



中国铁路通信信号股份有限公司  
China Railway Signal & Communication Co.,LTD.

**2020** 环境、社会及管治报告  
Environmental, Social And Governance Report

# 关于本报告

本报告是中国铁路通信信号股份有限公司发布的第八份社会责任报告暨环境、社会及管治报告，本着客观全面、规范透明的原则，详细阐述2020年度公司环境、社会及管治工作的管理理念、亮点实践及年度成效。本报告以中文及英文编订，如有差异，请以中文文本为准。

## 报告范围：

除特殊说明外，本报告涵盖中国铁路通信信号股份有限公司总部、分支机构及附属公司，与《中国铁路通信信号股份有限公司2020年年度报告》对外披露范围保持一致。

时间范围为2020年1月1日至2020年12月31日，部分内容超出此范围。

## 参考标准：

全球报告倡议组织《可持续发展报告标准 (GRI Standards) 》  
国务院国资委《关于中央企业履行社会责任的指导意见》  
中国社会科学院《中国企业社会责任报告指南(CASS-CSR4.0)》  
香港联合交易所主板上市规则附录二十七《环境、社会及管治报告指引》  
上海证券交易所《上市公司环境信息披露指引》

## 发布周期：

本报告为年度报告，于每年3-4月发布。

## 称谓说明：

为便于表达，本报告中提及的“中国通号”“公司”“我们”等均指代“中国铁路通信信号股份有限公司”。

## 数据说明：

本报告关键财务绩效来自《中国铁路通信信号股份有限公司2020年年度报告》，其他数据来自公司内部管理体系。

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# ABOUT THIS REPORT

This report is the eighth Environmental, Social and Governance Report of China Railway Signal & Communication Co., Ltd. Based on objective, comprehensive, regulative and transparent principles, this Report expounds management ideas, key practices and annual achievements for environmental, social and governance work of China Railway Signal & Communication Co., Ltd. in 2020. This Report is compiled in Chinese and English versions. Should there be any minor content difference, the Chinese version prevails.

## Scope of the Report:

Unless otherwise stated, this Report includes China Railway Signal & Communication Co., Ltd.'s headquarters, all its branches and subsidiaries, with the same scope of 2020 CRSC Annual Report.

The reporting period is from January 1, 2020 to December 31, 2020. Some contents are sourced from historical data.

## Reference Standards:

The Sustainability Reporting Guidelines issued by the Global Reporting Initiative (GRI)  
The Guidelines on Corporate Social Responsibility of State-owned Key Companies issued by State-owned Assets Supervision and Administration Commission (SASAC) of the State Council  
The Chinese Corporate Social Responsibility (CSR) Report Preparation Guide (CASS-CSR4.0) by the Chinese Academy of Social Sciences  
Appendix 27 Environmental, Social and Governance Reporting Guide of the Rules Governing the Listing of Securities on HKEX (Listing Rules)  
The Guidelines on Environmental Information Disclosure of Listed Companies issued by Shanghai Stock Exchange

## Reporting Cycle:

This is an annual report released in March or April.

## Reporting Specification:

For the convenience of expression, “China Railway Signal & Communication Co., Ltd.” may be expressed as “CRSC”, the “Company” and “we”.

## Data Specification:

All key financial performance data disclosed in this Report are collected from China Railway Signal & Communication Co., Ltd.'s 2020 Annual Report, and other data are mainly sourced from internal management systems of the Group.

## Reliability Guarantee:

The Board of Directors of China Railway Signal & Communication Co., Ltd. promises to supervise the contents of this Report and makes sure that it is free of false records, misleading statements or material omissions.

## Access to the Report:

This Report is provided in Chinese and English versions. You may browse or download the Report at the official website of CRSC (Investors Relations - Regular Reports) or at the website of Hong Kong Exchanges.



# 目录

## CONTENTS

董事长致辞 Chairman's Statement	6	关于我们 About Us	16	ESG指标索引 HKEX ESG Reporting Guide	116
2020中国通号十大要闻 CRSC's Top Ten Highlights in 2020	10	可持续发展管理 Sustainable Development Management	32	意见反馈 Feedback	120



### 创新驱动发展 38 Innovation Drives Development

### 服务创造价值 62 Service Creates Value

### 绿色驱动未来 76 Green Creates Bright Future

### 乐业汇聚英才 88 Good Environment for Talents

### 偕行共促发展 98 Cooperation Promotes Development

### 助力社会和谐 106 Facilitating Social Harmony

科技创新战略 40  
Technological innovation strategy

可靠产品与服务 64  
Reliable products and services

节约能源资源 78  
Saving energy resources

员工构成 90  
Employee mix

助力“一带一路” 100  
Empowering the BRI

助力脱贫攻坚 108  
Facilitating poverty alleviation

提升创新能力 42  
Enhancing innovation capabilities

推进数字化转型 69  
Promoting digital transformation

温室气体减排 80  
Reducing emissions of greenhouse gases

员工权益 92  
Employees' rights and interests

开展战略合作 102  
Engaging in strategic cooperation

抗击新冠疫情 112  
Fighting against COVID-19

创新成果转化 51  
Transformation of technological innovations

安全生产与应急管理 73  
Safe production and emergency management

减少“三废”排放 83  
Reducing emissions of “Three Wastes”

成长发展 93  
Growth and development

打造责任供应链 104  
Building responsible supply chain

开展志愿活动 114  
Conducting voluntary activities

推动行业进步 59  
Advancing industrial progress

提供绿色解决方案 86  
Providing green solutions

员工关爱 96  
Caring for employees

## 董事长致辞

### CHAIRMAN'S STATEMENT



刚刚过去的2020年是极为不平凡的一年。面对新冠肺炎疫情防控和企业改革发展双重任务、双重挑战，中国通号坚决贯彻落实党中央、国务院各项决策部署，坚定信心、迎难而上，统筹推进疫情防控、生产经营、改革发展等各项重点工作，企业高质量发展取得了新成效。

2020 was an unusual year for all of us. In face of the challenges posed by the COVID-19 pandemic and the need for corporate reform and development, CRSC implemented the decisions made by the CPC Central Committee and State Council resolutely, and embraced the challenges confidently to promote our key tasks in terms of COVID-19 control, production & operation, reform & development, marking a new milestone for CRSC's high-quality development.

#### 董事长: 周志亮

Chairman: Zhou Zhiliang

我们沉着应对困难挑战，经营业绩再创新高。面对新冠肺炎疫情给生产经营带来的严峻挑战，中国通号党委统筹谋划，各企业迅速行动，干部员工积极响应，有力有序推进疫情防控和复工复产，应对疫情常态化，在确保国内国外400余个项目、2万余名干部职工实现“零感染、零疑似、零确诊”的同时，实现新签合同额、利润总额、净资产正增长，净利润实现高位数增幅，完成“两个力争”目标任务。

Our business performance has reached a new high as we calmly dealt with challenges. In face of the grave challenge posed by COVID-19, all subsidiaries and staff of CRSC responded to the overall plans made by the CPC Committee of CRSC swiftly, making sure the pandemic was strictly under control as we returned to work. Not only did we ensure that there were “zero infection, zero suspected case and zero confirmed case” among our 20,000 staff working for over 400 domestic and overseas projects as the pandemic became a new norm, but we also achieved growth of newly signed contracts, gross profit and net assets. The net profit achieved a high growth as required by the “Two Pursuits” task.

我们坚定推进自主创新，核心技术攻关取得新进展。中国通号坚持“研发一代、应用一代、储备一代”，主动对接国家重大战略和未来科技发展趋势，推动关键核心技术攻关、加大前瞻性引领性技术研发投入，全年科技投入19.6亿元，开展科研项目825项。2020年，中国通号完成基于国产芯片的轨道电路、应答器产品研制并取得第三方安全认证；全套自主化列车运行控制系统装备在合安高铁开通应用。

Our key technical research has seen progress as we firmly insist on independent R&D. CRSC insists on the policy of “always have one generation under R&D, one generation applied, and one generation reserved”. We actively engage ourselves in national key strategies as well as the technological trends, and we aim to tackle down the difficulties of key technologies, and strengthen the investment in the R&D of insightful and leading technologies. A total of 1.96 billion yuan was invested in technological R&D with 825 research projects on the way all year round. In 2020, CRSC has completed the development of track circuit based on China-designed chips as well as a transponder product, which have been certified by a third party. A fully China-developed train operation and control system has been used along the Hefei-Anqing High-Speed Railway.

我们持续夯实质量安全，提升品牌竞争力。我们不断完善高铁测试案例库，推进地铁测试案例库共享，建立工业产品案例库，积累自动驾驶案例库，以案例库建设提升解决问题、保障安全的能力。2020年，全系统事故故障率同比下降25.8%，有力保障全国14.6万公里铁路，3.8万公里高铁安全稳定运行；全年安全优质开通合安、通沪、太焦、福平等高铁、普速铁路3,515公里，车站326个；开通城市轨道交通20条，391.9公里，其中自动驾驶线路127公里，稳居业内第一。

*Our brand competitiveness has been improved as we continue focusing on quality control. We continue to improve the high-speed rail test case base, share the base of subway test cases, establish a base of industry-wide product cases, and accumulate more auto-drive cases in their base, hoping to improve trouble-shooting and safety level with case base building. In 2020, system-wide failure rate dropped by 25.8% on a year-on-year basis, guaranteed the safety of over 146,000 km of railways and 38,000 km of high-speed railways all over the country. High-speed rail lines such as Hefei-Anqing, Shanghai-Suzhou-Nantong, Taiyuan-Jiaozuo, and Fuzhou-Pingtai; 3,515 km of general-speed railways, and 326 railway stations have come into service safely last year. Also, a total of 20 urban transit lines, stretching 391.9 km have come into service too, among which 127 km are of auto-drive line, ranking first all over the industry.*

我们响应“一带一路”倡议，高质量推进海外项目建设。中国通号持续完善亚太、南部非洲、北部非洲、欧洲及中东、美洲五大区域经营布局，为全球轨道交通事业贡献“中国方案”。2020年，中国通号成功签订磨万铁路万象-万象南段、泰国复线铁路华富里-北榄坡段、孟加拉帕德玛大桥铁路连接线、埃及斋月十日城等项目；有序推进欧洲匈塞铁路、印尼雅万高铁、泰国复线铁路等项目建设；成功助力巴基斯坦拉合尔橙线项目开通运营。

*Our overseas projects have been efficiently promoted as we respond to the “Belt and Road” Initiative. CRSC continues to improve its business in its five major regions, Asia Pacific, Southern Africa, Northern Africa, Europe and the Middle East, and the Americas, contributing “Chinese solutions” to global railway traffic. In 2020, CRSC has successfully undertaken projects such as the Vientiane- South Vientiane section of the Mohan-Vientiane Railway, the Lopburi-Pak Lampa section of the double-track railway in Thailand, the Padma Bridge connection line in Bangladesh, and the 10th Ramadan Project in Egypt; the construction of the Hungary-Serbia Railway in Europe, Jakarta-Bandung High-speed Railway in Indonesia, and double-track railway project in Thailand have been continuously promoted; and assisted the operation of the Orange Line in Lahore, Pakistan.*

我们践行可持续发展承诺，积极履行企业社会责任。中国通号坚持源头把关和过程控制并重的原则，将节能环保意识融入设计研发、生产制造与工程建设全流程，努力提升能源效益、降低“三废”及温室气体排放。同时，中国通号深入探索城市绿色解决方案，为建设美丽中国做出应有贡献。在社会公益方面，中国通号积极承担定点扶贫任务，开展产业、消费、教育、健康、民生、党建六大帮扶举措，助力社旗县顺利实现脱贫摘帽。在湖北省疫情严峻时期，以集团公司名义捐款3,000万元助力抗击新冠疫情。

*Our role as a socially responsible enterprise has been fulfilled as we honor our commitment to develop sustainably. CRSC adheres to the principle of equal emphasis on both source and process control, and integrates the awareness of energy-saving and environmental protection into the entire process of design, R&D, manufacturing and engineering, improving energy efficiency and reducing the emissions of the “three wastes” and greenhouse gases. At the same time, CRSC is making contributions to a greener China by exploring urban green solutions. As a socially responsible enterprise, CRSC actively undertakes poverty alleviation tasks targeting at fixed locations, launching six major measures in industry, consumption, education, health, livelihood, and CPC building, and helped Sheqi County overcome poverty. CRSC has made a donation worth of 30 million yuan in the name of CRSC Group to the COVID-19 control efforts in Hubei when the pandemic was still rampant.*

2021年，是实施“十四五”规划、开启全面建设社会主义现代化国家新征程的第一年。中国通号将继续坚持稳中求进工作总基调，以推动高质量发展为主题，以深化供给侧结构性改革为主线，以改革创新为根本动力，以满足人民日益增长的美好生活需要为根本目的，更好统筹发展和安全，扎实推进科技创新、深化改革、质量安全、产业升级、风险化解、党的建设各项任务，坚定不移做强做优做大中国通号，以持续健康的经营业绩回报股东、以高质量的项目服务客户，以更负责的姿态携手利益相关方，共同推进经济、社会、环境的可持续发展。

*2021 is the first year of the “14th Five-Year Plan”, and the beginning of a new journey to our goal of comprehensively building a socialist modernized country. CRSC will continue to ensure all works to advance in an increasing but steady manner. Our theme is high-quality development, our main job is deepening the supply-side structural reform, our fundamental motivation is reform and innovation, and our purpose is to meet the needs of people’s demand for a better life. We will make plans and ensure safety, and complete all sorts of key tasks including technological innovation, reform deepening, quality control, industry upgrade, risk settling and CPC building. We will firmly insist on developing CRSC into a better and more powerful enterprise, and provide continuous and sustainable returns to shareholders, high-quality project services to clients, and join hands with stakeholders with a stronger sense of responsibility to promote the sustainable development of our economy, society and environment.*



## 2020 中国通号十大要闻

### CRSC'S TOP TEN HIGHLIGHTS IN 2020

**疫情防控阻击战成果持续巩固**  
CRSC constantly consolidated its achievements in the fight against COVID-19.



**党建引领作用成果显著**  
CRSC's Party building played a significant leading role.

2020年，中国通号坚决贯彻落实习近平总书记关于统筹推进疫情防控和社会经济发展的重要讲话和指示批示精神，第一时间向湖北捐款3,000万元，公司党委以对职工群众生命安全和身体健康高度负责的态度，投入疫情防控专项资金2,000余万元，有力有效应对近在咫尺的新发地疫情，扎实推进疫情防控常态化，国内国外400余个项目、2万余名干部职工实现“零感染、零疑似、零确诊”。

In 2020, CRSC insisted on implementing President Xi Jinping's important speech and instructions on promoting epidemic prevention and social and economic development, and donated 30 million RMB to Hubei in the first time. CRSC Party Committee invested over 20 million RMB to a dedicated fund for epidemic prevention and control so as to safeguard the staff's safety and health in a high responsible manner, effectively fighting the Xinfadi Market epidemic right under its nose, and steadily advancing the normalized epidemic prevention and control. CRSC achieved "zero infection, zero suspected case and zero confirmed case" among over 400 domestic and overseas projects and more than 20,000 staff.

2020年，中国通号以“中央企业党建巩固深化年”专项行动为抓手，坚持党建与生产经营深度融合。领导班子成员深入12家联系点企业开展十九届五中全会精神宣讲，建成中国通号“三重一大”决策和运行监管系统，并推动全级次58家法人企业全覆盖，全系统空白班组、软弱涣散党组织“双清零”，一个党支部获评中央企业基层示范党支部，广泛设置党员先锋岗、划分党员责任区、组建党员突击队，党员示范引领作用在各岗位得到有力彰显。

In 2020, driven by the dedicated action of "the Year of Consolidating and Deepening Party Building of Central Enterprises", CRSC insisted on in-depth integration of party building, production and business operation. CRSC leaders went to convey the spirit of the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China in 12 subsidiaries, set up the "Three Importance and One Greatness" decision-making, operating and supervising system of CRSC, covered all 58 incorporated enterprises and achieved "dual elimination" of idle shifts and weak and lax Party organizations in the entire system. Furthermore, one of CRSC's Party branches was hailed as a basic demonstrative Party branch of state-owned enterprises. By vigorously setting up Party member pioneer posts, dividing areas of responsibility for Party members and organizing Party member commandoes, CRSC's Party members fully exhibited their leading roles at their respective posts.

**“两个力争”攻坚战彰显央企担当**  
CRSC's "Two Pursuits" demonstrated state-owned enterprises' sense of responsibility.

全系统坚决贯彻落实习近平总书记关于复工复产的重要讲话和指示批示精神，落实国资委党委“两个力争”工作要求，迎难而上挖潜力，千方百计稳增长，全年主营业务合同额稳中有升，营业收入与去年基本持平。股份实现净利润42.39亿元，同比增长1.49%，经营现金净流入达到30亿元。

CRSC resolutely implemented the spirit of President Xi Jinping's important speech and instructions on resumption of work and production, fulfilled the SASAC Party Committee's working requirements for "Two Pursuits", grasped the nettle, tapped the potentials and tried every means to stabilize the growth. For the whole year of 2020, CRSC's main business contract amounts went up steadily and its operating income was basically flat compared to that of last year. It earned a net profit of 4.239 billion RMB, with a year-on-year growth of 1.49%, and its net operating cash flow reached 3 billion RMB.

**深化改革攻坚战全面推向深入**  
CRSC deepened the reform in an all-round way.

全系统坚决贯彻落实习近平总书记关于全面深化改革的重要讲话和指示批示精神，两家“双百”企业、两家“科改示范”企业深化改革提速见效，科技型企业科研激励措施加快落地，子企业经理层任期制和契约化管理全面推行，获得国资委“双百企业”三项制度改革专项评估A级评价；中国通号启动对标世界一流管理提升工作，动员部署中国通号对标提升行动，明确目标任务，精准开展对标提升，系统推动管理改革，确保全系统管理体系和管理能力全面提升取得扎实成效。

CRSC was determined to implement the spirit of President Xi Jinping's important speech and instructions on deepening the reform in an all-round way. The efforts in deepening the reform of two enterprises under "Double-Hundred Action" and two enterprises under "Science Reform Demonstration Action" have sped up and yielded results, and the incentive measures for hi-tech enterprises were being developed and launched. The manager tenure and contract management system in subsidiaries was fully carried out, earning Grade A in the special assessment of three institutional reforms of enterprises under "Double-Hundred Action" by the SASAC; In order to align its contract management with world-class management level, CSRC mobilized and deployed targeted enhancement action by specifying goals and tasks. Through accurate targeted enhancement and systematic implementation of management reforms, CRSC ensured that its system-wide management system and management capacities were steadily reinforced.

**科技创新持续取得重要突破**  
CRSC made consistent breakthroughs  
in S&T innovations.

2020年,中国通号自主研发“一种轨道电路”专利获北京市发明专利特等奖;发明专利“列车运行控制方法、装置、车载设备及列控系统”获中国专利银奖表彰;国家铁路局认证的首批铁路行业科技创新基地“列车自主运行智能控制铁路行业工程研究中心”落户中国通号;企业重大科技专项——《轨道交通电磁环境效应研究与测试平台建设》项目启动;装备中国通号自主研发FAO系统达到国际最高自动化等级GOA4级的全自动运行天津试验线顺利通过专家组评估;发布自主研发列车自主运行系统(简称“TACS”)——“启骥™(TRANAVI Qiji)”,填补业内商用TACS系统空白;自主研发400T车载产品通过欧盟基线3TSI认证后,中国通号列控系统各产品全部通过欧盟基线3TSI认证,为支撑中国高端列控装备以CTCS标准或ETCS标准“走出去”奠定了坚实基础。

In 2020, CRSC independently developed “a track circuit” patent, which won the Grand Prize of Beijing Municipal Invention Patent; its patent “Train Operation Control Method, Device, On-board Equipment and Train Control System” was awarded a Silver Prize of Chinese Patent; moreover, “Engineering Research Center of Automated Train Operation in the Intelligent Railway Control Industry”, one of the first batch of railway industry science and technology innovation base certified by National Railway Administration of the People's Republic of China, settled down in CRSC; a key technology project Electromagnetic Environment Effects of Rail Transportation and Testing Platform Construction was initiated; the fully automated Tianjin test line equipped with CRSC's independently developed FAO system that has achieved the highest international automation level GOA4 smoothly passed the assessment of the panel; TRANAVI Qiji™, the independently developed Train Automated Control System (“TACS”) was released, bridged the gap of commercial TACS system; after our independently developed 400T on-board products was certified by ETCS 3TSI, all train control systems of CRSC have fully passed the certification of ETCS 3TSI, laying a solid foundation for supporting Chinese high-class train control devices to go globally at CTCS or ETCS standards.



**安全质量保卫战成效持续巩固**  
CRSC tasted riper fruits in safety and  
quality assurance.

全系统坚决贯彻落实习近平总书记关于安全生产的重要讲话和指示批示精神,守住底线、红线,开展安全质量专项巡视,全年事故故障率同比下降25.8%,有力保障全国14.6万公里铁路,3.8万公里高铁安全稳定运行。全年安全优质开通合安、通沪、太焦、福平等高铁、普速铁路3,515公里,车站326个。开通城市轨道交通20条,391.9公里,其中自动驾驶线路127公里,稳居业内第一。

By resolutely carrying out the spirit of President Xi Jinping's important speech and instructions on safe production, CRSC held the bottom line and red line, and conducted special inspection tour on safety and quality. For the whole year of 2020, its accident failure rate experienced a year-on-year decline of 25.8%, effectively safeguarding the safe and stable operation of 146,000 km ordinary railway and 38,000 km high-speed railway across China. A total of 3,515 km safe and premium high-speed and ordinary railway was put into operation, such as Hefei-Anqing High-speed Railway, Shanghai-Suzhou-Nantong Railway, Taiyuan-Jiaozuo Railway and Fuzhou-Pingtan Railway, covering 326 stations. Not only that, 20 urban rails were also opened, with a total length of 391.9 km, including 127 km autopilot line, ranking Top 1 in the rail industry.

**25.8%**

全年事故故障率同比下降

The accident failure rate  
experienced a year-on-year  
decline of 25.8%

**定点扶贫攻坚战取得圆满成功**  
CRSC scored a great victory in the  
targeted fight against poverty.

2020年,中国通号全系统坚决贯彻落实习近平总书记关于决战决胜脱贫攻坚的重要讲话和指示批示精神,落实精准扶贫政策,加大定点帮扶力度,助力河南省社旗县顺利实现脱贫摘帽,位列河南省南阳市脱贫成效考核第一名。自2003年定点帮扶社旗县以来,中国通号党委多措并举打好脱贫攻坚“组合拳”,为社旗县脱贫摘帽和贫困群众脱贫致富贡献了通号力量。

In 2020, in order to resolutely implement the spirit of President Xi Jinping's important speech and instructions on gaining a decisive victory against poverty, CRSC carried out targeted poverty alleviation policies, offered greater targeted support, and helped Sheqi County of Henan Province to smoothly get rid of poverty, ranking No. 1 among the poverty alleviation achievement assessment in Nanyang City, Henan Province. Since it began to offered targeted support for Sheqi County in 2003, CRSC Party Committee took multiple measures simultaneously against poverty, contributing its power to facilitating Sheqi County to get rid of poverty and helping poverty-stricken grassroots shake off poverty and become prosperous.



### 选先树模工作成果显著

CRSC enjoyed a bumper harvest in model setting.

2020年11月,中国通号基层员工、高级技师柯晓宾荣获“全国劳动模范”光荣称号;中国通号扶贫干部曾华杰荣获“全国脱贫攻坚先进个人”荣誉称号;中国通号员工李敏辉获“中央企业抗击新冠疫情‘先进个人’”荣誉称号;11月,中国通号旗下通号工程局集团喜获“全国文明单位”荣誉称号;12月,中国通号旗下研究设计院集团、北京工业集团双双入选国家工业和信息化部、中国工业经济联合会在全国范围内评选出90家“制造业单项冠军”企业;中国通号6名科研技术人员荣获“2019年度‘茅以升铁道工程师奖’”。

In November 2020, CRSC's grassroots staff and senior technician Ke Xiaobin won the honorary title of "National Model Worker"; Our poverty alleviation cadre Zeng Huajia was awarded the title of "National Advanced Individual for Poverty Alleviation"; CRSC's staff Li Minhui was praised as "State-owned Enterprises Advanced Individual against COVID-19"; in November, CRSC Engineering Group Company Ltd. was rated as "National Civilized Unit"; in December, both CRSC Research & Design Institute Group Co., Ltd. and CRSC (Beijing) Industry Group Co., Ltd. were listed as two of the 90 enterprises of "Individual Manufacturing Champion" chosen by Ministry of Industry and Information Technology of the People's Republic of China and China Federation of Industrial Economics; 6 scientific researchers of CRSC won "2019 Mao Yisheng Railway Engineer Award".

### 持续深化企业社会责任履责

CRSC proceeded with its fulfillment of corporate social responsibilities.

2020年初,中国通号自主研发的红外体温筛查系统投入使用,并对火车站、机场、丰台园区部分企业、地域实施捐赠,为打赢疫情防控阻击战贡献通号智慧与力量;中国通号党委书记、董事长周志亮应邀出席国务院国资委主办的中央企业社会责任报告集中发布会议,并围绕“严守质量安全底线红线,保障人民生命安全”“以技术和效率保障人民出行便捷”“以掌握核心技术助力中国高铁技术和标准走出去”等方面做主题分享,交流企业履行社会责任情况,共享央企发展新成果,描绘回报社会新画卷。

In early 2020, infrared body temperature screening system independently developed by CRSC was put into use, which were donated to railway stations, airports, some enterprises in Fengtai Science Park and other regions, contributing its wisdom and power to the epidemic prevention and control; CRSC Party Secretary and Chairman Zhou Zhiliang was invited to attend the Joint Release Conference of CSR for State-owned Enterprises hosted by SASAC, and exchanged their performance of CSR by centering on topics like "securing bottom and red lines of safety and quality and protecting the life safety of people", "facilitating convenient travel fueled by technologies and efficiency" and "mastering core technologies to help China's high-speed railway technologies and standards go globally", thus sharing the new development results of state-owned enterprises and depicting the new scroll of paying back to the society.

### 企业对外形象展示持续取得新突破

CRSC enhanced its corporate image and expanded its visibility.

2020年3月,由中央电视台制作的十集纪录片《百年京张“升级路”》在央视科教频道(CCTV10)“创新进行时”栏目播出。节目七集走进中国通号高铁列车运行控制系统实验室、装备制造基地和京张高铁建设现场,采访中国通号技术专家和现场技术人员,向社会公众全面展示中国高铁智能技术的发展,展示中国通号以自主创新助力智能铁路建设的央企担当;11月,在第三届中国国际进口博览会上,中国通号交易分团采购签约活动取得圆满成功,参展成果再创新突破,签约项目量、质均全面超过前两届。中国通号持续扩大与国外优秀企业的合作领域与合作规模,推动自主列控技术服务全球轨道交通建设,提升中国通号品牌价值,放大、扩大进博会溢出效应。

In March 2020, the ten-episode documentary Upgrading of Century-old Beijing-Zhangjiakou Railway filmed by CCTV was broadcasted on "Innovations in Progress" of CCTV Science and Education Channel (CCTV10). In the first seven episodes, at CRSC High-speed Railway Operation Control System Laboratory, Equipment Manufacturing Base and Beijing-Zhangjiakou Railway Construction Site, they interviewed CRSC's technical experts and field technicians to present China's intelligent high-speed railway technology developments to the world and display CRSC's contribution to the construction of intelligent railways with its independent innovations; In November, at the Third China International Import Expo, CRSC Delegation Purchase and Contracting Activity made a great success, and the participating results created a record high, which outperformed the previous sessions in terms of quantity and quality of contracted projects. CRSC continued to expand its cooperation field and cooperation size with overseas outstanding enterprises, drove the development of automated train control technologies and served the global rail transportation construction, enhancing CRSC's brand value and enlarging CIIE's spillover effect.





## 关于我们 ABOUT US

### 2020年度关键绩效 Performance and Achievements

#### 营业收入 Revenue

401.24 亿元人民币  
40.124 billion RMB

同比下降 3.65%  
with a year-on-year decline of

#### 资产总额 Total Assets

1,053.28 亿元人民币  
105.328 billion RMB

同比增长 8.01%  
with a year-on-year growth of

#### 净利润 Net profit

42.39 亿元人民币  
4.239 billion RMB

同比增长 1.49%  
with a year-on-year growth of

#### 全年实现新签合同额 Overall new contract amount in the year

714.5 亿元人民币  
7.145 billion RMB

同比增长 1.2%  
with a year-on-year growth of

#### 截至2020年末 As of the end of 2020,

公司在高速铁路控制系统核心产品  
及服务所覆盖的总中标里程居世界

### 第一。

CRSC ranks **No. 1** in total  
winning mileage among all core  
products and services of high-speed  
rail control systems across the globe.

## 公司简介 Company Profile

中国通号是以轨道交通控制技术为特色的高科技产业服务商，是中国轨道交通控制系统行业的领导者、全球领先的轨道交通控制系统提供商。公司拥有集轨道交通控制系统设计研发、设备制造及工程服务于一体的完整产业链，是中国轨道交通控制系统设备制式、技术标准及产品标准的归口单位，是唯一获国家铁路局授权的铁路控制系统和通信信号产品的标准化技术审核单位。

2015年8月7日，公司成功登陆香港联合交易所。2019年7月22日，公司在上海证券交易所科创板上市，成为登陆科创板的首家大型央企和A+H股的科创板上市公司（股票代码：688009.SH, 03969.HK）。

China Railway Signal & Communication Corporation Co., Ltd. (hereinafter referred to as CRSC) is a hi-tech service provider featured by railway signal and communication technology, the leader in China rail transit control industry, and an internationally leading rail transit system provider. We provide specialized one-stop solution of design and integration, equipment manufacturing and system implementation services for rail transportation control systems to our clients, and serve as the responsible department of rail transit control system equipment modes, technology standards and product standards in the PRC, as well as the only authorized reviewer of rail control systems and communication signal product standards by National Railway Administration of the People's Republic of China.

On August 7, 2015, CRSC was successfully listed on HKEX. On July 22, 2019, CRSC was listed on STAR Market of Shanghai Stock Exchange (SSE), and became the first state-owned enterprise and the first A+H company on SSE STAR Market (stock code: 688009.SH, 03969.HK).







## 企业文化与精神

### Corporate Culture and Spirit

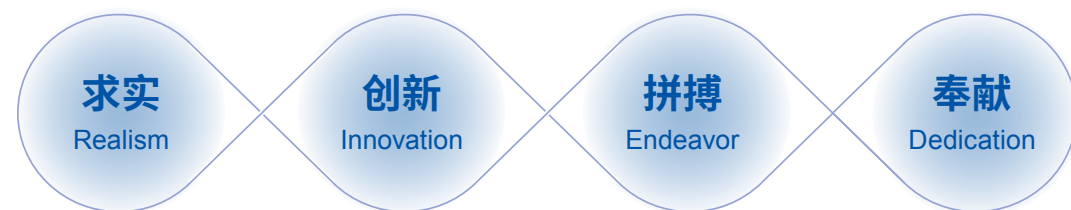
#### 使命 Mission

- 发展轨道交通民族产业
  - 以安全适用的轨道交通控制系统技术服务于国内外用户
  - 持续实现价值创造
- |  |   |                                   |
|--|---|-----------------------------------|
| Develop National Industry of Rail Transportation | Provide Domestic and Foreign Users with Safe and Suitable Control System Technologies for Rail Transportation | Achieve Continuous Value Creation |
|--|---|-----------------------------------|

#### 愿景 Vision

- 全球轨道交通控制技术的领导者
  - 轨道交通控制技术为特色的世界一流跨国产业集团
  - 世界知名企业的领导者
- |   |   |                         |
|---|---|-------------------------|
| Global Leader in Rail Transportation Control Technology | World-Class Multinational Industrial Group Featuring Rail Transportation Control Technology | World-Famous Enterprise |
|---|---|-------------------------|

#### 企业精神 Corporate Spirit



作风严谨，尊重科学，遵章守纪，追求实绩。

Rigorous attitude and scientific spirit

Compliance with regulation  
Openness and cooperation

开放合作，勇于攀登，精益求精，追求卓越。

Pursuit of results

Strive for perfection

泰而不骄，败而不馁，敢打硬仗，无私无畏。

Courage and efforts

Poised but not arrogant

恪尽职守，勇于担当，励精图治，产业报国。

Aspire for excellence

Selfless and fearless

Failed but not discouraged

Ambitious and serve the country

Devoted and responsible

country

#### 核心价值观 Core Values



#### 人是公司发展最大的资本。

CRSC advocates people-first approach.

公司视人为企业的第一资源，坚持以人为本、共同发展的准则。公司善待员工，切实维护员工的根本利益；公司以客户为中心，始于客户需求，终于客户满意；公司尊重合作伙伴，互惠互利，合作共赢。

Talent is the biggest capital for a company's development. Our company regards people's talents as its major resources, upholding a "people-oriented" principle and seeking common development. The company treats employees well by protecting their fundamental interests. We are also customer-centered by making every effort to fulfill their needs and to grant them satisfaction. Moreover, we respect our cooperative partners, adhering to win-win cooperation and mutual benefits.

#### 自主创新是公司发展的不竭动力。

Independent innovation is the momentum for CRSC's development.

公司坚持技术创新，致力于民族产业的技术进步；公司坚持管理创新和技术创新双轮驱动，助力企业不断做强做优做大。

We stick to technological innovation and endeavor to promote technological progress of national industries. We also continually encourage our management innovation to strive to be stronger and better.

#### 质量安全是公司发展的基石。

Quality and safety are the cornerstones for CRSC's development.

为客户提供安全、稳定、可靠的技术和产品，进而确保轨道交通运输安全，保障人民的生命财产安全是公司最重要的政治责任、经济责任和社会责任。“质量是生命，安全大于天”始终是我们的核心价值追求。

The most important political, economic and social responsibility for us is to provide safe, stable and reliable technologies and products for our customers, which in turn can ensure the safety of rail transportation and the security of people's lives and properties. "Quality is Life, Safety Is Paramount" is our core value proposition.

#### 创造价值是公司的矢志追求。

Value creation is the eternal pursuit of CRSC.

公司在经济社会发展中担负着重要的政治责任、经济责任和社会责任。价值创造不仅表现在经济效益提高，经营风险降低，发展潜力增强，更表现为政治和社会责任的有效履行，与股东、客户、社会共同创造和分享价值。

Our company shoulders great political, economic and social responsibility in the country's social and economic development. Creating values is not only represented by increasing economic benefits, reducing operation risks, and enhancing development potential, but also by fulfilling responsibilities. Creating values also means to jointly create and share values with shareholders, customers and society.

## 公司治理

### Corporate Governance

## 治理架构 Governance Framework

中国通号严格遵守《中华人民共和国公司法》《中华人民共和国证券法》《上市公司治理准则》等相关法律法规，构建了以“三会一层”为代表的现代公司治理架构，明确具体职责，制定科学有效的议事规则和工作程序，确保公司运行规范、运转协调。

According to the requirements of the Rules and Guidance on Listing Matters, the Company Law of the People's Republic of China, the Securities Law of the People's Republic of China and other laws and regulations, CRSC set up modern corporate governance architecture represented by Three Committees and Boards and One Layer, specified relevant responsibilities, and formulated scientific and efficient rules of procedure and working processes to ensure legitimate and coordinated corporate operations.

### 董事会

#### Board of Directors



**周志亮**  
党委书记、董事长、执行董事  
Zhou Zhiliang  
Secretary of CPC, Chairman,  
Executive Director



**徐宗祥**  
党委副书记、总裁、执行董事  
Xu Zongxiang  
Deputy Secretary of CPC,  
President, Executive  
Director



**杨永胜**  
党委副书记、执行董事  
Yang Yongsheng  
Deputy Secretary of CPC,  
Executive Director



**王嘉杰**  
独立非执行董事  
Wang Jiajie  
Independent Non-  
Executive Director



**陈津恩**  
独立非执行董事  
Chen Jin'en  
Independent Non-  
Executive Director



**陈嘉强**  
独立非执行董事  
Chen Jiaqiang  
Independent Non-  
Executive Director



**姚桂清**  
独立非执行董事  
Yao Guiqing  
Independent Non-  
Executive Director

### 高管团队

#### Top Management Team



**胡少峰**  
党委常委、总会计师  
Hu Shaofeng  
Party Committee Member,  
Chief Accountant



**赵晓东**  
党委常委、副总裁  
Zhao Xiaodong  
Party Committee Member,  
Vice President



**姚希春**  
党委常委、纪委书记  
Yao Xichun  
Party Committee Member,  
Secretary of Commission for  
Discipline Inspection



**黄卫中**  
党委常委、  
副总裁  
Huang Weizhong  
Party Committee  
Member, Vice  
President



**张志辉**  
党委常委、  
副总裁、  
总工程师  
Zhang Zhihui  
Party Committee  
Member, Vice President,  
Chief Engineer



**邱巍**  
董事会秘书  
Qiu Wei  
Secretary of  
the Board of  
Directors

### 监事会

#### Board of Supervisors



**孔宁**  
监事会主席  
Kong Ning  
Chairman of the Board of  
Supervisors



**李铁南**  
股东代表监事  
Li Tienan  
Shareholder Supervisor



**陈世奎**  
职工代表监事  
Chen Shikui  
Shareholder Supervisor



## 组织架构

### Governance Framework



## 合规运营

### Compliant Operations

中国通号坚持“全面覆盖、全员参与、全业务融合、全面协同监督”的合规管理原则，建立“事前有标准、事中有监控、事后有评价、事件有追责、持续有改善”的合规风险管控机制。2020年先后修订《中国铁路通信信号股份有限公司管控权力清单》《中国铁路通信信号股份有限公司合规性评价管理办法》等多项合规管理制度，针对重点业务和重点环节发布《中国通号劳动用工合规指引》等专项合规指引文件，健全了股份公司合规管理体系。根据合规管理工作的需要，中国通号及时调整了法治合规建设领导机构。在各项合规管理具体工作中，充分发挥部门合规联络员的作用，提升合规工作效率。建立法律合规骨干人才库，有效整合全系统法律合规人才资源，为全面深入开展合规工作做好专业力量的保证。

Upholding the compliance management principles of “Full Coverage, Full Participation, Full Business Integration and Comprehensive and Coordinated Supervision”, CRSC established the compliant risk control mechanisms of “predesigned standards and sufficient and continuous supervision, assessment, accountability and enhancement”. In 2020, CRSC successively revised the List of Regulated Power of China Railway Signal & Communication Co., LTD., Administrative Measures on Compliance Assessment of China Railway Signal & Communication Co., LTD. and other compliance management systems. For key businesses and key links, CRSC Labor Compliance Guidelines and other dedicated compliance guidance documents were released, improving CRSC's compliance management systems. In accordance with the needs of compliance management, CRSC adjusted the governance institutions of legal compliance construction in a timely manner. In the process of performing various compliance management work, compliance officers of relevant departments enhanced the efficiency of compliance work. CRSC set up a high-level compliance talent pool and effectively integrated legal compliance talent resources, providing professional workforce guarantee for comprehensive and in-depth implementation of compliance work.

#### 合规管理原则

The compliance management principles



## 风险防控

### Risk Prevention and Control

中国通号持续建设完善全面风险防控管理体系，将风险管控制度化，建立基本制度与专项制度相结合的层级有序、重点明确、标准明晰的风险防控管理制度体系。并通过开展定期和专项的风险排查，全面防范化解重大风险。

CRSC continued to improve its risk control management system by systemizing risk control, establishing a structured risk control and management system with clear priorities and standards that combines basic and dedicated mechanisms and conducting regular and special risk identification work, thus preventing, controlling and eliminating major risks in a comprehensive manner.

2020年，公司修订《中国铁路通信信号股份有限公司全面风险管理与内部控制手册》，与公司业务经营情况、机构设置保持一致，明确了72项关键业务管控流程、237个关键业务控制点和230个业务风险点，发挥手册实际管控指导作用。制定并发布了《中国铁路通信信号股份有限公司重大经营风险事件报告管理办法》，确定对重大经营风险事件“全面预警、及时报告、快速反应和全过程动态管理”的管理原则。

In 2020, CRSC revised Comprehensive Risk Control and Internal Control Manual for China Railway Signal & Communication Co., LTD. to align with its business operations and institutional settings, specified 72 key business control processes, 237 key business control nodes and 230 business risks, giving full play to the control and guidance effects of the Manual in real life. CRSC also formulated and released Administrative Measures on Reporting of Major Business Risk Events for China Railway Signal & Communication Co., LTD. to specify the management principles for major business risk events, namely, “comprehensive warning, immediate reporting, quick response and full-process dynamic management”.

中国通号建立重大风险季度跟踪监测常态化工作机制，根据各企业年度重大风险台账，将年度重大风险应对措施进展、对新增风险及风险事件处理情况纳入监测范围，按季度对企业重大风险管控及变化情况进行跟踪和更新。通过对重大风险的跟踪监测，中国通号健全和完善上下贯通、全面覆盖的内控工作体系。

CRSC established quarterly normalized tracking and monitoring mechanisms for major risks, incorporated the progress of countermeasures and the disposal of new risks and risk events into the monitoring scope based on its annual major risk ledger, and tracked and updated major risk control and relevant changes on a quarterly basis. By tracking and monitoring major risks, CRSC improved its internal control system for full communication and wide coverage.

为增强防范化解重大风险能力，构建一体化风险管理体系，中国通号设立风险控制中心，在北京设立中国铁路通信信号股份有限公司风险控制中心，在上海、西安、长沙三地分别下设分中心。

In order to enhance its ability of preventing, controlling and eliminating major risks and construct an integrated risk management system, CRSC set up the Risk Control Center of China Railway Signal & Communication Co., LTD. in Beijing and three subcenters in Shanghai, Xi'an and Changsha, respectively.



## 党建工作

### Party Building

中国通号以“中央企业党建巩固深化年”专项行动为抓手，面对新冠肺炎疫情防控和企业改革发展双重任务、双重挑战，强化党建引领，充分发挥党组织的领导核心和政治核心作用，加快推动党建工作提质增效升级，为企业改革发展提供了坚强有力的政治保证。

On the occasion of “the Year of Consolidating and Deepening Party Building of Central Enterprises”, challenged by the prevention and control of COVID-19 and corporate reforms, CRSC strengthened the party building, gave full play to the leading and political roles of Party organization, and sped up the quality and efficiency of party building work, providing powerful political guarantee for its reforms and developments.

#### 学习贯彻党的十九届五中全会精神

Studying and implementing the spirit of the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China

中国通号党委第一时间召开党委理论学习中心组（扩大）学习，专题学习党的十九届五中全会精神，并印发学习宣贯工作计划，做好部署落实。全年，公司全部8名领导班子成员深入所属12家企业开展十九届五中全会精神宣讲，号召各级党组织把思想和行动高度统一到以习近平同志为核心的党中央决策部署上来，科学把握新发展阶段，深入贯彻新发展理念，促进构建新发展格局，着力抓好深化改革、科技创新和党的建设等各项工作。

The Party Committee of CRSC convened a theoretical learning group to study the spirit of the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China in the first time, distributed and publicized relevant working plans for deployments and implementations. In 2020, all 8 leaders of CRSC went to 12 subsidiaries to publicize the spirit of the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China, and summoned Party organizations at all levels to level up their ideology and behavior to uniform height in accordance with the decisions and deployments of the Party Central Committee led by President Xi Jinping. CRSC grasped the new development stages in a scientific manner, deepened the implementation of new development ideas, promoted the construction of new development patterns, and made great efforts to advance reforms, scientific innovations, party building and other work.

#### 提升基层党建工作质量

Enhancing the quality of basic-level party building work

为进一步提升各级党组织的组织力，中国通号健全组织体系，完善党建制度，推动党建责任制考核，加强党支部建设指导，推动全面从严治党。党务工作层面，敦促二级企业党组织换届选举；加强科技、生产、工程一线基层党组织建设；摸排软弱涣散基层党组织，并推进整改；开展“三基”队伍建设、加强党员教育、做好党员发展、党费管理等工作，全面贯彻落实新时代党的建设总要求。

In order to further enhance the organization of Party organizations at all levels, CRSC perfected its organizational system and party building system, promoted the appraisal of party building accountability system, strengthened the guidance on the construction of Party branches, advanced strict ruling over the Party. In terms of Party affairs, CRSC urged the general election of Party organizations at secondary enterprises, enhanced the construction of frontline S&T, production and engineering Party organizations, found out weak and slack basic-level Party organizations and implemented rectifications. CRSC also engaged in the construction of “Three Basics”, increased the education on Party members, and managed the Party membership dues, urged the developments of Party members, and fully implemented the general requirements of party building in the new era.

#### 开展党建责任制考核

Appraising party building accountability system

为推动各企业党建工作责任制落实，中国通号党委成立考核评价工作领导小组，制定考核工作方案，明确考核细则，规范考核流程，对各二级企业党建工作责任制落实情况推进情况进行检查考核，推动全面从严治党向基层延伸。

In order to push forward the implementation of party building accountability system, Party committee of CRSC established an appraisal and assessment work leading group to develop appraisal schemes, specify appraisal rules, standardize appraisal procedures, check the implementation of party building accountability system at secondary enterprises, and advanced strict ruling over the Party to the grassroots.

## 反腐倡廉

### Anti-corruption and Integrity Advocation

公司深入开展反腐倡廉建设，制定《职工违纪违规处理规定》《领导干部廉政档案管理办法（试行）》《对领导干部进行提醒、函询和诫勉的实施细则》《关于落实党风廉政建设监督责任的意见》等管理办法，构建从管理人员到一线员工的全方位、立体化反腐败管理体系，通过不断执行、审查和提升，优化反腐败、反贿赂体系的有效性。2020年，公司未发生腐败相关诉讼事件，未发生舞弊诉讼案件，人均反腐败培训5.9小时。

CRSC deepened the construction of combating corruption and building a clean government, formulated the Measures on Dealing with Employees' Violations of Disciplines and Regulations, Administrative Measures on Integrity Files of Leading Cadres (trial edition), the Implementing Rules for Reminders, Inquiry, Admonition and Encouragement of Leading Cadres, the Opinions on the Implementation of Supervisory Responsibilities for Construction of Party Style and Clean Government and other administrative measures, constructed all-round three-dimensional anti-corruption management systems from management to frontline employees, and optimized the effectiveness of anti-corruption and anti-bribery systems through constant implementation, review and enhancement. In 2020, no corruption-related and fraud-related lawsuits occurred in CRSC, and each employee averagely received 5.9 hours of anti-corruption trainings.

## 中国通号贪污防范措施

### CRSC Corruption Prevention Measures

#### 健全“三不腐”体制机制

##### Perfecting the mechanism of “No Dare, No Access and No Desire” system

开展执纪审查，落实“三个区分开来”，贯通运用监督执纪“四种形态”，推动咬耳扯袖、红脸出汗成为常态。

Carry out discipline review, implement “Three Distinguishments” and “Four Forms” of supervision and discipline, and push forward the normalization of supervision measures like ear biting, sleeve pulling, red face and sweating.

及时制定、修订党风廉政建设制度，持续扎牢制度“笼子”；深化以案促改，注重发挥纪律检查建议书“利器”作用，督促落实主体责任、堵塞管理漏洞。

Formulate and revise the party style and incorrupt government construction system in a timely manner, constantly tighten the system “cage”; deepen the rectifications through cases, give play to the roles of discipline inspection proposal as “a sharp weapon”, implement its main responsibilities and plug up the loopholes in management rules.

坚持在全系统召开警示教育大会，用身边事教育身边人；推进廉洁文化建设，开展党风廉政建设教育月活动，利用公司官网、智慧党建等渠道及时发布反腐倡廉信息，营造风清气正企业发展环境。

Insist on convening warning education meetings, and educate employees with their own stories; advance the construction of incorruptible culture, organize the education month activity of Party style and incorrupt government construction, release anti-corruption information through official website, Smart Party Building and other channels, and create a clean development environment for CRSC.

#### 做实做细监督工作

##### Refining supervision work

开展境外腐败、利益输送、设租寻租和化公为私四个专项整治，着力解决靠企吃企问题。

Conduct four specialized rectifications against overseas corruption, benefits transfer, setting up obstacles for seeking private benefits and appropriating public property so as to fundamentally solve the problem of playing their own game and making private profit from CRSC.

开展领导干部个人及亲属违规经商办企业专项整治工作，严查隐瞒不报、报而不实、拒不纠正等行为。

Conduct specialized rectifications against illegal business operations of leading cadres and their relatives, and investigate strictly into behaviors like concealing the information, reporting untrue information and refusal to make rectifications.

聚焦疫情防控和复工复产、追逃追赃、脱贫攻坚等重点事项，聚焦“关键少数”，聚焦“三重一大”事项决策和执行、科技创新、选人用人、物资采购、劳务分包等重点领域和关键环节，进一步加大监督力度，通过有形有效的监督防范腐败风险。

Focus on epidemic prevention and control, resumption of production, recovering the stolen money or goods, poverty alleviation and other major issues, pay attention to “critical minority” and the decisions of “Three Majors and One Large” and their implementations, as well as S&T innovations, selection and appointment of talents, materials procurement, labor subcontracting and other key fields and links, and further enhance the supervision efforts through effective corruption risk prevention and supervision.

#### 推动“大监督”工作格局运转

##### Promoting the “general supervision” over working patterns

定期召开党风廉政建设和反腐败协调小组会议，统筹解决跨部门工作，落实协调联动和线索移交机制，促进监督检查结果互认互用，共享监督资源，形成监督合力，为防范腐败问题发生提供机制保障。

Convene group meetings on Party style and incorrupt government construction and anti-corruption coordination on a regular basis, make overall arrangements of cross-department work, implement the coordination, linkage and clue transfer mechanisms, promote the mutual recognition and use of supervision and inspection results, share supervision resources and make joint efforts in supervision, thus providing guarantee mechanism for corruption prevention.

## 中国通号反贪污举报及受理程序

### CRSC Anti-corruption Reporting and Acceptance Procedures

#### 受理 Acceptance

收到信访举报后，负责信访工作人员分类编号，在信访举报拟办单上登记举报人、被举报人的基本信息，填写反映问题摘要，登记本级信访举报台账。

After receiving the reporting letters, responsible personnel shall classify and number these letters, register basic information of the informer and the person being reported against on the Reporting Letter Form, fill in the reporting abstract, and make corresponding reporting ledger.

#### 研判 Studying and Coming to a Decision

落实信访举报反映问题研判机制，成立研判小组，根据受理范围和权限，提出报送上级、本级办理、下级办理、受理范围外移交有关单位或部门办理、重复举报留存等办理意见，按照谈话函询、初步核实、暂存待查、予以了结四类方式提出进一步的处置建议。

In order to develop a mechanism of studying the reporting letter and coming to a decision, establish a dedicated group, and based on the scope and permissions of acceptance, propose the disposal opinions including reporting to superior levels, being handled at the current level, being assigned to next level, transferring to other relevant units or departments for those letters beyond the acceptance scope, retaining repeated reporting letters etc., and put forward further disposal suggestions in accordance with four disposals: interviewing and inquiry, preliminary check, setting aside for further checking and closing the case.

#### 承办 Undertaking

问题线索承办部门按照纪检监察机构分管领导的审批意见和四类问题线索处置方式规定的程序开展工作。

Undertaking departments groping for clues shall conduct their work in accordance with the approval opinion of competent leaders of discipline inspection authorities and the regulations on the disposal of clues to the above four classifications.

#### 办结 Closing

问题线索处置完毕，经承办部门报批后，问题线索办结。信访工作人员按要求进行归档。

After the disposal of the clues and the approval of undertaking departments, the cases are closed. Responsible reporting letter personnel shall place on files in accordance with relevant requirements.





## 可持续发展理念

### Sustainability Concept

**坚持依法经营，诚实守信。**模范遵守法律法规和社会公德、商业道德以及行业规则，及时足额纳税，维护投资者和债权人权益，忠实履行合同，恪守商业信用，反对不正当竞争，杜绝商业活动中的腐败行为。

Running business with integrity and abiding by law. CRSC is committed to the legal operation and highest standards of integrity, business ethics and industry regulation when working with all stakeholders, including investors and creditors. CRSC embraces the value of paying taxes in full amount, committing to the execution of contract, and keeping commercial credit. We are against unfair competition and business corruption.

**不断提高盈利能力。**完善公司治理，提高管理水平。推进实施集团发展战略，突出做强主业，突出科技创新。合理配置资源，降低经营成本，加强风险防范，提高投入产出水平，增强市场竞争能力。

Improving profitability. CRSC is dedicated to perfect the corporate governance and enhance management level. We consistently carry forward the implementation of CRSC Group's development strategy by highlighting the strength of main business and technological innovation. CRSC has always been devoted to the rational allocation of resources to reduce operating cost with the precaution of risk prevention. Consequently, CRSC's production has gradually been more cost-effective, and its market competitive edge has been sharpened.

**切实提高产品质量和服务水平。**建立和贯彻并严格运行质量、环境、职业健康安全管理体系，从产品设计、生产制造、施工安装、用户服务等各个环节，强化全员质量意识，坚持持续不断改进，改善产品性能，提高产品可靠性、安全性，最大限度地满足铁路、轨道交通运输安全的需要。

Committing to product quality and service level. CRSC is committed to the implementation of the management system which integrates quality, environment and vocational safety. CRSC values the quality awareness in every aspect of its business from product design, manufacturing, construction, installation to customer service. We seek to deliver these core values to every employee, and at the same time CRSC strives to enhance the performance, reliability and security of products to meet the requirement of railway and mass transportation to the largest extent.

**加强资源节约和环境保护。**认真落实节能减排责任，带头完成节能减排任务。发展循环经济，提高各类资源综合利用效率。增加环保投入，改进工艺流程，降低污染物排放，改进施工工法，减少占地，保护植被，实施清洁生产。坚持走低投入、低消耗、低排放和高效率的发展道路。

Enhancing resources utilization and reducing our environmental impact. CRSC Seriously implements the responsibility of energy conservation and emission reduction, takes the lead in completing the related task and develops a circular economy and improve the efficiency of comprehensive utilization of various resources. CRSC will increase environmental protection investment, improve process flow, reduce pollutant discharge, improve construction methods, reduce land occupation, protect vegetation, and implement clean production, adhering to the development path of low input, low consumption, low emissions and high efficiency.

**推进自主创新和技术进步。**建立完善技术创新机制，加大科技投入，提升原始创新、集成创新和引进消化吸收再创新能力。以建立中国高速铁路列车控制系统和配套产品体系为重点，加快科技创新基地与基础设备研发平台建设。加快既有产品更新换代，加快技术装备改造。加强知识产权保护，健全知识产权保护体系，加快形成一批具有自主知识产权、较完整配套的核心系统技术和产品体系，发挥对行业产业的带动作用和对中国通号可持续发展的支撑作用。

Promoting independent innovation and technology progress. CRSC is committed to establishing and optimizing its technological innovation mechanism by sharpening its capacity to be more originally innovative, integrated creative and re-innovative after introduction, digestion and absorption of other technologies. CRSC is focused on the system building of Chinese high-speed railway train control system and auxiliary products by speeding up the construction of technological innovation bases and basic equipment research and development platforms. We are making efforts to speed up the product upgrading and technical equipment modification. CRSC is devoted to protecting intellectual property rights, improving the protection of intellectual property rights system and accelerating the formation of a core technology and product system equipped with proprietary intellectual property rights and relatively complete kit, thus playing as a role model in the industry development and CRSC's sustainability.

**保障生产安全。**严格落实安全生产责任制，加大安全生产投入，严防重、特大安全事故发生。建立健全应急管理体系，不断提高应急管理水平和应对突发事件能力。为职工提供安全、健康、卫生的工作条件和生活环境，加大劳动保护监督检查力度，保障职工职业健康，预防和减少职业病和其他疾病对职工的危害。

Guaranteeing safe production. CRSC strictly sticks to the system of responsibility in safe production, increases input to ensure safety and prevents big or extraordinarily serious safety-related accidents. CRSC is also dedicated to building an emergency management system to increase its capability to face sudden events. CRSC is committed to providing a safe and healthy working environment. We equip employees with products and equipment that are safe for use. We also focus on implementing and improving processes and controls for preventing work-related accidents, injuries and illnesses.

**维护职工合法权益。**依法与职工签订并履行劳动合同，建立企业职工收入与企业效益相适应的工资正常调整和保障机制，按时足额缴纳社会保险。尊重职工，爱护职工，公平对待职工，杜绝性别、民族、宗教、年龄等各种歧视。加强职业教育培训，创造平等发展机会。为社会创造就业机会。加强职代会制度建设，深化厂务公开，推进民主管理。关心职工生活，切实为职工排忧解难。

Focusing on employee's legal rights. CRSC signs labor contracts with employees according to the law. We ensure and reasonably adjust the salaries according to the corporate profitability and pay social insurance in full amount. CRSC respects and cares for employees and treats everyone fairly without discrimination against their gender, nationality, religion, and age. We embrace the value of vocational training and providing equal opportunities for them. CRSC strives to create more job opportunities for society and pays attention to the formation of employee representative congress mechanism. CRSC is open to democratic management, and we care about every employee's mentality and try to solve their problems together with them.

**参与社会公益事业。**积极承担和热心参与扶贫、助困、捐助、志愿者等社会公益事业，关心支持教育、文化、卫生等公共福利事业。在发生重大自然灾害和突发事件的情况下，自觉听从当地政府和铁路等业务主管部门指挥，积极提供人力、财力和物力等方面的支持和援助。

Participating in public welfare undertakings. CRSC is actively taking part in public welfare undertakings such as poverty alleviation, donations and volunteering, and public welfare services in the areas of education, culture and sanitation. During natural disasters and sudden events, CRSC is a firm supporter of local government and railway authorities by proactively providing manpower, financial and material resources.

# 利益相关方沟通

## Stakeholder Communication

中国通号重视与利益相关方的沟通，建立并完善沟通渠道及方式，积极回应利益相关方的期望与诉求，并及时向各方传递公司动态，提高企业运行透明度。

CRSC emphasized on the communication with stakeholders, established and enhanced communication channels and means, positively responded to the expectations and appeals of stakeholders, and conveyed our dynamics to all stakeholders in a timely manner, thus improving its operational transparency.

利益相关方类型 Stakeholder Types	 <b>政府机构</b> Government	 <b>股东与投资者</b> Shareholders and Investors	 <b>客户</b> Clients	 <b>员工</b> Employees	 <b>供应商</b> Suppliers	 <b>合作伙伴</b> Cooperation Partners	 <b>行业</b> Industry	 <b>环境</b> Environment	 <b>社区与公众</b> Community
期望与诉求 Expectations and Appeals	<ul style="list-style-type: none"> <li>贯彻宏观政策</li> <li>诚信守法经营</li> <li>依法纳税</li> <li>促进就业</li> <li>带动地方经济发展</li> </ul> <ul style="list-style-type: none"> <li>To implement macro policies</li> <li>To operate honestly and legally</li> <li>To pay taxes according to law</li> <li>To promote employment</li> <li>To drive local economic development</li> </ul>	<ul style="list-style-type: none"> <li>良好的经营业绩</li> <li>资产保值增值</li> <li>信息合规披露</li> <li>降低经营风险</li> <li>股东权益保护</li> </ul> <ul style="list-style-type: none"> <li>Good operation performance</li> <li>To preserve or add the asset value</li> <li>To disclose information</li> <li>To reduce operation risks</li> <li>To protect the interests of shareholders and investors</li> </ul>	<ul style="list-style-type: none"> <li>合同履行</li> <li>产品质量安全</li> <li>提供优质服务</li> <li>保障客户隐私</li> </ul> <ul style="list-style-type: none"> <li>To perform contracts</li> <li>To guarantee product quality and safety</li> <li>To offer premium service</li> <li>To protect clients' information</li> </ul>	<ul style="list-style-type: none"> <li>保障员工权益</li> <li>保障职业发展</li> <li>员工生活关怀</li> <li>保障薪酬福利</li> <li>加强海外员工管理</li> </ul> <ul style="list-style-type: none"> <li>To protect staff interests</li> <li>To clear the career development route</li> <li>To offer staff caring</li> <li>To offer rational salary and welfare</li> <li>To enhance the management of overseas staff</li> </ul>	<ul style="list-style-type: none"> <li>诚信守法</li> <li>阳光采购</li> <li>扶持供应商成长</li> <li>信息保密</li> </ul> <ul style="list-style-type: none"> <li>To be honest and trustworthy</li> <li>To guarantee open, fair and legal procurement</li> <li>To support suppliers' development</li> <li>To keep information confidential</li> </ul>	<ul style="list-style-type: none"> <li>诚信守法</li> <li>遵守商业道德</li> <li>合作共赢</li> </ul> <ul style="list-style-type: none"> <li>To be honest and obey the law</li> <li>To abide by business ethics</li> <li>To achieve win-win cooperation</li> </ul>	<ul style="list-style-type: none"> <li>公平竞争</li> <li>科技创新研发</li> <li>助力行业进步</li> </ul> <ul style="list-style-type: none"> <li>Fair competition</li> <li>Technology innovation research</li> <li>To promote the industrial development</li> </ul>	<ul style="list-style-type: none"> <li>遵守环境法律法规</li> <li>践行节能减排</li> <li>资源节约利用</li> <li>环保意识提升</li> </ul> <ul style="list-style-type: none"> <li>To abide by laws and regulations of environment</li> <li>To save energy and reduce emissions</li> <li>To save resources</li> <li>To improve the awareness of environment mental protection</li> </ul>	<ul style="list-style-type: none"> <li>参与社区建设</li> <li>社会公益服务</li> </ul> <ul style="list-style-type: none"> <li>To take part in community construction</li> <li>Public welfare activities</li> </ul>
沟通方式 Communication Channels	<ul style="list-style-type: none"> <li>工作汇报</li> <li>参加会议</li> <li>监督检查</li> <li>信息报送</li> </ul> <ul style="list-style-type: none"> <li>Work report</li> <li>Conferences</li> <li>Supervision and inspection</li> <li>Information reporting</li> </ul>	<ul style="list-style-type: none"> <li>企业定期报告及公告</li> <li>业绩发布会</li> <li>股东大会</li> <li>投资者见面会</li> <li>沟通汇报</li> </ul> <ul style="list-style-type: none"> <li>Corporate annual report, middle term report and announcements</li> <li>Performance conference</li> <li>General meeting of shareholders</li> <li>Investors conference</li> <li>Reporting and communication</li> </ul>	<ul style="list-style-type: none"> <li>客户拜访</li> <li>客户满意度调查</li> <li>电话、邮件、信件及在线反馈</li> </ul> <ul style="list-style-type: none"> <li>Clients visiting and communication</li> <li>Satisfaction survey</li> <li>Telephone, e-mail, letter, and on-line feedback</li> </ul>	<ul style="list-style-type: none"> <li>职工代表大会</li> <li>员工培训宣教</li> <li>日常沟通</li> </ul> <ul style="list-style-type: none"> <li>General meeting of staff representatives</li> <li>Training and education</li> <li>Daily communication</li> </ul>	<ul style="list-style-type: none"> <li>公开招标</li> <li>开展合作</li> <li>行业沟通与交流</li> </ul> <ul style="list-style-type: none"> <li>Open tendering</li> <li>Carrying out cooperation</li> <li>Industrial communication and exchanges</li> </ul>	<ul style="list-style-type: none"> <li>高层互访</li> <li>定期沟通交流</li> <li>协议合同执行</li> </ul> <ul style="list-style-type: none"> <li>High-level visit exchanges</li> <li>Regular communication and exchanges</li> <li>Execution of agreements or contracts</li> </ul>	<ul style="list-style-type: none"> <li>加强同业交流</li> <li>参加行业论坛</li> <li>考察互访</li> </ul> <ul style="list-style-type: none"> <li>Enhancing communication with peers</li> <li>Industrial forums and conference</li> <li>Research tours and visits</li> </ul>	<ul style="list-style-type: none"> <li>环保技术应用</li> <li>环保理念宣贯</li> <li>环境信息公开</li> </ul> <ul style="list-style-type: none"> <li>Application of energy saving technology</li> <li>Publicity of environmental protection conceptions</li> <li>Environmental information disclosure</li> </ul>	<ul style="list-style-type: none"> <li>社区沟通宣传</li> <li>开展公益活动</li> </ul> <ul style="list-style-type: none"> <li>Community publicity</li> <li>Organizing public welfare activities</li> </ul>

## 董事会参与 Participation of Board of Directors

公司董事会对环境、治理、社会策略及报告承担责任，负责评估有关ESG风险，针对可能影响本公司业务及运作、利益相关方关注议题制定公司ESG管理方针、策略及目标。此外，董事会对利益相关方沟通结果及重大议题判定进行审批，对报告内容进行审核，参与ESG信息披露。2020年，公司共召开治理会议15次，其中股东大会2次，董事会7次，监事会6次。

CRSC's Board of Directors is responsible for developing ESG strategies and their reporting, assessing relevant ESG risks, and formulating ESG management guidelines, strategies and goals for issues that possibly affect its businesses and operations or that arouse the attention of stakeholders. Moreover, the Board of Directors is also responsible for reviewing and approving the communication results with stakeholders and the determination of material issues, auditing the reporting contents and engaging in ESG information disclosure. In 2020, CRSC convened 15 governance conferences, including 2 general meetings of shareholders, 7 board meetings and 6 supervisory board meetings.

### 治理议题 Governance Issues

1. 守法合规
  2. 廉洁从业
  3. 资产保值增值
1. Legal compliance
  2. Practice of integrity
  3. Asset preservation and appreciation

### 经济议题 Economic Issues

4. 科技创新
  5. 科技成果转化
  6. 数字化与智能化
  7. 产品质量与安全
  8. 优质服务
  9. 供应链管理
  10. 安全生产
4. Technological innovation
  5. Transformation of technological achievements
  6. Digitalization and intelligentization
  7. Quality and safety of products
  8. Quality services
  9. Supply chain management
  10. Safe production

### 社会议题 Social Issues

11. 员工权益保障
  12. 员工培养与职业发展
  13. 社会公益
  14. 海外履责
11. Safeguarding employees' rights and interests
  12. Employee cultivation and career development
  13. Social welfare
  14. Performing overseas responsibilities

### 环境议题 Environmental Issues

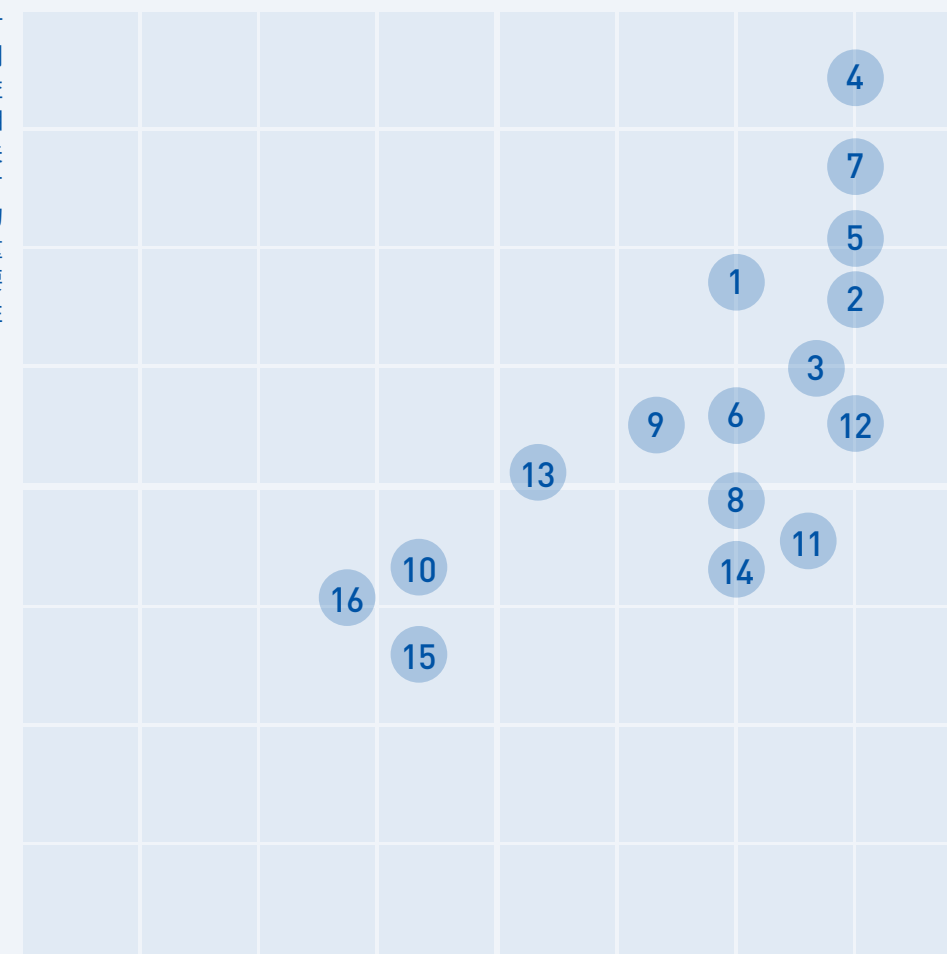
15. 节能减排
  16. 应对气候变化
15. Energy conservation and emission reduction
  16. Tackling climate changes

## 实质性议题识别 Identification of Material Issues

2020年，公司梳理宏观政策导向，研究分析ESG报告标准要求，结合公司发展战略、利益相关方关注议题，根据与利益相关方之间的依赖程度、权责关系、影响程度等原则，比较、分析不同ESG议题对利益相关方的影响及对公司发展的重要性，开展实质性议题分析调研，就16个实质性议题进行评估、优次排列，议题及分析结果见下图。相关分析结果呈报董事会讨论，并将相关反馈纳入可持续发展战略规划，分解到各部门执行。

In 2020, CRSC studied the orientations of macro policies, explored and analyzed the standards and requirements of ESG reports. In combination with its development strategies and issues that arouse the attention of stakeholders, based on the dependency on, the relationships between rights and responsibilities for and the influence on stakeholders and other principles, CRSC comparatively dissected the influence and the importance of different ESG issues on/to its development, conducted surveys on material issues, and assessed and prioritized 16 material issues. The issues concerned and analytical results are shown below. These results were submitted to the Board of Directors for discussion and relevant feedbacks were incorporated into strategic plans for sustainable development, and then decomposed to various departments for implementation.

对利益相关方的重要性  
Importance to stakeholders



对企业可持续发展的重要性  
Importance to CRSC's sustainable development





# 创新驱动发展

## Innovation Drives Development

科技创新是引领发展的第一动力。中国通号发挥科技创新在全面创新中的引领作用，完善创新体制机制，激发创新活力，强化创新能力，以“巩固行业领先、保障质量安全、支撑业务拓展、促进国际化转型”为中心，全面加速推进创新工作，不断提升公司整体科技实力和核心竞争力。同时，中国通号坚守社会公共利益，在新技术研究、新设备设计及应用中，注重安全与质量把控，为维护铁路系统安全运营贡献力量。

Technological innovation is the primary driving force for development. CRSC gave play to the leading role of technological innovation in comprehensive innovations, perfected its innovation mechanisms, stimulated innovation vigor, enhanced innovation capability, and comprehensively accelerated the advancement of innovation work centering on “consolidating its dominance in the industry, safeguarding quality and safety, expanding supporting businesses and promoting international transformation”, thus constantly increasing its overall scientific and technological strengths and core competitiveness. Meanwhile, CRSC upheld social public benefits, valued safety and quality control in the research of new technologies and the design and application of new equipment, contributing its power to maintaining the safe operation of railway system.

科技创新战略	40
Technological Innovation Strategy	
提升创新能力	42
Enhancing Innovation Capabilities	
创新成果转化	51
Transformation of Technical Innovations	
推动行业进步	59
Advancing Industrial Progress	



## 科技创新战略

### Technological Innovation Strategy

2020年，中国通号梳理“十四五”时期科技创新工作思路，明确科技创新工作发展目标和路径。中国通号科技创新总体战略目标为：全力打造“一个体系、二个中心、三个高地、四个平台”，实现“五大突破”，将中国通号建设成为以轨道交通控制系统技术为特色的世界一流的跨国产业集团，科技整体实力进入同行业世界领先水平。

In 2020, CRSC organized its ideas on technological innovations in the “Fourteenth Five-Year Plan”, and specified the development goals and paths of technological innovations. CRSC set up overall strategic goals for technological innovations: fully building “One System, Two Centers, Three Highlands and Four Platforms”, achieving “Five Breakthroughs”, constructing itself into a world-class multinational industrial group featured by rail transport control systems and technologies so that its overall scientific and technological strengths will rank the top across the globe.

#### 构建一个体系

##### Constructing One System

构建以核心技术为方向、科技创新平台为依托、创新人才为基础，企业内上下游协同、国内政产学研用结合、研发资源全球配置的新时代使命引领型科技创体系

Constructing a scientific and technological innovation system driven by the missions in the new era, oriented by core technologies, relying on technological innovation platforms, grounding on innovative talents, which achieves upstream and downstream collaboration within CRSC, the combination of government-industry-university-research-application in the domestic market and the global allocation of research and development resources

#### 打造二个中心

##### Building Two Centers

具有全球竞争力的轨道交通控制技术创新中心

具有全球影响力的通信信号产业创新中心

A rail transport control technology innovation center with global competitiveness

A communication signal industry innovation center with global influence

#### 引领三个高地

##### Leading Three Highlands

全球的轨道交通控制技术研发、制造、施工一体化服务的技术和服务模式输出高地

轨道交通通信信号高端人才创新集聚高地

全球的轨道交通知识产权和标准创造、运用、服务和转移高地

Technical and service mode output highland that integrates the research, development, manufacturing and construction of global rail transport control technologies

Innovation clustering highland that attracts high-end rail transport and communication talents

The highland of creating, applying, serving and transferring global rail transport-related intellectual property rights and standards

#### 建设四个平台

##### Shaping Four Platforms

国家工程研究中心、国家产业创新中心为代表的国家级技术创新和科研成果转化平台

符合国际标准的具有第三方独立检测认证评估能力的检验检测试验平台

面向全球的专注于轨道交通通信信号新技术孵化和创投培育平台

面向全球的学术交流、人才培养平台

National transformation platforms of technological innovations and scientific achievements represented by National Engineering Research Center and National Industrial Innovation Center

Inspection and testing platforms with third-party independent testing and certification assessment capabilities in line with international standards

New technology incubation and venture development platforms with a global perspective for the rail transport and communication signal industry

Academic exchange and talent cultivation platforms with a global perspective

#### 实现五大突破

##### Achieving Five Breakthroughs

新一轮的全面科技管理改革取得重大突破

新一代关键核心技术和深度自主化取得历史性突破

轨道交通安全控制技术在其他行业示范性应用的战略性突破

中国高铁标准与产业输出取得产品市场全球化、技术品牌国际化的突破

科技创新动能不断激发，核心人才培养和引进取得重要突破

Major breakthrough in a new round of comprehensive scientific and technological management reforms

Historic breakthrough in a new round of core technologies and in-depth autonomy

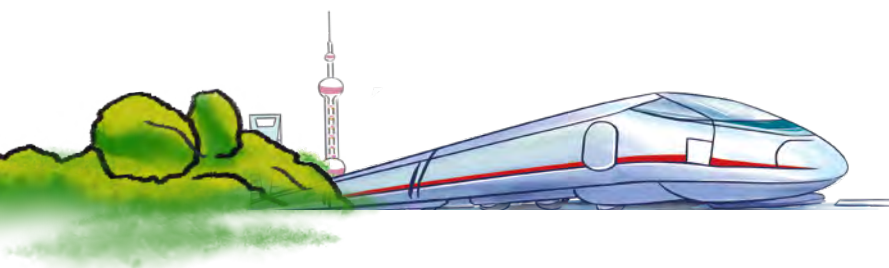
Strategic breakthrough in the exemplary application of rail transport safety control technologies in other industries

International breakthrough in China's high-speed railway standards and industrial outputs in occupying global market.

Critical breakthrough in constantly inspiring scientific and technological innovations, cultivating and attracting core talents



中国通号城市轨道交通列控系统综合实验室  
General Laboratory of CRSC Urban Rail Transport Train Control Systems





## 提升创新能力

### Enhancing Innovation Capabilities

中国通号不断完善创新管理体系，加大研发投入力度，加强科技人才引进和培养，加速关键核心技术攻关和科技成果转化，提升技术创新能力和核心竞争力，全面攻克了列车超速防护、自动驾驶、复杂条件下的测速测距、列控系统安全增强、智能调度指挥等一批核心技术，形成了产品种类多元化、主要产品谱系化、核心产品自主化、产品层次差异化的列控系统装备；掌握了基于复杂枢纽下的运营高铁既有改造换装的成套关键技术、轨道交通通信信号装备产业化和工程化关键技术，为解决列控系统全球适应性难题积累了中国智慧和方案。

2020年，公司加快关键核心技术攻坚、布局部署前瞻性技术研发、持续巩固信号领域技术优势，提高自主创新能力，领跑行业技术发展，全年科技投入19.6亿元，全年开展科研项目825项。

CRSC constantly enhanced innovation management system, increased inputs into research and development, strengthened the introduction and cultivation of high-tech talents, accelerated the tackling of core technologies and the transformation of scientific achievements, increased technological innovation capabilities and core competitiveness, fully overcame technical difficulties in automatic train protection, autopilot, range and velocity measurements in complicated situations, enhanced safety of train control systems, intelligent dispatching etc., and formed train control systems and devices with diversified product types, structured fist products, independently-developed core products and differentiated product hierarchy; CRSC grasped a complete set of key technologies for refitting old high-speed railways in the complex hub, as well as core technologies for industrialized and engineered rail transport and communication signal devices, providing Chinese wisdom and schemes for the solving of global adaptation difficulties in train control systems.

In 2020, CRSC accelerated the tackling of core technologies, deployed the research and development of prospective technologies, constantly reinforced its technical advantages in the signal field, improved independent innovation capabilities, and took the lead in the technological developments. It invested 1.96 billion RMB into scientific and technological research in 2020, and engaged in 825 scientific and technological programs for the whole year.

#### 中国通号“十三五”时期科技投入及承担科研项目情况

##### CRSC's Research Inputs and Scientific Research Programs during the "Thirteenth Five-Year Plan"

指标 Indicator	单位 Unit	2016	2017	2018	2019	2020
年科技投入 Annual research inputs	亿元 100 million RMB	14.90	16.61	17.97	19.25	19.6
承担国家级科研项目 National scientific research programs undertaken	件 piece	3	1	2	3	8
承担省部级科研项目 Provincial and ministerial research programs undertaken	件 piece	23	13	5	10	12
新增国家级奖励 New national awards	项 piece	1	2	1	1	1
新增省部级奖励 New provincial and ministerial awards	项 piece	20	8	21	20	38

#### 中国通号启动《轨道交通电磁环境效应研究与测试平台建设》重大科技专项

案例  
Case

CRSC launched a major scientific and technological project of Electromagnetic Environment Effects of Rail Transportation and Testing Platform Construction

提升核心装备的安全性和可靠性是中国通号永恒的课题。目前，高铁列控系统面临的电磁兼容问题依然存在，亟需集合国内优势资源联合攻关，保证高铁安全高效运行。

2020年8月，中国通号携手国铁集团及院士专家搭建产学研用合作平台，推进《轨道交通电磁环境效应研究与测试平台建设》，聚焦高铁复杂电磁环境对列控装备的影响，解决目前行业内存在的电磁兼容难题，提升核心安全装备的可靠性，并推动相关研究成果服务于铁路运输，服务全国铁路网安全高效运营。

Improving the safety and reliability of core equipment is an eternal task of CRSC. At present, the electromagnetic compatibility problems faced by the high-speed train control system still exist, and it is urgent to gather domestic superior resources to jointly tackle key problems to ensure the safe and efficient operation of high-speed trains.

In August 2020, CRSC teamed up with China Railway Group and academicians to build an industry-university-research cooperation platform to promote the "Electromagnetic Environment Effects of Rail Transportation and Testing Platform Construction", focusing on the impact of the complex electromagnetic environment of high-speed rail on train control equipment, and solving the electromagnetic compatibility problems in the industry in the current situation, improving the reliability of core safety equipment, and promotes related research results to serve railway transportation and serve the safe and efficient operation of the national railway network.





## 中国通号为京张高速铁路安上“千里眼”

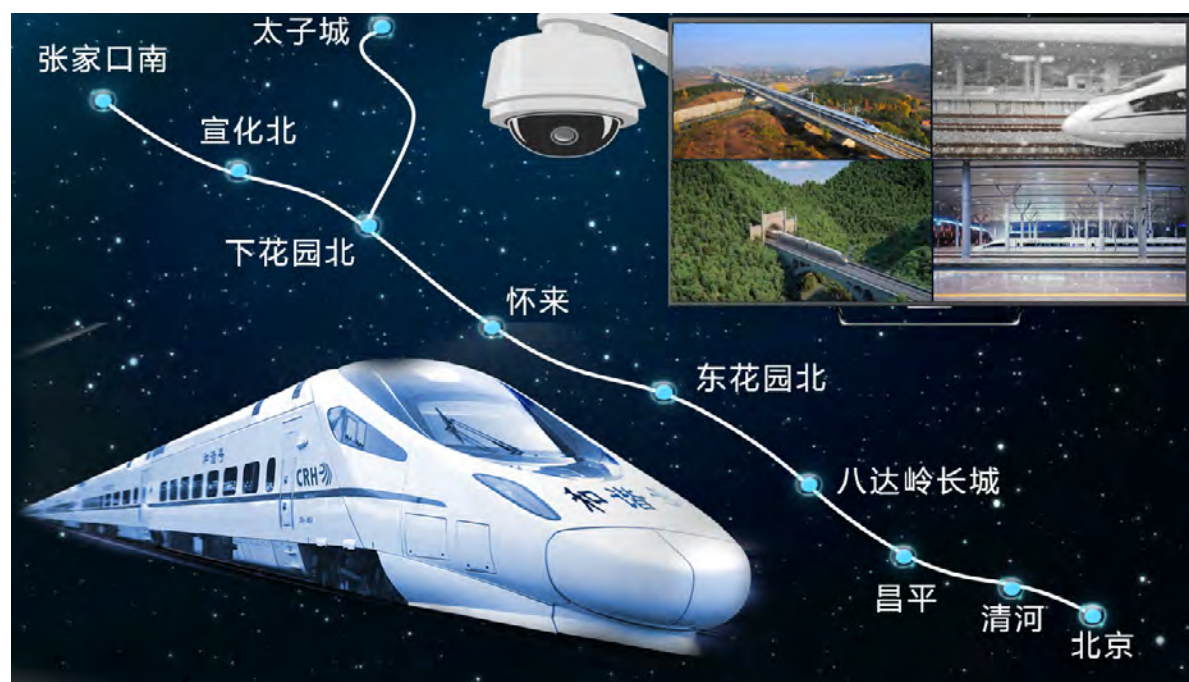
## CRSC installed "Clairvoyance" on Beijing-Zhangjiakou High-speed Railway

京张高铁是中国首条智能高速铁路，是人工智能、云计算等落地铁路的实践者、先驱者，引领了中国铁路的发展方向。在京张高铁众多的高科技中，中国通号通信信息集团创新研发一体化综合视频监控云系统，成为京张高铁的“千里眼”，这也是该系统在路内的首次亮相。

该系统能够通过一张“网”看清京张高铁全线各个角落，第一时间将旅客行为异常、异物侵入、设备故障等情况报警通知给铁路调度、客货运、工务、电务、供电、机务、车辆、信息和公安等业务系统专业部门，使风险和隐患能够迅速得到应对和处理，从而保障高铁运营安全。这也是路内首次采用将综合视频和专业视频相融合的一体化综合视频监控网。一体化综合视频监控系统在京张全线共设置北京北、清河、昌平、八达岭、怀来、下花园北、太子城、张家口8个云节点，时刻保障旅客的人身安全、财产安全。

The Beijing-Zhangjiakou High-speed Railway is China's first intelligent high-speed railway. It is a practitioner and pioneer of artificial intelligence, cloud computing and other grounded railways, leading the development direction of China's railways. Among the many high technologies of the Beijing-Zhangjiakou High-speed Railway, CRSC Communications and Information Group has specially developed an integrated comprehensive video surveillance cloud system for innovation, which has become the "clairvoyance" of the Beijing-Zhangjiakou High-speed Railway. This is also the first appearance of the system on the rail line.

The system can see all corners of the Beijing-Zhangjiakou high-speed rail line through a "net", and immediately notify abnormal passenger behavior, foreign body intrusion, equipment failure, etc. to the railway dispatching, mixed passenger and freight station, public works, electricity, power supply, maintenance, vehicles, information and public security and other business system professional departments, so that risks and hidden dangers can be quickly addressed and dealt with, thereby ensuring the safety of high-speed rail operations. This is also the first time in the rail line to adopt an integrated comprehensive video surveillance network that integrates integrated video and professional video. The integrated comprehensive video surveillance system has set up 8 cloud nodes in Beijing North, Qinghe, Changping, Badaling, Huailai, Xiahuayuan North, Taizicheng, and Zhangjiakou across the Beijing-Zhangjiakou line to ensure the personal safety and property safety of passengers at all times.



## 京张高铁一体化综合监控云系统的创新

## Innovation of Beijing-Zhangjiakou High-speed Railway Integrated Surveillance Cloud System



## 列车智能识别技术

## Train intelligent recognition technology

高铁列车运行速度快，很难通过手动查找的方式来调看特定列车的运行状态和位置画面。列车智能识别技术能够对监控画面中高速运行的列车进行自动识别、自动切换、自动播放，帮助运营单位快速锁定列车位置，并持续跟踪。

High-speed rail trains run fast, and it is difficult to adjust the operating status and location of a specific train by manually searching. Train intelligent recognition technology can automatically identify, automatically switch, and automatically play the high-speed trains in the monitoring screen, helping the operation management unit to quickly lock the train position and continue to track it.



## 视频网管系统

## Video network management system

传统的视频网管采集数据手段单一，数据不全面，往往无法及时排查故障原因。京张高铁新研发的视频网管系统，就像人体的防疫系统，能够实时采集、分析、展示来自摄像机、交换机、服务器、视频服务等各个有机体的数据指标，判断这些有机体的健康状态，帮助预先发现风险并及时处理隐患，保障了一体化综合视频监控云系统的稳定运行。

Traditional video network management has a single method of collecting data, and the data is not comprehensive, and it is often impossible to find the cause of the fault in time. The video network management system newly used in Beijing-Zhangjiakou High-speed Railway is like a human body's epidemic prevention system. It can collect, analyze, and display data indicators from various organisms such as cameras, switches, servers, and video services in real time. It can judge the health status of these organisms and help identify risks in advance and deal with hidden dangers in time, ensuring the stable operation of the integrated comprehensive video surveillance cloud system.



## 互联互通、共享数据

## Interconnection and data sharing

京张一体化综合视频监控云系统接入3,000多路高清摄像机，视频图像存储规模达到5,000多TB。为高效利用这些图像数据，发挥数据的最大价值，京张一体化综合视频监控云系统与供电专业系统、车站旅服管控平台、灾害监测系统等多个系统互联互通，最大限度分享数据，大大提升各个业务部门的作业能力和效率。

The Beijing-Zhangjiakou integrated comprehensive video surveillance cloud system is connected to more than 3,000 high-definition cameras, and the video image storage scale reaches more than 5,000 TB. In order to use these image data efficiently and maximize the value of the data, the Beijing-Zhangjiakou integrated comprehensive video surveillance cloud system is interconnected with the professional power supply system, station travel service management and control platform, disaster monitoring system and other systems to share data to the greatest extent and greatly improve operational ability and efficiency of each business department.

## 科技创新平台

### Technological Innovation Platform

中国通号推进创新平台和示范建设,推动创新要素汇聚和创新资源优化配置,形成“3468+N”的科技创新平台和示范格局,为高质量创新发展提供平台支撑,也为引进、培育创新人才奠定基础。截至2020年底,公司共拥有3个博士后科研流动工作站、4个院士工作站、6个国家级创新平台、8个国家级创新示范称号,26个省部级重点实验室/工程技术研究中心/工程实验室。

CRSC promotes the construction of innovation platforms and demonstrations, promotes the convergence of innovation elements and the optimal allocation of innovation resources, and forms a "3468+N" technological innovation platform and demonstration pattern, providing platform support for high-quality innovation development, and also laying the foundation for the introduction and cultivation of innovative talents. As of the end of 2020, the company has 3 post-doctoral research mobile workstations, 4 academician workstations, 6 national innovation platforms, 8 national innovation demonstration titles, and 26 provincial and ministerial key laboratories/engineering technology research centers/engineering experiments room.



截至2020年底 As of the end of 2020



3 ↑

博士后科研  
流动工作站

post-doctoral  
research mobile  
workstations



4 ↑

院士工作站

academician  
workstations



6 ↑

国家级创  
新平台

national  
innovation  
platforms



8 ↑

国家级创新  
示范称号

national innovation  
demonstration titles



26 ↑

省部级重  
点实验室

provincial and  
ministerial key  
laboratories

## 科研人才队伍

### Scientific Research Talents

中国通号全面深化科技体制机制改革,健全优化员工激励奖励机制、激发创新动能,主要企业全部建立了涉及技术创新、知识产权等奖励机制。同时,积极推动企业科技创新人才队伍建设,加强科技人才队伍选、用、育、留,激发企业创新活力。截至2020年底,公司共有研发人员4,310人。2020年,中国通号新增6名茅以升铁道工程师奖获得者,新增1人获詹天佑成就奖,1人获詹天佑青年奖,2人获评2020年最美铁道科技工作者,2人获评交通运输部“交通运输青年科技英才”,2人获“北京市优秀青年工程师”称号,1人获得中国科协青年人才托举工程项目支持。

CRSC has comprehensively deepened the reform of the science and technology system and mechanism, improved and optimized the employee incentive and reward mechanism, and stimulated innovation momentum. All major companies have established incentive mechanisms involving technological innovation and intellectual property rights. At the same time, CRSC actively promoted the construction of the enterprise's scientific and technological innovation talent team, strengthened the selection, adoption, cultivation and retention of the scientific and technological talent team, and stimulated the innovation vitality of the enterprise. As of the end of 2020, the company has a total of 4,310 R&D personnel. In 2020, CRSC added 6 new winners of Mao Yisheng Railway Engineer Award, 1 person won the Zhan Tianyou Achievement Award, 1 person won the Zhan Tianyou Youth Award, 2 people won the 2020 Most Beautiful Railway Technologists, 2 People were awarded the "Young Talents in Transportation Science and Technology" by the Ministry of Transport, 2 were awarded the title of "Beijing Outstanding Young Engineers", and 1 was supported by the China Association for Science and Technology Young Talents Support Project.

#### 研究设计院集团深化科研分配机制改革

CRSC Research & Design Institute Group deepened the reform of scientific research distribution mechanism

案例  
Case

中国通号下属核心企业——研究设计院集团是掌握高铁列控和通信信号核心技术的科技型企业。2018年被纳入国企改革“双百行动”。2020年,为进一步激发活力、提高科技创新能力,研究设计院集团组织发布了《科研风险抵押、项目分红、业务跟投激励方案(暂行)》《科研项目间接费绩效发放管理细则》《科技创新奖励激励管理办法》等一系列制度,积极推行风险抵押、项目分红、业务跟投等中长期激励,提升科技人才的创新成就,有效提升职工科技研发积极性、能动性。同时,加快科技人才队伍建设和管理,培养和造就一批具有国际水平的战略科技人才、科技领军人才、青年科技人才和高水平创新团队。

CRSC Research & Design Institute Group, a core subsidiary of CRSC, is a technology-based enterprise that masters the core technologies of high-speed rail train control and communication signals. In 2018, it was included in the "Double Hundred Action" for the reform of state-owned enterprises. In 2020, in order to further stimulate vitality and improve scientific and technological innovation capabilities, the Research and Design Institute Group organized and issued a series of systems such as the "Scientific Research Risk Mortgage, Project Dividends, Business Co-investment Incentive Plan (Interim)", "Detailed Rules for the Management of the Performance Distribution of Indirect Costs for Scientific Research Projects", "Administrative Measures for Incentives for Scientific and Technological Innovation", actively implemented medium and long-term incentives such as risk mortgage, project dividends, business follow-up investment, etc., to enhance the innovation achievements of scientific and technological talents, and effectively enhance the enthusiasm and motivation of employees in scientific and technological research and development. At the same time, CRSC speeded up the construction and management of scientific and technological talents, and cultivated and brought up a group of international-level strategic scientific and technological talents, scientific and technological leaders, young scientific and technological talents and high-level innovative teams.



## 前瞻技术融合应用

### Integration and Application of Prospective Technologies

中国通号坚持“应用一代、研发一代、储备一代”，潜心研究高铁绕行既有有线列控技术，让通铁路的城市就能通高铁，让我国3.8万公里高铁与14.6万公里普速铁路互联互通成为可能，进一步贯通铁路运输大动脉。同时，中国通号加快高铁列控系统核心装备的设计开发、系统设计等关键核心技术攻关；基于5G、北斗、区块链等新技术，展开轨道交通控制信息技术、电磁安全防护技术、智能检测和诊断技术等研究。

#### 中国通号开展基于北斗的下一代列控系统研发

CRSC conducted research and development of next generation of Beidou-based train control system

北斗卫星导航系统是中国自行研制的全球卫星导航系统，是继美国GPS、俄罗斯GLONASS之后第三个成熟的卫星导航系统。2020年7月，北斗三号全球卫星导航系统正式开通。随着全球组网的成功，北斗卫星导航系统的国际应用空间不断扩展。

2020年8月，国铁集团颁布《新时代交通强国铁路先行规划纲要》，明确提出到2035年，率先完成智能化铁路网，全国铁路网长度将达到20万公里左右，其中高铁占据7万公里左右；高铁列车将拥有基于北斗卫星导航系统、5G通信技术的空天地一体化的“超级大脑”。

中国通号前瞻性参与基于北斗卫星定位的列控系统研发，储备研发更高效、更智能、更环保的列控系统——CTCS-4新一代列车控制系统。

通过融合北斗的多源定位技术，实施移动闭塞实现列车高效追踪。该系统可适应电气化/非电气化区段，以及特长隧道、高原、山区、戈壁等环境恶劣地区，满足高可靠、高可用和少维护需要。达到提高线路运输能力，人均百公里能耗降低的目标。



CRSC insisted on "always have one generation under R&D, one generation applied, and one generation reserved", and concentrated on researching high-speed rail bypassing existing line train control technology, so that cities with railways can be connected to high-speed rail, so that the intercommunication of our country's 38,000 kilometers of high-speed rail and 146,000 kilometers of normal-speed railways becomes possible, and the railway transportation artery is further connected. At the same time, CRSC speeded up the design and development of the core equipment of the high-speed train control system, system design and other key core technologies; based on new technologies such as 5G, Beidou, and blockchain, it has launched rail transit control information technology, electromagnetic safety protection technology, intelligent detection, and diagnostic technology.

#### 案例 Case

The Beidou satellite navigation system is a global satellite navigation system developed by China itself. It is the third mature satellite navigation system after the United States GPS and Russian GLONASS. In July 2020, the Beidou-3 global satellite navigation system was officially opened. With the success of global networking, the international application space of Beidou satellite navigation system continues to expand.

In August 2020, the National Railway Group issued the "Outline of the Advanced Railway Planning for a Powerful Country in the New Era", which clearly stated that by 2035, it will be the first to complete the intelligent railway network, and the national railway network will reach about 200,000 kilometers in length, of which high-speed rail will occupy about 70,000 kilometers; the high-speed rail train will have a "super brain" based on Beidou satellite navigation system and 5G communication technology that integrates space, sky and ground.

CRSC proactively participated in the research and development of the train control system based on Beidou satellite positioning, and reserved and researched and developed of a more efficient, smarter and more environmentally friendly train control system—the CTCS-4 new generation train control system.

By integrating Beidou system's multi-source location tracking technology, CRSC implemented moving block and efficient tracking of trains. The system is well-adapted to electrified/nonelectrified segments, as well as regions with harsh environment, such as extra-long tunnels, plateaus, mountains, and deserts, thus effectuating high reliability, high availability, and minimal maintenance. After being put into operation, the system would help to enhance line transportation capacity and achieve the goal of reducing Kwh per capita.



## 知识产权

### Intellectual Property Rights (IPR)

中国通号在深耕研发的同时，不断完善知识产权管理体系。根据《中华人民共和国专利法》《中华人民共和国著作权法》《企业知识产权管理规范》等相关法律法规，制定知识产权管理办法及制度文件，持续开展知识产权创造、管理、保护、运用，在保障自有知识产权不被侵犯的同时尊重他人知识产权。截至2020年12月31日，公司累计有效授权专利2,571项，累计软件著作权1,391项。

#### 2020年，中国通号规范知识产权工作进展

In 2020, the work progress of CRSC to regulate intellectual property rights

2020年新增专利申请首次突破1,000件，达到1,055件，其中发明专利申请622件，同比增长39%；新增在欧洲、亚太等地布局申请PTC专利80件。开展高价值专利培育，引导企业由强调专利数量向强调专利质量转变。

In 2020, the number of new patents exceeded 1,000 for the first time and reached 1,055. Among them, there were 622 applications for invention patents, with a year-on-year growth of 39%; moreover, 80 new PTC patents were applied in Europe, the Asia-Pacific Region, and other regions. By cultivating high-value patents, CRSC is leading a patent trend from quantity-focused to quality-focused.

#### 知识产权管理

##### Intellectual property rights management

制定并发布了知识产权发展规划（2020-2022），组织开展国家《企业知识产权管理规范》的对标和认证工作。定期开展各类的培训，培养和造就一支数量充足、结构优化、布局合理、素质较高的知识产权人才队伍。

CRSC developed and released Intellectual Property Develop Plan (2020-2022), and engaged in benchmarking and certification of Enterprise Intellectual Property Management Specifications. It also organized various trainings on a regular basis, cultivated and shape an intellectual property team with sufficient talents, optimized structure, well-deployed layout and high quality.

#### 知识产权运用

##### Intellectual property rights creation

注重标准研制与专利布局的有效衔接，形成标准必要专利，提升专利的商业价值。组织常态化开展专利信息查询、专利文献传递和专利情报分析等工作，拓宽科研人员研发创新思路，提高研发创新效率。

CRSC paid close attention to effective docking of standard preparation and patent deployment, thus forming standard-essential patents, and enhancing patents' commercial value. CRSC incorporated patent information query, patent literature transmission and patent intelligence analysis into routine work, expanded the research innovation ideas of scientific researchers, and enhanced research innovation efficiency.

#### 知识产权保护

##### Intellectual property rights protection

中国通号不断完善知识产权风险识别机制、预警机制、知识产权保护工作体系等相应的管理机制。持续开展海外知识产权预警分析。

CRSC has been improving its risk identification, warning and protection mechanisms for intellectual property, and constantly diving into warning analysis of overseas intellectual property rights.

CRSC continued to improve its intellectual property management system while deepening research and development. In accordance with the Patent Law of the People's Republic of China, The Copyright Law of the People's Republic of China, Enterprise Intellectual Property Management Regulations and other relevant laws and regulations, CRSC formulated intellectual property management measures and system documents, and continued to carry out the creation, management, protection, and use of intellectual property rights, ensuring our own intellectual property rights are not violated while respecting the intellectual property rights of others. As of December 31, 2020, the company has a total of 2,571 valid authorized patents and a total of 1,391 software copyrights.

#### 2020年专利情况

Patents of CRSC in 2020

<b>779</b> 件 piece 新增授权专利 Newly licensed patents	<b>256</b> 件 piece 新增授权发明专利 Newly licensed patents of invention	<b>1,055</b> 件 piece 新增申请专利 Newly applied patents
<b>622</b> 件 piece 新增申请发明专利 Newly applied patents of invention	<b>80</b> 件 piece 新增海外专利申请 Newly applied overseas patents	<b>14</b> 件 piece 新增海外专利授权 Newly licensed overseas patents

## 创新成果转化

### Transformation of Technical Innovations

列车运行控制系统是国家科技实力的重要体现。近年来，中国通号坚持技术成果化、成果市场化、市场效益化，取得一批重大科技创新成果，积极推进重点产品产业化，发展成为全球规模最大的轨道交通控制系统解决方案供应商。

Train operation control system is an important manifestation of national scientific and technological strength. In recent years, CRSC has adhered to technological achievements, marketization of results, and market efficiency, achieved a number of major scientific and technological innovations, actively promoted the industrialization of key products, and developed into the world's largest rail transit control system solution provider.

## 高铁领域



### High-speed rail

成功研发出自主知识产权的CTCS-3级列车控制系统和自动驾驶系统（C3+ATO）并完成上道应用，满足高铁列车最高时速350公里、最小运行间隔3分钟的运营要求，让高铁运营更加自主可控、更加智能高效。

Successfully developed the CTCS-3 train control system and automatic driving system (C3+ATO) with independent intellectual property rights and completed the on-track application, meeting the operating requirements of high-speed trains with a maximum speed of 350 kilometers per hour and a minimum running interval of 3 minutes, making high-speed rail operations more autonomous and controllable, more intelligent and efficient.

## 货运领域



### Freight transport

自主研发的编组站综合自动化系统（CIPS），实现货车调度、管理、作业的全盘自动化。郑州北站可日均办理货车编组3.6万辆，使我国铁路货运一天的办理量相当于欧洲一个月的装车量。

The self-developed marshalling station integrated automation system (CIPS) realizes the full automation of truck dispatching, management and operation. Zhengzhou North Railway Station can handle an average of 36,000 truck formations per day, making the daily handling capacity of our country's railway freight is equivalent to the monthly loading capacity of Europe.

## 基础产品领域



### Basic products

完成高速铁路移频脉冲轨道电路、高速道岔转换系统、电加热道岔融雪系统、自主化欧标应答器、S系列应答器等信号基础设备的研发和推广应用。

Completed the research and development and application of signal basic equipment such as high-speed railway frequency shift pulse track circuit, high-speed turnout conversion system, electric heating turnout snow melting system, autonomous European standard transponder, S series transponder, etc.

## 生产制造领域



### Manufacturing

加速智能制造工厂建设，建成高速铁路列控系统设备智能化柔性加工中心，技术装备和制造工艺达到国际同行业先进水平。

Accelerated the construction of intelligent manufacturing plants and built an intelligent flexible processing center for high-speed railway train control system equipment, making the technical equipment and manufacturing process have reached the international advanced level of the same industry.

## 城际铁路领域



### Intercity railway

成功打造全球首条自动驾驶铁路，实现城际列车最高时速200公里下自动驾驶、精准停车，助力我国城际铁路跨入公交化运营时代。

Successfully built the world's first self-driving railway, realized automatic driving and precise parking of intercity trains at a maximum speed of 200 kilometers per hour, and helped our country's intercity railways enter the era of public transportation operation.

## 中低速磁悬浮领域



### Medium and low speed magnetic levitation

装备中国通号中低速磁悬浮列车运行控制系统（MATC）的北京S1线，成为国内首条实现自动驾驶的磁悬浮线。

Beijing S1 line equipped with CRSC's low- and medium-speed maglev train operation control system (MATC) became the first maglev line in China to realize automatic driving.

## 通信信息领域



### Communication information

自主研发的铁路综合视频监控系统已成功应用于国铁集团核心节点，并在11个铁路局集团实现视频全接入应用，助力我国铁路“千里眼”。

The self-developed railway integrated video surveillance system has been successfully applied to the core nodes of the National Railway Group, and the full video access application has been implemented in 11 railway bureau groups, promoting our country's railway "clairvoyance".

## 施工领域



### Construction

实施施工标准化和智能化，弘扬“工匠”精神，施工工艺水平在轨道交通通信信号行业中保持最高水准。

Implemented construction standardization and intelligence, promoted the "craftsman" spirit, and maintained the highest level of construction technology in the rail transit communication signal industry.

## 地铁领域



### Subway

自主研发的地铁CBTC系统具备全时、全程无人驾驶功能，助力全球首条互联互通地铁的顺利开通。

The self-developed subway CBTC system has full-time and full-range unmanned driving functions, promoting the successful opening of the world's first interconnected subway.

## 既有线改造领域



### Existing cable transformation

完美实施京津城际列控改造工程，开创全球高铁列控系统全线一次性升级换装新模式。

Perfectly completed the Beijing-Tianjin intercity train control transformation project, creating a new model of one-time upgrade and replacement of global high-speed train control systems.

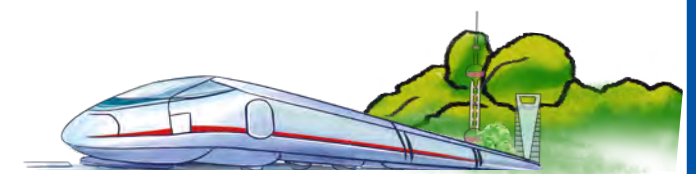
## 运维领域



### Operation and maintenance

成功开发完全自主知识产权的智能运维系统，能够实现对铁路运维的一体化分析、一致性校核、风险告警等功能，有效保障高铁和城轨在轨设备的安全稳定运行。

Successfully developed an intelligent operation and maintenance system with completely independent intellectual property rights, which can realize the functions of integrated analysis, consistency check, and risk warning of railway operation and maintenance, effectively guaranteed the safe and stable operation of high-speed rail and urban rail equipment.





## 中国通号自主研制车载产品通过欧盟认证

案例  
Case

CRSC's independent development of on-vehicle products passed EU certification

2020年12月,中国通号自主研制的400T车载(列车自动防护)产品通过欧盟基线3TSI认证,获得整系统安全SIL4级、DMI安全SIL2级、TSICB及CD全部4个证书,成为中国首个获得欧洲权威测试机构认可并通过欧盟基线2与基线3双基线TSI认证的列控车载产品。至此,中国通号列控系统各产品(ATP、RBC、LEU、应答器)已全部通过欧盟基线2和基线3 TSI认证。

400T车载设备是我国首个完成技术创新、产品研制及现场试验的自主化C3车载设备,即将装备于雅万高铁,也是我国首个通过欧盟TSI认证的列控核心产品,已获得欧洲订单,即将在德国、瑞士等欧洲五国应用。

In December 2020, the 400T on-vehicle (automatic train protection) product independently developed by CRSC passed the EU baseline 3TSI certification and obtained all four certificates of system safety SIL4, DMI safety SIL2, TSICB and CD, Which means the train control on-vehicle products from China was approved by the European authoritative testing organization and passed the EU baseline 2 and baseline 3 dual baseline TSI certification for the first time. So far, all products of CRSC's train control system (ATP, RBC, LEU, transponder) have all passed the EU baseline 2 and baseline 3 TSI certification.

The 400T on-vehicle equipment is our country's first autonomous C3 on-vehicle equipment that has completed technological innovation, product development and field testing. It is about to be equipped on the Jakarta-Bandung high-speed rail, and it is also our country's first train control core product that has passed the EU TSI certification. It has received European orders and will soon be applied in five European countries including Germany and Switzerland.

## 小知识 Tips

*TSI (Technical Specification for Interoperability): 欧盟互联互通技术规范,是欧盟关于铁路产品的法规,任何进入欧盟国家的铁路产品必须具有此认证证书。在轨道交通领域,欧洲标准是大多数国际标准的来源,获得欧盟认可,也就意味着获得了进入包括欧盟在内的全球市场的“通行证”。*

TSI (Technical Specification for Interoperability): European Union Interoperability Technical Specification is the European Union's regulations on railway products. Any railway product entering the EU country must have this certification. In the field of rail transit, European standards are the source of most international standards, and being recognized by the European Union means obtaining a "passport" to enter the global market including the European Union.



## 400T车载设备

the 400T on-vehicle equipment

我国首个通过欧盟TSI认证的列控核心产品

China's first train control core product that has passed the EU TSI certification

## 中国通号全自主 FAO 系统亮相世界智能大会

案例  
Case

CRSC's fully automated FAO system appeared at the World Intelligence Conference

2020年6月23日至26日,第四届世界智能大会智能交通峰会在天津举行。装备中国通号自主研发FAO系统的全自动运行天津试验线作为本次峰会的唯一实体展示平台参展,该系统已达到国际最高自动化等级GOA4级。

全自动运行天津试验线是中国通号城交公司联合天津轨道交通集团、中车唐山机车车辆于2019年开展三方科研合作并共同建立的项目。该试验线既可以满足全自动运行信号系统及车辆现场测试验证,还可为天津全自动运行线路运营组织管理提供实操平台。

登上该试验线上的实验列车,可以体验全自动运行系统控制下列车唤醒(高低压上电、自检、静态测试)、列车出库、无人驾驶、进站停车、站台发车、终点清客、折返换端、列车回库、清扫、休眠等正常运行场景以及故障场景演示,是对中国通号城交公司自动化、智能化的轨道交通控制系统解决能力的全面展示。

From June 23 to 26, 2020, the Intelligent Transportation Summit of the 4th World Intelligent Conference was held in Tianjin. The fully automated Tianjin test line equipped with the FAO system independently developed by CRSC was exhibited as the only physical display platform of this summit. The system has reached the highest international automation level GOA4.

The fully automatic operation of the Tianjin test line is a project jointly established by the China Railway Transportation Company, Tianjin Rail Transit Group and CRRC Tangshan Locomotives in 2019 to carry out a tripartite scientific research cooperation. The test line can not only meet the requirements of fully automatic operation signal system and vehicle field test verification, but also provide a practical platform for the operation and management of Tianjin fully automatic operation line.

Boarding the experimental train on the test line, you can experience demonstration of normal operation scenes and failure scenes such as the fully automatic operation system to control the wake-up of the trains (high and low voltage power-on, self-check, static and dynamic test), train out of the warehouse, unmanned driving, inbound and stop, platform departure, terminal clearance, turn-back and exchange terminals, train return, cleaning, sleep etc. It fully demonstrated the automated and intelligent rail transit control system solution capabilities of CRSC Urban Transportation Company.





卡斯柯公司基于车车通信的列车自主运行系统完成现场多车无人驾驶测试验证

案例  
Case

CASCO's vehicle-to-vehicle communication-based automated train running system completed the unmanned driving test on several vehicles

2020年6月,卡斯柯公司基于车车通信的列车自主运行系统(TACS)完成在上海地铁宝山路站3/4号线上的无人驾驶测试验证,验证关键功能和性能指标,包括分岔性能、汇合性能、折返间隔、任意站穿梭、任意点折返等,所有验证指标均达到预期目标。在此次测试中,所有列车全程均采用了UTO无人驾驶模式,创下全国先例。此次测试验证结果标志着该系统已具备商用条件,将为各城市的轨道交通新建项目以及既有线路的升级改造提供新的选择方案。

车车通信TACS系统作为城轨高效能列控的突出代表,具有安全、高效、灵活、经济、易部署等特点。相对于传统CBTC系统,车车通信TACS系统设备更加精简,架构更加扁平,各系统高度融合,车与车之间直接进行信息交互,可显著提升系统性能和轨交运能,并能提供灵活多样的行车组织模式,有助于应对各种故障和突发情况。此外,车车通信TACS系统在应用场景上还能对既有线路的延伸改造和扩容增能提供新的选择,使系统生命周期的运维成本进一步降低。

In June 2020, CASCO's vehicle-to-vehicle communication-based automated train running system (TACS) completed the unmanned driving test on No.3 and No.4 subway lines at Baoshan Station of Shanghai Metro, during which key functions and performance indicators were validated, including turnout performance, convergence performance, turning-back interval, shuttling through any station, turning back at any point, etc. All indicators validated satisfied the expected goals. During this test, all trains adopted UTO unmanned driving mode for the whole trip. The test results signified that this system can be commercialized, providing a new choice for newly built rail transport programs and the upgrading and transformation of existing routes in various cities.

As a prominent representative of efficient control system for urban rails, vehicle-to-vehicle communication-based TACS system is safe, efficient, flexible, economical and easily deployable. Compared to traditional CBTC system, TACS system boasts more concise size and flattened architecture with highly integrated systems. Information is directly interchanged between vehicles, which significantly enhances system performance and rail transport capacity and provides flexible vehicle organization modes, contributing to the responses to various faults and emergencies. Moreover, in terms of application scenarios, TACS system offers new choices for the extension, transformation and capacity expansion of existing routes, further reducing the operation and maintenance costs of the system during its life cycle.

测试列车现场演示  
Onsite demonstration of tested train





## 中国通号首次中标磁浮机电总承包项目

CRSC won the bid of maglev-based mechanical and electrical EPC project for the first time

案例  
Case

2020年6月，中国通号成功中标“凤凰磁浮文化旅游项目（一期工程）机电设备采购及安装总承包项目”，标志着中国通号成功进入国内中、低速磁浮总承包项目建设领域。

凤凰磁浮文化旅游项目位于湖南省湘西土家族苗族自治州凤凰县境内，是国内首个“磁浮+文化+旅游”项目，预计2021年与张吉怀高铁凤凰站同步开通运营。一期工程以张吉怀高铁凤凰站为起点到民俗园站，线路全长9.121公里，拟设车站4座，车辆段1处，预留车站2座，设计行车时速为100km/h。建成后，将有效助力湖南旅游新升级，打造轨道旅游新业态。

中国通号负责凤凰磁浮文化旅游项目一期工程全线通信、信号、供电、FAS、BAS、安防与门禁、通风、空调、给排水与消防、自动售检票、车站辅助设备及车辆段机电工程的深化设计、设备采购和安装调试、技术指导、培训、联调联试等内容。

In June 2020, CRSC successfully won the bid of "Mechanical and Electrical Equipment Procurement and Installation EPC Project under Fenghuang Maglev Culture Tourism Project (Phase I)", signaling that CRSC officially entered domestic EPC project of middle and low-speed maglev train.

Fenghuang Maglev Culture Tourism Project, located at Fenghuang County, Western Hunan Tujia and Miao Autonomous Prefecture, Hunan Province, is the first project that combines maglev, culture and tourism in China, and is expected to put into operation together with Fenghuang Station of Zhangjiakou-Jishou-Huaihua High-speed Railway in 2021. Phase I Project starts from Fenghuang Station of Zhangjiakou-Jishou-Huaihua High-speed Railway and ends at Folk Park Station, with a full length of 9.121km. It is proposed that 4 stations, 1 depot and 2 reserved stations will be built, with a designed traffic speed of 100km/h. After being built, the Project will effectively facilitate the upgrading of Hunan tourism business, and build a new format of rail tourism.

CRSC is responsible for full-line communication, signaling, power supply, FAS, BAS, security and door access, ventilation, air-conditioning, water supply and drainage, firefighting, automatic fare collection, auxiliary station equipment, detailed design of mechanical and electrical at depot, equipment procurement, installation and commissioning, technical guidance, training, integrated test and commissioning and other contents for Fenghuang Maglev Culture Tourism Project (Phase I).



## 推动行业进步

## Advancing Industrial Progress

中国通号积极参与中国铁路通信信号领域国家标准制定，并主导编制行业领域重要产品、工程技术、服务等领域标准和规范，并与科研院所、行业协会等展开技术交流，推动轨道交通通信信号相关标准制定、研发设计、生产制造、施工安装、运营维护等全产业链业务水平的提升。

CRSC took an active part in formulating national standards for China's railway communication signal, led the compilation of standards and specifications for key products, engineering technologies and services, conducted technical exchanges with research institutions and industry associations, promoted the enhancement of the entire industrial chain related to rail transport and communication signals, including formulation of standards, research, development and design, production and manufacturing, construction and installation, operation and maintenance.

## 行业标准制定

## Formulating Industry Standards

中国通号是国家铁路局技术标准的归口单位。截至2020年底，中国通号共归口管理现行有效行业标准186项，在编标准22项。主编发布行业标准6项、国铁集团标准10项。公司加强标准研究制定工作，全面完成公司C3列控系统和自主化CBTC系统技术标准体系建设。公司积极参加国际标准化组织铁路应用技术委员会相关工作，参与国际标准研究制定，助力国际铁路质量管理和技术标准体系不断完善。

CRSC is the responsible department of technical standards for National Railway Administration of the People's Republic of China. As of the end of 2020, CRSC participated in the centralized management of a total of 186 prevailing valid industry standards, and 22 in-process standards. As the chief editor, it released 6 industry standards and 10 China Railway standards. CRSC strengthened the research and formulation of standards, and fully completed the construction of technical standards for C3 train control system and automated CBTC system. It also actively participated in the work of Railway Application Technical Committee of International Organization for Standardization, engaged in the research and formulation of international standards, and constantly improved international railway quality management and technical standard system.

## 中国通号“十三五”期间主参编国家及行业标准一览

CRSC's Participation in the Compilation of National and Industry Standards during "the Thirteenth Five-Year Plan"

指标 Indicator	单位 Unit	2016	2017	2018	2019	2020	累计 Total
主参编国家标准 National standards	件 piece	6	0	8	2	1	17
主参编行业技术标准 Industry standards	件 piece	100	34	42	13	9	198

## 中国通号主导、主编的铁路行业技术标准

Technical Standards for Railway Led or Compiled by CRSC as Chief Editor

### 中国铁路列车运行控制系统 (CTCS) ——最顶层的控制技术方案



#### Chinese Train Control System (CTCS) - the top-level control technology solution

- 《铁路列控系统 (CTCS) 总体技术要求》  
General Technical Requirements of Railway Train Control System (CTCS)
- 《CTCS-3级列控系统总体技术方案》  
Overall Technical Scheme of CTCS-3 Train Control System
- 《铁路数字移动通信系统 (GSM-R) 总体技术要求》  
General Technical Requirements of Railway Digital Mobile Communication System (GSM-R)
- 《CTCS-3级列车运行控制系统与铁路数字移动通信系统 (GSM-R) 接口规范》  
Interface Specification between CTCS-3 Train Control System and Railway Digital Mobile Communication System (GSM-R)

### CTCS-3级列控系统——最核心的技术装备



#### CTCS-3 Train Control System - the core technical equipment

- 《调整集中系统技术条件》 (CTC)  
Technical Conditions of Centralized Traffic Control (CTC)
- 《无线闭塞中心技术规范》 (RBC)  
Technical Specifications of Radio Block Center (RBC)
- 《铁路车站计算机联锁安全原则》 (CBI)  
Safety Principles of Computer Based Interlocking (CBI) in Railway Stations
- 《CTCS-3级列控系统车载设备技术条件》 (ATP)  
Technical Conditions of CTCS-3 Onboard Equipment (ATP)
- 《临时限速服务器技术条件》 (TSRS)  
Technical Conditions of Temporary Speed Restriction Server (TSRS)
- 《铁路信号安全数据网》  
Railway Signal Safety Data Network
- 《列控中心技术条件》 (TCC)  
Technical Conditions of Train Control Center (TCC)
- 《铁路信号系统内部接口》  
Internal Interfaces of Railway Signal System

### 中国铁路信号——最基础的安全设备



#### China Railway Signal - the most fundamental safety equipment

- 《ZPW-2000轨道电路技术条件》  
Technical Conditions of ZPW-2000 Track Circuit
- 《铁路信号符号》  
Railway Signaling Symbols
- 《列控系统应答器应用原则》  
Application Principles of Transponders for Train Control Systems
- 《铁路信号设计规范》  
Railway Signal Design Specifications
- 《铁路道岔转辙机》系列规范  
Series of Specifications of Railway Switch Machines
- 《铁路信号故障-安全原则》  
Railway Signal Fault-Safety Principles
- 《铁路信号计轴设备》  
Railway Signal Axle Counter
- 《铁路通信、信号、信息工程施工安全技术规程》  
Technical Specification for Construction Safety of Railway Communication, Signal and Information Engineering

## 行业技术交流

### Exchanging Industry Technologies

作为中国铁道学会通信信号分会的挂靠单位,中国通号大力支持通信信号分会创条件、搭平台、促服务,推动行业技术交流、技术品牌建设。2020年,中国通号主办中国铁路通信信号创新发展论坛、第七届全国ZPW-2000轨道电路技术研讨会等交流会议;集聚铁路行业通信领域专家力量组织开展《下一代承载网应用技术白皮书》《智能铁路通信云技术白皮书》编制工作并在中国铁路通信信号创新发展论坛上发布,促进铁路通信承载网和业务网技术的发展,推动铁路承载网和通信云相关技术应用。

As an attached institution of the Communications Signal Branch of China Railway Society, CRSC offered vigorous support for the Communications Signal Branch to create conditions, build platforms, promote services, advanced technical exchanges and the construction of technical brands. In 2020, CRSC hosted Innovative Development Forum on China Railway Communication Signal, the Seventh Technical Seminar on ZPW-2000 Track Circuit and other exchange conferences; it also brought together the experts in the railway communication field to organize the compilation of Technical White Paper for Next Generation of Bearer Network Applications and Technical White Paper for Intelligent Railway Communication Cloud, and released them on Innovative Development Forum on China Railway Communication Signal in an attempt to promote the technological development of railway communication bearer network and business network and push forward the applications of railway bearer network and communication cloud.



10月24日,中国铁道学会通信信号分会、中国通号联合主办“轨道交通智能化发展-通信信号创新发展”论坛

On October 24, 2020, the Communications Signal Branch of China Railway Society and CRSC co-hosted "Intelligent Rail Transport Development-Communication Signal Innovation Development"



白皮书现场发布仪式

Onsite Launch of White Papers





# 服务创造价值

## Service Creates Value

铁路通信信号系统是铁路的核心技术装备，是铁路安全、高效运营的重要保障，是铁路高端技术水平的集中体现。中国通号始终坚持“求实、创新、拼搏、奉献”的企业精神，以卓越的产品、工程、技术和服务，为国内外客户提供安全适用的轨道交通控制系统技术服务，持续创造价值。中国通号牢固树立“质量是生命、安全大于天”的理念，筑牢安全质量底线红线意识，注重企业安全质量文化建设，安全质量管控水平显著提升。中国通号的系统技术和装备广泛应用于我国14.6万公里普速铁路、3.8万公里高速铁路和100多条城市地铁线路，为人民群众提供安全、便捷、智能的出行方式。

Railway communication signal system is a core technology of railways, an important guarantee for the safe and efficient operations of railways, and an intensive embodiment of high-end railway technologies. CRSC always adheres to its corporate spirits of “realism, innovation, endeavor and dedication”, and provides safe and appropriate rail transport control systems, technologies and services for domestic and overseas clients, thus creating continuous value. CRSC entrenches the concept of “Quality is Life, Safety is Paramount”, strengthens the red-line thinking of safety and quality bottom-line, focuses on the construction of safety and quality culture, and significantly enhances its safety and quality control level. CRSC’s systems, technologies and devices are widely applied in 146,000 km ordinary speed railways, 38,000 km high-speed railways and over 100 urban subways in China, providing safe, convenient and intelligent transportation for the public.

**可靠产品与服务** 64

**Reliable Products and Services**

**推进数字化转型** 69

**Promoting Digital Transformation**

**安全生产与应急管理** 73

**Safe Production and Emergency Management**

## 可靠产品与服务

## Reliable Products and Services

中国通号致力于以全方位的产品和全生命周期的服务，为安全运营提供保障。公司信守质量承诺，严格遵守国家产品质量法、产品质量安全法等法律法规，制定《质量管控规则》《产品质量检验工作管理办法》《产品质量监督检查管理办法》《产品质量安全事故（故障）管理办法》《安全质量约谈办法》等一系列质量管理制度，明确质量责任、加强质量安全控制，建立起“一级总部质量安全监管中心—二级集团或专业化公司质量安全管理中心—三级业务实施单元质量安全中心”的质量安全三级管控体系，从产品研发、设备制造、工程安装、集成调试、运营维护全产业链统筹质量管理。2020年，公司完成通用产品安全认证11项、通用应用安全认证42项、特殊应用安全认证114项。

同时，中国通号以及旗下系统集成、研发设计、生产制造、工程施工等结合企业业务体系，切实履行客户隐私保护责任，不断创新服务方式，为客户提供卓越服务。

### 2020年，公司产品质量安全目标全面实现

In 2020, CRSC's product quality and safety goals were fully realized

- 01 未发生铁路交通一般B类及以上责任事故  
No general category-B and above railway traffic liability accident
- 02 未发生工程质量一般及以上责任事故  
No general and above engineer quality liability accident
- 03 未发生重大质量问题  
No major quality issue
- 04 产品质量监督检查合格率、工程一次交付验收合格率100%  
The acceptability of product quality supervision and inspection and engineering one-time delivery and acceptance of 100%
- 05 新研发安全关键产品和城轨信号集成系统100%实行第三方安全评估  
Third-party quality safety assessment implemented for all newly developed safety critical products and urban rail signal integration systems
- 06 安全关键产品软件100%实行独立安全测试  
Independent safety tests implemented for all safety critical products
- 07 全系统较大及以上质量事故数为0  
No major and above quality accident
- 08 在轨系统设备安全可靠运行，质量安全持续平稳  
Safe and reliable operation of on-track system equipment, continuous stability of quality safety

CRSC is dedicated to providing guarantee for safe operations of railways with a complete set of products and full-lifecycle services. It kept quality promises, strictly followed the Product Quality Law of the People's Republic of China, the Product Quality and Safety Law of the People's Republic of China and other applicable laws and regulations, formulated a series of quality management systems like Quality Control Rules, Administrative Measures on Product Quality Inspection, Administrative Measures on Product Quality Supervision and Inspection, Administrative Measures on Product Quality and Safety Accidents (Faults) and Safety and Quality Interviewing Methods, clarified quality accountability, strengthened quality and safety control, and established a three-level quality and safety control system, namely, "the first-level quality and safety supervision center at the Headquarters, the second-level quality and safety management centers at secondary groups or specialized companies, and the third-level quality and safety centers at various business units", thus making overall planning of quality management of the entire industrial chain including product research, device manufacturing, engineering installation, integration and commissioning, and operation and maintenance. In 2020, CRSC completed 11 safety certifications of general productions, 42 safety certifications of general applications and 114 safety certifications of special applications.

Over the same period, based on system integration, research, development and design, manufacturing, construction and other business systems, CRSC earnestly performed its responsibility of protecting client privacy, and constantly innovated its service modes to provide excellent services for clients.

### 中国通号全方位质量管理体系

CRSC Comprehensive Quality Management System

#### 产品研发 Product R&D

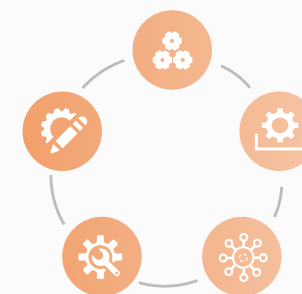
明确关键质量控制点及控制要求，进行可靠性、安全性计算与分析，保证产品满足相应等级安全标准

Specifying key quality control points and control requirements, conducting reliability and safety calculation and analysis, ensuring products meeting corresponding levels of safety standards

#### 设备制造 Equipment Manufacturing

出台《产品质量检验工作管理办法》，设立产品质量检验部门，完成产品入场、生产、出厂全流程的严格检验，建立产品质量检验档案，禁止不合格产品流出

Administrative Measures on Product Quality Inspection, setting up product quality inspection department, strictly inspecting the whole process of entry, production and delivery of products, establishing product quality inspection records, prohibiting the outflow of unqualified products



#### 工程安装 Engineering Installation

严格按照施工安装标准，加强施工安装过程安全分析和质量控制

Strictly following construction installation standards, strengthening safety analysis and quality control during construction installation

#### 运营维护 Operation & Maintenance

细化产品使用说明书及培训教材，制定安全管控措施

Detailing product instruction manuals and training materials, formulating safety prevention and controlling measures

#### 集成调试 Integration & Commissioning

提供产品检验、测试工作，识别并有效应对集成调试存在的管理与技术问题

Providing product inspection and test, identifying and efficiently handling management issues and technical troubles existing in integration and commissioning



## 安全质量体系

### Safety and Quality System

截至2020年底,公司及旗下子企业均完成ISO9001(质量)管理体系认证;工程建设施工企业通过了GB/T50430:2017新版标准转版升级认证,各企业深入推进IRIS国际铁路行业标准、CMMI、安全保障体系的充分融合,形成一体化质量安全管理体系统。

As of the end of 2020, CRSC and all its subsidiaries passed ISO 9001 (Quality Management System) certification. Engineering construction enterprises passed GB/T50430: 2017 new version of the standard version upgrade certification. All CRSC enterprises further promoted the full integration of IRIS, CMMI and safety guarantee system, forming an integrated quality and safety management system.

## 产品可靠性管理

### Product Reliability Management

公司细化可靠性、可用性、可维护性和安全性 (RAMS) 技术要求、失效模式与影响分析 (FMEA) 等质量工具应用,全面开展安全产品RAMS分析和设计,加强产品可靠性管理。全年完成通用安全产品认证、通用应用安全认证、特殊应用安全认证在内的167项认证,安全认证项目认证通过率100%。

CRSC detailed quality tools applications like reliability, availability, maintainability and safety (RAMS), and technical requirements, failure mode and effect analysis (FMEA), fully carried out the RAMS analysis and design of safety products and strengthened product reliability management. In 2020, CRSC passed 167 certifications including general safety product certification, general application safety certification and special application safety certification. The passing rate of safety certification items reached 100%.

## 产品检验检测及售后

### Product Inspection, Testing and After-sales Services

中国通号严格产品检验、检测管理,制定了产品质量检验工作管理办法、产品质量监督抽查管理办法等,旗下企业建立检验、检测程序、产品和服务质量问题程序、全生命周期可追溯管理程序等。组织接受国家铁路局、国铁集团产品质量监督检查,加强企业级产品质量控制,严把质量关。

CRSC strictly managed product inspection and testing management, and formulated Administrative Measures on Product Quality Inspection, Administrative Measures on Product Quality Supervision and Inspection. Its subsidiary enterprises set up the inspection and testing procedure, the product and service quality issue procedure, the full-lifecycle traceable management procedure, etc. CRSC organized and accepted product quality supervision inspection conducted by National Railway Administration of the People's Republic of China and China Railway, strengthened enterprise-level product quality control and strictly controlled quality.



## 测试案例库建设

### Building of Test Case Repository

依托3万多公里高铁和2,000多公里地铁的建设经验,积累了全球规模最大、案例最多的列控系统研发及仿真测试案例库和产品制造测试检验项点库,拥有4万多个专属测试案例和10万余个测试项点,建立起轨道交通建设运营的突出优势。2020年,中国通号进一步总结、提炼既有测试过程、技术、方法,根据用户需求和系统及设备技术标准,设计各种可能的站场类型和特殊工程数据,完善系统功能、安全功能、运行场景、故障缺陷等测试案例库,为产品研发、设计变更、系统集成、故障分析等各阶段关键环节质量把控夯实基础;为提高系统和产品的可靠性,降低安全风险提供基础数据。

Relying on the construction experience of more than 30,000 kilometers of high-speed rail and over 2,000 kilometers of subway, CRSC accumulated the world's largest train control development and simulation testing case repository and product manufacturing test inspection item bases with the maximum quantity of cases, owned more than 40,000 exclusive test cases and over 100,000 testing items and built outstanding advantages of rail transit construction and operation. In 2020, CRSC further summarized and simplified existing test procedures, technologies and methods, designed various possible types of station yards and special engineering data and completed test case repository based on user demand and system and equipment technical standards, like system function base, safety function base, operation scenario base and fault base to lay a solid foundation for quality control in critical sections like product R&D, design changes, system integration and fault analysis and provide basic data for system and product reliability improvement and safety risk reduction.



## 卡斯柯公司助力上海地铁 2 号线升级为“双卡双待”

CASCO boosted Shanghai metro line 2 upgrading to Dual SIM Dual Standby (DSDS)

案例  
Case

作为上海轨交线网中最重要的骨干线之一，上海地铁2号线自开通以来已“服役”20年，设备的日趋老化，系统的稳定性和安全性逐渐难以满足日益增长的客流运输需求。

2014年，申通地铁开始研究2号线的信号改造方案。根据既有经验，对既有线路信号升级，或者沿用原有信号制式，或者采用全新信号系统进行替代。但沿用原有信号制式，不符合技术发展的趋势，采用全新信号系统进行替代必须一次性完成信号切割替换，且无法分段实施改造，对于上海地铁2号线这样线路长、列车多、运营压力大的线路来说，几乎是无法完成的任务。最终，中国通号卡斯柯公司独家创新定制了第三种方案——“双套信号系统”，让上海地铁2号线实现“双卡双待”。



经过五年时间的持续技术攻关和改造，2020年10月，该方案实现了关键突破——31列新购列车的安装调试完成，针对69列既有信号制式列车的改造正式启动。改造完成后，将有共计100列具有“双卡双待”功能的2号线列车整装待发，运营间隔将被缩减至2分钟，为高峰期间地铁运营能力提供更为可靠的保障。

该创新方案有效解决了分段改造的难题，改造工期缩短一年以上，对2号线既有运营的影响也被降到最低。同时，改造后的系统将更具智能性和安全性，系统冗余性、稳定性、可维护性均得到增强，还可实现远程技术诊断，维护效率大大提升。

As one of the most important backbone metro lines in Shanghai rail network, Shanghai metro line 2 has served for 20 years since its launching. It's difficult for the aging equipment and devices and the stability and safety of systems to meet the increasing demand of passenger transport.

In 2014, Shanghai Metro started to study signal upgrade scheme for metro line 2. According to existing experience, for existing metro line signal upgrading, either the original signal system or a brand-new signal system should be used to replace existing metro line signal system. However, the continued use of the original signal system was not in line with the trend of technical development. For the replacement with a brand-new signal system, signal cutting and replacement must be completed once, and the sectional replacement was impossible to be conducted. For Shanghai metro line 2 with long length, lots of trains and high operation pressure, it was an impossible mission. Finally, CASCO exclusively developed the third scheme, i.e., "dual signal system", realizing DSDS for Shanghai metro line 2.

After five years' continuous technological breakthrough and upgrading, a critical scheme breakthrough was realized in October 2020: the installation and commissioning of 31 newly purchased trains were completed, and the upgrading of 69 trains with original signal system was officially launched. After upgrading, a total of 100 metro line 2 trains with DSDS function would be fully equipped for operation with the operating interval shortening to two minutes, which provided reliable guarantee for subway operation capability in rush hours.

The innovation scheme effectively solved the problem of sectional upgrading, which shortened the construction period for more than a year and minimized the impact on current operation of metro line 2. Meanwhile, the upgraded system was intelligent and safe. System redundancy, stability and maintainability were enhanced. Remote technical diagnosis was also realized, and maintenance efficient was greatly improved.

## 推进数字化转型

Promoting  
Digital  
Transformation

中国通号深刻认识信息化、数字化技术对企业转型、高质量发展的重要性，强化数据驱动、集成创新，积极推进人工智能、北斗通信等新一代信息技术应用，各级企业积极探索构建适应业务特点和发展需求的新技术推广，推进生产运营智能化、用户服务敏捷化，切实提高安全质量管理水平和效能。

公司全面部署数字化转型工作，深入学习相关政策、标准和要求，为全面推进国有企业数字化转型工作打好基础；与数字化转型工作专家进行咨询交流，并组织调研数字化转型工作流程与方式，开展“国有企业数字化转型诊断工作”，帮助企业发现数字化建设过程中存在的问题，摸清发展现状同时为企业提供短板和问题点诊断，为全面数字化转型过程提供决策依据。

公司积极推进信息化建设，组织各下属企业梳理安全质量信息流程及需求，建成覆盖二三级所有企业，包含安全、质量、专项管理与督办四个模块的安全质量信息管理系统，开展安全风险、隐患排查、生产安全事故和产品质量问题、事故故障信息及供应商质量问题信息管理，建立专项任务在线督办和在建设项目信息台账管理，初步搭建安全质量信息化管理平台，该系统已于2020年11月投入试运行。

CRSC had a deep understanding of the importance of information, digitized information technology for enterprise transformation and high-quality development, strengthened data-driven, integration innovation and actively promoted the application of the new generation of information technology including AI and Beidou communication. All levels of enterprises actively explored new technology promotion adapting to business characteristics and development demands, promoted the intelligent production and operation and user services agility and effectively improved the level and efficiency of safety and quality management.

CRSC fully deployed digital transformation, conducted in-depth study of relevant policies, standards and requirements to lay a solid foundation for fully promoting the digital transformation of state-owned enterprises. CRSC also consulted and communicated with digital transformation experts, organized the investigation of digital transformation procedures and means, conducted digital transformation diagnosis of state-owned enterprises, helped enterprises find problems existing in digitalization construction, figured out development situation and meanwhile provided weakness and problem diagnosis for enterprises to offer decision basis for comprehensive digital transformation.

CRSC actively promoted information construction, organized its subordinate enterprises sorting safety quality information procedures and requirements, built a four-module safety quality information management system covering all level-2 and 3 enterprises, including safety, quality, specialized management and supervision, conducted information management covering safety risk and potential risk identification, production safety accidents and product quality issues, accident and fault information and supplier quality issues, set up online supervision of specialized tasks and record management of projects under construction and preliminarily built the safety quality information management platform which was put into trial operation in November 2020.





**中国通号  
数字化转型案例**

**CRSC Digital  
Transformation Cases**

通过先进铁路VR培训系统对技术人员进行培训  
CRSC provided trainings for technicians of through advanced railway VR training system

**通号建设集团  
CRSC Construction Group**

推进BIM技术（建筑信息模型建造技术）在工程项目安全质量管控中的应用。充分利用BIM和VR技术，创建危大工程模型，三维场地模型、自动生成图片和动画视频等，创新管理模式和手段，为重大项目提供完整的、与实际情况一致的建筑工程信息库，提高安全技术交底效果和工程质量，降低安全风险。

Promoted the application of BIM technology (Building Information Modeling Technology) in engineering project safety quality prevention and control. Fully utilized BIM and VR technologies, created dangerous engineering modules, 3D site module, automatic generation of images and animated videos, innovated management models and means, provided a complete construction engineering information database consistent with the actual situation for major projects, improved safety technical disclosure effect and engineering quality and reduced safety risks.

**北京工业集团北信公司  
CRSC(Beijing) Rail Industry Group**

加快提升产品生产智能化水平，借助MES系统（制造企业生产过程执行管理系统）整体上线运行，实现PLM（产品生命周期管理）、ERP（管理信息系统）、MES三个平台的互联互通，达到平台整合、业务整合、数据整合，实现全部电子元器件物料批次追溯信息化，关键工艺及过程质量参数电子化，生产过程防呆防错智能化。

Accelerated the promotion of product production intelligence level, realized interconnectivity of PLM, ERP and MES relying on the overall online operation of MES, achieved platform integration, business integration and data integration and realized traceability informatization of all electronic components and materials batches, electrification of key technology and process parameters and intelligence of error proof and mistake proof.

**西安工业集团西信公司  
CRSC (Xi'an) Rail Transit Industry Group**

以提升产品质量、满足用户需求及提高生产效率为目标，建立信号基础装备智能化柔性生产线，通过整合立体仓库、AGV系统、智能搬运机械手、自动化专机和智能物流输送系统，将数控加工、组装设备、计算机控制系统形成柔性制造单元，实现可根据制造任务或生产环境的变化迅速进行调整,适用于多品种、中小批量产品生产。

With the goal of improving product quality, meeting user needs and increasing production efficiency, constructed the intelligent flexible production line for signal infrastructure, formed numeric control machining, mounting equipment and computer control system into a flexible manufacturing cells by integrating stereoscopic warehouse, AGV system, intelligent handling manipulator, automatic aircraft and intelligent logistics delivery system, realized rapid adjustment based on the changes of manufacturing tasks production environment, suitable for the production of multi-type, small and medium batch products.

**通号工程局集团  
CRSC Engineering Group**

开发基于北斗技术的铁路营业线施工安全防护预警系统，可对施工人员位置和活动轨迹进行监控，对人员侵限及列车接近进行预警，已在京津城际、京张高铁、连徐客专项目投入应用。

Developed the railway line construction safety protection and early warning system based on Beidou technology, monitored the position and movement track of construction personnel, gave early warning to personnel intrusion and train approaching. The system has been used in Beijing-Tianjin inter-city high-speed railway, Beijing-Zhangjiakou High-speed Railway and Xuzhou-Lianyungang High-speed Railway.



### 中国通号轨道交通 BIM 创新应用

#### BIM innovative application of CRSC

中国通号持续深化BIM技术应用,挖掘BIM技术使用潜力,引领BIM技术在铁路通信、信号领域的创新应用,为企业高质量发展提供技术支撑。

2020年7月,随着我国首个国产化BIM基础建模软件BIMMAKE1.0发布,中国通号所属工程施工企业通号工程局集团完全自主研发的国内首套“轨道交通通信信号工程BIM模型库”搭载首个国产化软件“东风”正式上线。

轨道交通通信信号工程BIM模型库包括通信模型、信号模型以及典型车站配置模板,涵盖设备、板卡、模块、支架、电缆等,模型精度全部达到运维等级,满足设计、施工、运维阶段应用要求。该模型库已获得国家版权局著作权登记证书。该模型库的建立,极大降低通信信号专业的建模难度,推动BIM技术在通信信号专业的普及应用,提高建模效率,为施工方案优化、精细化施工提供全新手段。

CRSC continually deepened the application of BIM technology, exploited the potential of BIM technology, led the innovative application of BIM technology in the railway communication and signal field and provided technical support for high-quality development of enterprises.

In July 2020, with the launching of BIMMAKE1.0, China's first homemade BIM basic modeling software, the "rail transit communication signal engineering BIM model base" equipped with the first home-made software "Dongfeng" officially online and solely developed by CRSC Engineering Group Company Ltd. was officially launched.

The rail transit communication signal engineering BIM model base included communication model, signal model and typical station configuration template and covered equipment, board cards, models, brackets, cables and so on. The accuracy of all models reached the level of operation and maintenance and met application requirements in design, construction, operation and maintenance periods. The model base has obtained the copyright registration certificate issued by National Copyright Administration. The establishment of the model base greatly lowered the level of difficulty of communication signal modeling, popularized the use of BIM technology in communication signal area, improved modeling efficiency and provided new methods for the optimization of construction plans and fine construction.

案例  
Case



## 安全生产与应急管理

### Safe Production and Emergency Management

中国通号持续推进全员安全生产责任体系建设,修订完善《安全生产责任制》,明确责任清单,安全管理与业务工作相融合,落实安全质量责任落实。2020年,公司累计投入安全生产资金4.1亿元,未发生生产安全一般及以上、重伤轻伤事故,未发生特种设备、火灾一般及以上责任事故,未发生职业病及职业中毒等事故。2018~2020年,公司因工亡故人数、职业病和职业中毒事件发生数均为0。

CRSC continued to advance the construction of safe production accountability system, revised Safe Production Accountability System, specified the list of responsibilities, integrated safety management and business work, and implemented safety and quality accountability. In 2020, CRSC cumulatively inputted 410 million RMB of funds for safe production. No minor or major production safety accidents and no special equipment accident or fire occurred in CRSC; there was also no occupational disease or occupational poisoning. From 2018 to 2020, no employee died of occupational injury or caught occupational disease or occupational poisoning.

#### 强化安全生产 责任落实

#### Strengthening Safe Production Accountability

中国通号制定安全生产监督管理办法、安全生产检查制度等,明确安全生产工作体系、责任体系,考核机制等,确保安全生产。中国通号及系统子企业根据市场要求,全部通过ISO45001:2018(职业健康安全)管理体系认证。全年公司敦促13家二级企业安全总监配备岗位人员,做到应配尽配。62家法人企业修订完善《安全生产责任制》,明确规定各级岗位人员安全职责、责任范围,实现安全责任全面覆盖;与18家二级企业签订安全质量责任书,将安全质量风险防范关口前移,实现源头控制。

CRSC formulated administrative measures on supervision of safe production, safe production checking system and other regulations to specify safe production working, accountability and appraisal systems and make sure production safety. In accordance with market requirements, CRSC and its subsidiaries fully passed the certification of ISO45001:2018 (Occupational Health and Safety System). In 2020, CRSC urged the Safety Directors of 13 subsidiaries to recruit sufficient qualified staff. 62 incorporated enterprises revised and perfected Safe Production Accountability System, specified the safety responsibilities and responsibility scope of staff, and achieved full coverage of safety responsibilities; CRSC also signed safety and quality responsibility agreements with 18 subsidiaries to shift forward the gateway of safety and quality risk prevention and control and achieve source controls.

#### 推进安全生产 双重预防机制

#### Advancing Dual Prevention Mechanism on Safe Production

2020年,中国通号按照国家、行业和属地规定,结合业务特点,公司旗下各企业加强风险辨识和评价,建立危险源和安全生产风险数据库,建立安全生产风险分级管控机制,落实安全生产风险管控措施,梳理事故隐患排查标准,加大安全检查及隐患排查整治,建立起安全生产双重预防机制,有效提升安全管理水平。2020年,公司各企业组织安全生产检查和隐患排查2,230次,已发现的安全问题及事故隐患全部整改完毕。

In 2020, by following national, industrial and local regulations, taking into account business characteristics, CRSC required all of its subsidiaries to enhance recognition and assessment of risks, establish a database on hazard sources and safe production risks, set up hierarchical control mechanisms of safe production risks, implement safe production risk management and control measures, sort out potential accident identification standards, exert efforts for safety inspection and hazard identification, build dual prevention mechanisms for safe production, and effectively enhanced safety management level. In 2020, CRSC organized 2,230 safe production inspections and hazard identifications, and potential safety issues and hazards identified have all been rectified.





## 开展安全生产专项整治三年行动

## Launching Three-year Dedicated Rectification Actions for Safe Production

## 安全生产培训与教育

## Safe Production Trainings and Education

发布中国通号《安全生产专项整治三年行动方案》，各企业按照2个专题和3个专项整治实施方案，结合自身业务制定本企业的具体实施计划，共确定整改事项1,070项，2020年已完成245项，其他事项正在逐步扎实推进。

CRSC released the Three-year Dedicated Rectification Actions for Safe Production, and developed 2 special topics and 3 dedicated rectification implementation schemes for each subsidiary based on their own business. A total of 1,070 rectification matters have been confirmed. 245 of them were completed in 2020, and the remaining matters are being implemented step by step.

中国通号成立以董事长为主任的安全生产管理委员会，制定安全生产决策，建立起自上而下的安全生产监管机制，提升公司本质安全。制定《中国通号安全生产检查制度》等管理办法，对安全生产工作及考核机制做出规定。同时，加强员工安全培训及教育，为员工提供安全健康工作环境，提高全员安全意识和安全素质。

各企业共进行安全生产内部培训2,727期，58,854人次参加，人均安全生产培训10小时；各企业参加外部特种设备及特种作业岗位复训人员1,098人，复训率100%。此外，公司组织两期外部专家培训，共计1,255人次参加。

CRSC established a safe production management committee with the Chairman of the Board as the Director, formulated safe production decisions, set up top-down safe production supervision mechanism, and enhance its essential safety. It also developed administrative measures like CRSC Safe Production Checking System, and specified regulations on safe production work and its appraisal mechanism. Meanwhile, CRSC also strengthened safe trainings and education on employees, created a safe and healthy working environment and improved safety awareness and safety quality of all employees.

All subsidiaries under CRSC conducted 2,727 internal safe production trainings, involving 58,854 participants, and each employee averagely received 10 hours of safe production training; 1,098 second-time trainees attended the trainings on external special equipment and special operation posts, with a second-time training rate of 100%. Moreover, CRSC also organized two trainings by external experts, which attracted 1,255 participants.

## 应急管理

## Emergency Management

## 应急预案演练和评估

## Exercise and Assessment of Emergency Plans

中国通号制定《安全生产应急管理办法》，明确应急管理工作原则、责任要求及应对机制，规范事故灾难应急管理，建立起科学高效的应急管理机制。2020年，按照预防为主、预防与应用相结合的原则，公司加强事故灾难前期预防措施，制定应急预案、加大预案演练和评估，加强一线从业人员应急知识和技能培训，规范应急管理，保障安全运营。截至2020年底，公司在综合应急预案、专项预案、现场处置方案、应急处置卡等各类应急预案共计1,775个；全年组织一线从业人员应急能力培训347次。

CRSC formulated Safe Production Emergency Management Methods to specify emergency management work principles, responsibility requirements and response mechanisms, to standardize emergency management of accidents and disasters, and to set up scientific and efficient emergency management mechanisms. In 2020, according to the principle of prevention upfront and combination of prevention and application, CRSC enhanced preliminary prevention measures for accidents and disasters, developed emergency plans, increased emergency plan exercises and evaluations, promoted emergency knowledge and skill trainings on frontline practitioners, standardized emergency management and guaranteed safe operations. As of the end of 2020, CRSC set up a total of 1,775 comprehensive emergency plans, dedicated contingency plans, onsite disposal schemes, emergency disposal cards and other emergency plans; it also organized 347 emergency capability trainings for frontline practitioners.

应急演练是检验应急预案、锻炼应急队伍、磨合应急机制的有效措施。2020年，公司各企业共组织开展火灾、触电、机械伤害、高空坠落事故等场景应急演练475次，并通过演练效果评估，发现问题修订现场处置方案，提高应急预案的科学性、实用性和操作性。

Emergency exercises are effective measures to test emergency plans, hone emergency teams and coordinate emergency mechanism. In 2020, CRSC organized its subsidiaries to engage in 475 scenario-based emergency exercises against fire, electric shock, mechanical injury and falling from high etc., and assessed the emergency plans through exercise effects. In case that any problem was identified, CRSC would revise onsite disposal schemes to improve the scientificity, practicability and operability of emergency plans.



在匈塞项目现场开展符合塞方标准的应急演练

CRSC conducted emergency exercises at the site of Hungary-Serbia Railway Project in accordance with Serbia's standards



# 绿色驱动未来

## Green Creates Bright Future

绿水青山就是金山银山。中国通号坚持以最少的资源和能源消耗换取最大的产品产出，降低自身生产运营对环境带来的影响；通过技术创新、通信科技解决方案等方式，用绿色解决方案助力生态文明建设，实现低碳经济。

Green mountains and clear water are as valuable as mountains of gold and silver. CRSC insisted on getting the maximum product outputs with the minimum resources and energy consumption, and reducing the influence of its own production and operations on the environment; By means of technical innovations, communication technology solutions and other methods, CRSC facilitated the construction of ecological civilization and the realization of low-carbon economy with green solutions.

节约能源资源	78
Saving Energy Resources	
温室气体减排	80
Reducing Emissions of Greenhouse Gases	
减少“三废”排放	83
Reducing Emissions of “Three Wastes”	
提供绿色解决方案	86
Providing Green Solutions	



## 节约能源资源

### Saving Energy Resources

中国通号严格遵循《中华人民共和国环境保护法》《中华人民共和国清洁生产促进法》及所在运营地的环保法律、法规及标准，公司各企业全部完成环境管理体系ISO14001的认证。公司制定《中国通号能源节约与生态环境保护管理办法》，细化分工要求，明确统计检测要求，坚持源头把关和过程控制并重的原则，倡导节能减排技术应用、开发高效节能环保产品，将节能环保意识融入设计研发、生产制造与工程建设全流程。公司每年对各企业节能减排工作及检测统计数据收集、分析，并进行评估审查，敦促所属企业不断完善管理、提升效能。

CRSC strictly followed the Environmental Protection Law of the People's Republic of China, the Clean Production Promotion Law of the People's Republic of China and local environmental laws, regulations and standards, and all of its subsidiaries have fully completed the certification of ISO14001. CRSC formulated CRSC Administrative Methods on Energy Conservation and Ecological Environmental Protection, specified the requirements for division of labor and statistical and testing requirements, attached the same importance to source control and process control, advocated the application of energy-saving and emission-reduction technologies and the development of efficient and energy-saving products, and integrated energy conservation and environmental protection awareness into full processes of design, research, development, manufacturing and construction. CRSC collected, analyzed and assessed the energy conservation and emission reduction data of all subsidiaries on a yearly basis, and urged relevant subsidiaries to constantly improve management and enhance efficiency.

包装材料类型 Packing material type	生产制造包装用料 Manufacturing packing material			建筑工程包装用料 Construction packing material	
	纸箱 Carton	木材 Timber	塑料 Plastics	塑料 Plastics	金属 Metal
	吨 tons	吨 tons	吨 tons	吨 tons	吨 tons
2018	238.6	3,055.2	41.4	68.0	114.0
2019	321.5	3,849.1	37.3	8.2	109.8
2020	293.3	3,339.7	34.0	38.9	119.9

中国通号 2018-2020 年度制成品包装消耗量  
CRSC Packing Material Consumption for Finished Products in 2018-2020

### 中国通号2018-2020年度能源资源消耗情况

#### CRSC Energy Consumption in 2018-2020

能源类型 Energy type		电力 Electricity	液化气 Liquefied gas	汽油 Gasoline	柴油 Diesel	热力 Heating power	天然气 Natural gas
		兆瓦时 MWH	立方米 m <sup>3</sup>	吨 tons	吨 tons	百万千焦 million KJ	立方米 m <sup>3</sup>
工程建设 Construction	2018	19,236.9	83,174.0	3,147.5	2,476.7	14,989.9	130,365.0
	2019	19,078.4	89,775.6	2,819.0	2,738.3	16,898.0	153,522.9
	2020	19,536.5	79,506.1	3,076.4	1,003.4	20,259.2	187,293.7
生产制造 Manufacturing	2018	32,707.3	0.0	158.3	47.2	70,157.0	1,183,900.0
	2019	41,350.0	0.0	118.1	38.1	63,593.0	1,504,000.0
	2020	35,452.0	0.0	99.48	33.8	43,777.0	1,089,356.0
办公场所 Administration	2018	36,663.0	33,366.9	1,097.4	12.5	2,134.9	1,873,107.3
	2019	31,788.4	59,516.5	1,060.0	10.2	4,711.6	1,336,783.3
	2020	25,730.6	7,648.1	672.2	0.0	58,447.4	953,537.3
合计 Total	2018	88,607.0	116,541.0	4,403.3	2,536.4	87,281.7	3,187,372.3
	2019	92,216.8	149,292.1	3,997.1	2,786.6	85,202.6	2,994,306.2
	2020	80,719.1	87,154.2	3,847.2	1,037.2	122,483.6	2,230,187.0

能源类型 Energy type	用水量 Water consumption	用水强度 Water consumption intensity	综合能源消耗量 Comprehensive energy consumption	综合能源消耗强度 Comprehensive energy consumption intensity
	吨 tons	吨/万元 tons/10,000 RMB	吨标煤 tce	吨标煤/万元 tce/10,000 RMB
2018	1,691,950.8	0.4	28,896.3	0.01
2019	1,449,785.8	0.3	28,848.3	0.01
2020	796,981.91	0.2	20828.63	0.01

中国通号 2018-2020 年度能源资源消耗情况  
CRSC Energy Consumption in 2018-2020

## 中国通号集团下属企业节能减排降碳措施(部分)

### CRSC Energy-saving, Emissions-reduction and Carbon-reduction Measures (to name just a few)

研究设计院集团加强用电管理, 对公司供电照明系统全年定期巡查, 采用节能产品, 及时更换照明设备。倡导节能减排, 鼓励员工利用自然光源, 减少灯光照明时间及区域; 午休和办公区域无人时关闭灯光; 公共区域仅使用必要的基础照明; 合理设定办公区域空调温度等措施。

CRSC Research & Design Institute Group strengthened power usage management, conducted regular patrolling of its power supply and lighting systems, made use of energy-saving products and replaced lighting equipment in a timely manner. It also advocated energy conservation and emissions reduction, encouraged employees to take advantage of natural light, and reduced the lighting time and area. Lights are turned off during noon break and when there is nobody in the office area; only necessary fundamental lighting is utilized in public areas; the air-conditioner in the office area is also set up at an appropriate temperature.

## 温室气体减排

## Reducing Emissions of Greenhouse Gases

应对气候变化是人类共同的事业。中国政府已承诺, 二氧化碳排放力争于2030年前达到峰值, 努力争取2060年前实现碳中和。气候变化对我们业务的运营提出了更高的要求, 提出了更高的挑战。极端气候可能会导致铁路基础设施损坏、施工项目延期、影响铁路信号的稳定性等问题, 从而导致中国通号业务经济损失; 气温上升还会导致电力消耗的增加等。中国通号认为, 需要在业务中, 减少碳足迹及提升能源效益, 以助力减缓气候变化。中国通号结合节能减排工作安排, 努力提升能源效益, 降低温室气体排放。

Fighting climate changes is a common cause for human beings. Chinese Government has promised to achieve peak emission of carbon dioxide before 2030 and carbon neutrality before 2060. Climate changes raise higher requirements for our business operations and pose more severe threats. Extreme climates may lead to the damage of railway infrastructure, the postponement of construction projects, the weakening of the stability of railway signals and other problems, thus causing economic losses to CRSC business; temperature rise will also bring about increased power consumption and other issues. CRSC believes that it is necessary to reduce carbon footprints and enhance energy efficiency during business operations to slow down the speed of climate changes. In combination with energy conservation work arrangements, CRSC strives to enhance energy efficiency and reduce the emissions of greenhouse gases.

### 我们采取的应对措施有:

#### We took the following countermeasures:

#### 研发设计 Research, development and design

- 加大不同气候条件下数据的收集, 丰富数据资源库;  
Increase the collection of the data under different climate conditions to enrich data repository;

- 研发绿色出行解决方案, 通过技术优化, 助力低碳排放;  
Develop green travel solutions, and facilitate low-carbon emissions through optimized technologies;

西安工业集团启动雨污分离系统改造项目, 对排水管网进行改造, 实现雨水、污水分流排放。在雨污分离项目的同时, 完成地下综合管网改造, 有效解决地沟内老旧能源管道锈蚀渗漏问题, 减少能源浪费。

CRSC (Xi'an) Rail Transit Industry Group Co., Ltd. initiated the Transformation Project of Rain and Sewage Diversion System to transform the drainage pipe network and achieve the diversion and discharge of rain and sewage. At the same time, it completed the transformation of underground comprehensive pipe networks to effectively solve the pipe corrosion and leakage of old energy pipes in trenches and reduce energy waste.

电缆集团对2台每月消耗电能10万千瓦时的螺杆式空压机进行变频节能改造, 使空压机能达到自动化控制的同时, 可以根据生产需求选择运行不同容量空压机, 实现节电、节能。

CRSC Cable Group conducted frequency conversion restructuring on 2 screw compressors with a monthly power consumption of 100,000 KWH for energy conservation so that different capacity of compressors would be operated based on production needs to achieve electricity and energy conservation while achieving automation control.

#### 生产制造方面 Manufacturing

- 采用高环保标准设施及系统;  
Make use of highly environmental-friendly facilities and systems;
- 加强对生产过程的控制, 保障产品质量、提升产品性能的同时, 降低能耗;  
Strengthen the control over production process and reduce energy consumption while guaranteeing product quality and enhancing product performance;

#### 工程建设方面 Construction

- 加强对供应商的管控, 采用更低碳、环保的材料;  
Strengthen the management and control of suppliers, and adopt lower-carbon and more environmentally-friendly materials;

#### 办公及物业方面 Administration

- 推广使用LED灯;  
Promote the use of LED lights;
- 公共廊道使用声光控制系统;  
Adopt sound and light control systems in public corridors;
- 采用更集约的空调系统、控制空调运作时间;  
Adopt more intensive air-conditioning systems and control the operation time of air-conditioners;
- 推广绿色办公, 及时关闭非必要照明排风、显示器、采光灯、开水炉等。  
Promote green office, and turn off unnecessary lighting, ventilation system, displays, lighting lamps, boilers and other systems in a timely manner, etc.



## 中国通号2018-2020年度温室气体排放情况

## CRSC Greenhouse Gas Emissions in 2018-2020

指标 Indicator	2018	2019	2020
温室气体排放总量 (吨) Total greenhouse gas emissions (tons)	104,744.4	113,283.7	91,481.5
温室气体排放强度 (吨/人民币万元) Greenhouse gas discharge intensity (tons/10,000 RMB)	0.03	0.03	0.03
范畴一: 温室气体排放量 (吨) Category One: Greenhouse gas emissions(tons)	29,067.2	28,433.6	20,336.6
范畴二: 温室气体排放量 (吨) Category Two: Greenhouse gas emissions (tons)	75,677.2	84,850.1	71,144.9

注: 本公司温室气体排放参考《2006年IPCC国家温室气体清单指南》, 2018、2019年参考《2017年度减排项目中国区域电网基准线排放因子》, 2020年参考《2019年度减排项目中国区域电网基准线排放因子》等文件排放因子, 进行统计核算。

For CRSC's greenhouse gas emissions, please refer to 2006 IPCC Guidelines for National Greenhouse Gas Inventories and Baseline Emission Factors of China Regional Power Grid in 2017 (which was used for the year of 2018 & 2019) /2019 (which was used for 2020) Emission Reduction Projects for statistical calculations.

## 电缆集团强化用电管理

## CRSC Cable Group strengthened power usage management

案例  
Case

电缆集团持续加强“动态无功补偿及谐波治理”设备更新改造, 确保公司供配电系统安全可靠运行, 及时跟踪动态无功补偿及滤波设备, 提高功率因数和用电质量, 有效抑制谐波, 2020年公司的功率因数始终保持在0.96~0.99之间。对各制造部用电实行分时计价考核, 减少尖峰和高峰用电量, 降低用电费用, 提高各制造部门的节能积极性; 同时根据河南省发改委《关于征求河南省电力体制改革专项试点方案和电力市场交易规则意见的函》和《关于进一步降低企业用电成本的通知》要求, 与相关电力能源公司签订合同协议, 开展基本电费容改项目, 仅半年就节约电费36.5万元, 节能效果初见成效。

CRSC Cable Group continued to strengthen the updating and transformation of "Dynamic Reactive Power Compensation and Harmonic Suppression Equipment", so as to guarantee safe and reliable operations of power supply and distribution systems, track dynamic reactive power compensation and harmonic suppression devices in a timely manner, improved power factor and power usage quality, and effectively suppressed harmonics. In 2020, CRSC's power factor always maintained within 0.96-0.99. It also implemented segmented power pricing assessment for various manufacturing departments to reduce the peak power usage, reduce power consumption expenses and enhance their initiative in energy conservation; meanwhile, in accordance with the requirements of the Letter on Soliciting Opinions on Henan Provincial Special Pilot Programs for Electric Power System Reforms and the Notice on Further Reducing Enterprises' Power Usage Costs released by Henan Provincial Development and Reform Commission, CRSC signed contracts with relevant power energy companies and transformed the capacity-based power costs into the demand-based power costs, which achieved remarkable power-saving effect in just half a year, 365,000 RMB power costs were saved.

## 减少“三废”排放

## Reducing Emissions of "Three Wastes"

中国通号严格遵守《中华人民共和国大气污染防治法》《中华人民共和国水污染防治法》《中华人民共和国固体废物污染环境防治法》等相关法律法规, 管控“三废”排放。

CRSC has strictly complied with relevant laws and regulations such as the Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution, the Law of the People's Republic of China on Water Pollution Prevention and Control and the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste to control the emissions of "Three Wastes".



**废气治理:** 按照《挥发性有机物无组织排放控制标准》的要求, 持续对生产过程中挥发有机物进行治理, 加强VOCs处理设施运行监控管理, 通过加装电子装联过程VOCs回收处置装置, 电缆喷码废气收集设施等, 确保治理之后挥发性有机物按照有组织排放要求达标排放。

**Exhaust gas treatment:** In accordance with the requirements of Control Standards for Fugitive Emissions of Volatile Organic Compounds, CRSC continued with the governance of volatile organic compounds (VOCs) during the production process, strengthened the monitoring and management of operations of VOCs disposal facilities, and ensured that VOCs are emitted pursuant to organized emission requirements after the governance by installing VOCs recycling and disposal devices, cable-coded exhaust gas collection devices and other facilities through electronic assembly.



**废水治理:** 生产及生活废水排放方式以循环利用为主, 经设备处理达标后统一排放, 并按照要求进行水质污染物自行监测与第三方抽检。

**Wastewater treatment:** For recycling purpose, industrial and domestic wastewater is uniformly discharged after being processed into standard wastewater by dedicated devices, and self-inspection and third-party spot inspection will be conducted on water quality pollutants in accordance with relevant requirements.



**固体废弃物:** 定期收集并规范处理办公垃圾、建筑垃圾、包装材料等一般废弃物; 分区存放, 并由有资质的第三方处理危险废弃物 (包括生产制造产生的危险化学品、电镀污泥、有机溶剂、乳化液等)。开展生活垃圾分类工作、既有生活垃圾清运工作, 购置垃圾分类垃圾桶, 针对垃圾桶摆放、垃圾投放、垃圾清运等问题组织全员进行宣传教育。

**Solid waste:** Regular collection and standard treatment of general waste such as office waste, construction waste, packaging materials; storage by area, and hazardous waste (including hazardous chemicals produced by manufacturing, electroplating sludge, Organic solvents, emulsions, etc.) treated by the qualified third party. Household garbage is sorted, cleared and transported to dedicated sites. Sortable garbage bins are purchased, and publicity and education are provided on garbage bin placement, garbage throwing, garbage clearing and transporting and other relevant issues.

## 中国通号2018-2020年度一般废弃物排放情况

## CRSC Emissions of General Wastes in 2018-2020

一般废弃物类型 General waste type	生产制造 Manufacturing					工程建设 Construction	办公场所 Administration				
	木材 Timber	塑料 Plastics	金属 Metal	纸箱 Carton	其他 Others	建筑垃圾处理量 Construction waste disposal amount	废纸 Waste paper	废旧灯管 Waste lamps	电子垃圾 Electronics waste	硒鼓等打印耗材 Toner cartridge and other printing consumables	灯泡 Bulbs
	吨 tons	吨 tons	吨 tons	吨 tons	吨 tons	吨 tons	千克 kg	根 piece	台 piece	个 piece	个 piece
2018	215.3	246.5	1,506.2	95.5	93.9	48,929.0	17,810.9	2,454	628	5,926	60
2019	118.8	344.1	1,425.1	72.5	138.5	51,528.9	24,054.7	3,166	1,146	7,325	1,046
2020	107.2	330.7	1,355.9	99.0	133.5	6,040.6	49,292.5	6,660	617	5,113	889

## 中国通号2018-2020年度排放物情况

## CRSC Emissions in 2018-2020

排放物类别 Emission type	2018	2019	2020
二氧化硫 (吨) Sulfur dioxide (tons)	0.2	0.02	0.016
氮氧化物 (吨) Nitrogen oxides (tons)	0.5	1.0	0.749
化学需氧量 (吨) Chemical oxygen demand (tons)	2.2	3.4	1.1
氨氮 (吨) Ammoniacal nitrogen (tons)	0.6	0.6	0.26
有害废弃物 (吨) Hazardous wastes (tons)	167.7	168.5	154.6

## 西安工业集团沈信公司电镀工序退出

Shenyang Railway Signal Co., Ltd. under CRSC (Xi'an) Rail Transit Industry Group Co., Ltd. exited out of plating section

案例  
Case

2020年,为从根本上消除电镀工序重金属污染物排放,从公司战略发展和环保要求,西工集团沈信公司决定将涂装中心电镀工序逐步委外加工。通过对新涂装材料与工艺的研究,以产品质量和环境保护两手同抓共管为目标,沈信公司将涉及重金属的电镀生产线全部关停,取消剧毒化学品、易制爆化学品使用。同时向沈阳市生态环境局铁西分局报送“电镀工序停产报告”,并通过分局现场审查确认;依法依规对工序遗留的危险废物进行安全处置,委托具有相应经营资质的单位对电镀污泥、电镀废液等进行转移处置。

In 2020, in order to fundamentally eradicate the emissions of heavy metal pollutants of plating process, in line with CRSC's strategic development and environmental protection requirements, Shenyang Railway Signal Co., Ltd. under CRSC (Xi'an) Rail Transit Industry Group Co., Ltd. decided to gradually outsource the plating process of its Coating Center. By studying new coating material and process, driven by the goal of pursuing product quality and environmental protection, Shenyang Railway Signal Co., Ltd. shut off plating production lines involving heavy metals, and cancelled the use of highly toxic and easily explosive chemicals. Meanwhile, "Plating Process Production Stoppage Report" was submitted to Tiexi Branch of Shenyang Municipal Bureau of Ecology and Environment, which was reviewed and confirmed immediately; the remaining hazardous wastes are disposed in a safe way in accordance with relevant laws and regulations, and the units with relevant qualifications were entrusted to transfer and dispose of electroplating sludge, electroplating effluent and other matters.



## 提供绿色解决方案

### Providing Green Solutions

中国通号紧密结合当今世界铁路科技发展的趋势,通过新一代信息技术与先进的铁路技术创新融合,成功实现轨道交通的智能调度指挥、智能驾驶、智能制造、智能建造、智能运维等智能化水平的全面提升,使铁路运营和建设更加高效,更加绿色环保,更加便捷舒适。

Strictly following the development trends of current railway technologies, by virtue of the integration of a new generation of information technologies and advanced railway technologies, CRSC successfully achieved enhanced intelligentization level of railway transport, including intelligent dispatching, intelligent driving, intelligent manufacturing, intelligent construction and intelligent operation and maintenance. In this way, operation and construction of railways become more efficient, more environmental-friendly and more convenient and comfortable.



中国通号发挥轨道交通核心技术优势,提升工艺技术、开发节能高效产品,延伸节能环保新产业,引导轨道交通装备行业向绿色、智能方向发展。公司持续整合绿色出行解决方案,在能源分级利用、工业园区改造升级、信息化监控智能管理、在线仿真控制技术、绿色建筑智能楼宇等方面不断进行技术优化,推出海绵城市、地下综合管理综合监控与报警系统、智慧建筑综合应用系统、智能建筑解决方案和电源及环境集中监控系统、铁路基础设施如屏蔽门、PM2.5空气净化器(装置)、高速铁路道岔转换设备数字化仿真平台等成果。

CRSC gives play to its core technology advantages in railway transport, enhances process techniques, develops emerging energy-saving and efficient products, extends to emerging environmental-friendly industries, and guides the green and intelligent development of railway transport equipment industry. CRSC continuously integrates solutions for green transportation and updates technologies in the areas of energy grading and utilization, industrial parks transformation and upgrading, information-based monitoring and intelligent management, online simulation control, and intelligent and green buildings, etc. We have launched Sponge City, monitoring and alarm system for underground pipe gallery, integrated application system for intelligent building, intelligent building solution, centralized monitoring system for power and environment, railway infrastructure equipment such as screen door, PM2.5 air purifier (device), high-speed railway turnout conversion equipment like digital simulation platform, and so on.

#### 卡斯柯ATO车载系统算法节能改进

Casco improved ATO on-board system algorithm for energy conservation

案例  
Case

卡斯柯针对准点运行与节能运行这两个目标,改进ATO节能时间调整策略,设计速度偏离算法用于离线生成不同运营等级的速度曲线。搭建TRANAVI系统仿真环境,在离线ATO仿真过程中,考虑真实线路场景约束以及列车牵引制动延时响应模型,以保证离线规划的速度曲线能够贴合实际。在地铁运营非高峰时段,增加列车惰行比例,通过增加用户可以接受的站间旅行时间来达到节能目的。同时为了列车能够准点到达,需要在不同运营等级之间进行动态时间调整,列车以最大加速度启动,到达目标调整速度之后采取惰行或巡航方式,站间调整时根据剩余时间计算新的目标调整速度,以最大减速度进站停车。目前部署该节能策略的车载系统已经在上海17号线、北京房山线等项目投入使用,为实现地铁运营节能减排、绿色出行的目标起到了有力的推动作用。

For the purpose of running on time and energy-saving running, Casco improved the adjustment strategies for ATO energy conservation time, and designed speed deviation algorithm for offline generation of speed curves at different operational levels. With the help of TRANAVI simulation environment, during the offline ATO simulation process, true route scenario constraints and train traction, braking and delayed response model are taken into account to make sure that the planned speed curves through offline channels fits well with the reality. During off-peak periods of subways, coasting ratio of trains is increased, and the travel time between stations acceptable to the users is also increased to achieve the goal of energy conservation. Meanwhile, to make sure that the train will arrive on time, dynamic time adjustments shall be made between different operational levels; the trains start the maximum acceleration, and adopt coasting or cruising mode after reaching the targeted adjusted speed. When making adjustments between stations, the targeted adjusted speed is calculated in accordance with the remaining time for inlet parking at the maximum deceleration. Currently, the onboard system deployed with this energy-saving strategy has been put into use in projects like No. 17 subway line in Shanghai and Fangshan Line in Beijing, effectively pushing forward the realization of goals like energy conservation, emission reduction and green travel of subway.





# 乐业汇聚英才

## Good Environment for Talents

中国通号视员工为公司最为宝贵的财富，坚持“开放引进、精英集聚”的人才战略，维护员工基本权益，助力员工快速成长，暖心关爱员工工作生活，营造友爱互助的公司氛围。

CRSC regards employees as its most precious treasure. By adhering to the talent strategy of "open access and elite concentration", CRSC guarantees basic rights and interests of employees, facilitates their rapid growth and development, shows care for their work and life, and creates a friendly and interdependent atmosphere.

员工构成 Employee Mix	90
员工权益 Employees' Rights and Interests	92
成长发展 Growth and Development	93
员工关爱 Caring for Employees	96



## 员工构成

### Employee Mix

中国通号制定《中国铁路通信信号股份有限公司招聘管理制度》，规范人员招聘流程，强化人才招聘，优化人才结构。公司严格按照规定程序操作，工作人员遵守组织人事工作纪律，在过程中执行保密制度和回避制度，确保招聘工作公平、公正。同时，招聘工作接受员工、纪检监察部门和社会各界的监督，及时对招聘过程中出现的违规违纪行为进行处理。报告期末，中国通号员工总数21,063人，劳动合同签订率100%，社会保险覆盖率100%。全年流失员工1,060人，流失率为5.03%。

CRSC formulated Recruitment Management System of China Railway Signal & Communication Co., LTD. to standardize personnel recruitment procedures, enhance talent recruitment effects and optimize talent structure. In strict accordance with standard procedures, CRSC obeyed recruitment discipline, and implemented confidentiality and avoidance systems to make sure fair and equitable recruitment. Meanwhile, our recruitment work was subject to the supervision of employees, discipline inspection and supervision authorities and all walks of life, and violations of regulations occurring during the recruitment process were dealt with in a timely manner. At the end of the reporting period, CRSC has a total of 21,063 employees with 100% labor contract signing rate and 100% social security coverage rate. CRSC lost 1,060 employees whole year, and the staff turnover rate is 5.03%.

#### 中国通号2020年度员工构成情况 CRSC Employee Mix in 2020

	类别	Types	员工人数 (人) Numbers
按员工类型划分雇佣人员总数 By employee type	劳动合同员工	Under employment contract	21,063
	劳务协议员工	Under labor agreement	67
	第三方派遣员工 (含劳务派遣和股东方派驻)	Dispatched by third parties (including labor dispatching and shareholder dispatching)	1,140
按年龄结构划分的员工数量 By age	≥55岁	≥55 years old	1,242
	51-54岁	51-54 years old	1,150
	41-50岁	41-50 years old	3,982
	31-40岁	31-40 years old	7,868
	≤30岁	≤30 years old	6,821
按层级划分的员工数量 By employee level	高级管理人员	Senior management	311
	中层管理人员	Middle-level management	1,577
	普通员工	Ordinary employees	19,175
按性别划分的员工数量 By gender	男	Male	15,951
	女	Female	5,112
按地区划分的员工数量 By region	中国内陆	China Mainland	20,991
	港澳台	Hong Kong, Macao and Taiwan	1
	国外	Overseas	71

## 员工权益

### Employees' Rights and Interests

中国通号严格遵守《中华人民共和国劳动法》《女职工劳动保护特别规定》等法律法规,制定《中国铁路通信信号股份有限公司劳动保护管理办法》等制度规范,完善员工管理,保障员工权益,坚持同工同酬,杜绝雇佣童工及强制或强迫劳动现象,杜绝一切性别、民族、宗教、年龄等歧视现象,尊重和保障员工各项合法权益,积极构建和谐劳动关系。

In strict accordance with relevant laws and regulations such as the Labor Law of the People's Republic of China, and Special Provisions for the Work Protection of Female Employees, CRSC formulated Administrative Measures on Labor Protection of China Railway Signal & Communication Co., LTD. and other regulations to improve employee management, safeguard employees' rights and interests, insist on equal pay for equal work, forbid the employment of child labors and compulsory or forced labor, prevent all discriminations against gender, race, religion and age, respect and guarantee legal rights of employees and take an active part in constructing harmonious labor relations.



**薪酬福利:** 公司制定《中国铁路通信信号集团公司总部薪酬管理办法》《中国铁路通信信号股份有限公司员工考勤与休假管理暂行办法》等薪酬福利制度,建立公平合理、具有市场竞争力的薪酬激励体系,严格执行各项社会保障制度,为员工缴纳社会保险,提供法定节假日、带薪年假等各项福利待遇。

**Remuneration and benefits:** Formulate remuneration and benefits systems such as the Administrative Measures for Salaries of CRSC Headquarters and Interim Measures for the Administration of Attendance and Vacation of CRSC Employees, set up fair and reasonable remuneration incentive systems with market competitiveness, strictly implement various social security systems, pay social insurances for employees, and provide various benefits like legal holidays and paid annual leave.



**民主沟通:** 公司健全以职工代表大会为基本形式的企业民主管理制度,所属各企业普遍建立集体合同及集体协商制度,保障员工的知情权、参与权、表达权、监督权,提高员工的归属感和责任感。

**Democratic communication:** CRSC improves democratic management systems with the workers' congress as the basic form; all subsidiaries generally establish collective contract and collective consultation systems, guarantee employees' rights to know, to participate and to supervise, and enhance their belongingness and sense of responsibility.

## 成长发展

### Growth and Development

中国通号关注员工成长、尊重员工工作成果,努力为员工提供符合职业发展所需的专项培训,培养人才;建立长效激励机制,吸引人才、留住人才。

CRSC puts value on the growth of employees, shows respect for their work results and strives to provide them with dedicated trainings satisfying their career development needs and to cultivate talents; it also establishes long-term incentive mechanisms to attract and retain talents.



**员工培训:** 中国通号为员工搭建职业发展平台,为员工提供符合职业发展所需的专项培训,助力员工激发潜能、提升员工素质,助力员工成长成才,实现“人尽其才”。

**Employee trainings:** CRSC builds career development platforms for their employees, provides them with dedicated trainings satisfying their career development needs, taps their potentials, enhances their quality, facilitates their growth and development, and achieves “giving full scope to the talents”.

#### 中国通号2020年度员工培训情况

##### CRSC Employee Trainings in 2020

类别 Type	员工培训百分比 (%) Training Rate (%)	人均培训时长 (小时) Average Training Hours (h)	
按性别划分的员工培训情况 By gender	男 Male	85.3	29.6
	女 Female	81.7	26.9
按雇员层级划分的员工培训情况 By employee level	高级管理层 Senior management	100	73.8
	中级管理层 Middle-level management	100	35.4
	基层员工 Ordinary employees	81.7	27.3



## 中国通号举办项目经理培训班

## CRSC held a project manager training workshop

2020年10月，为强化项目经理安全生产责任和精益化管理意识，提高成本管控和安全风险管控能力，中国通号在北京举办项目经理培训班。培训专门邀请行业权威专家，分别从信用评价管理、工程项目成本管理、铁路安全管理与风险防控、工程项目管理及发展趋势等方面进行授课并组织考试。

In October 2020, in order to strengthen project managers' awareness of safe production accountability and lean management and enhance cost and safety risk control capabilities, CRSC held a project manager training workshop in Beijing. Authoritative industry experts were invited to give lectures and organize exams from the perspectives of credit assessment and management, engineering project cost management, railway safety management and risk control, and engineering project management and development trends.

案例  
Case

**发展激励：**为进一步吸引、留住优秀人才，中国通号加强人才工作顶层设计，制定《中国铁路通信信号股份有限公司人才发展纲要》《中国铁路通信信号股份有限公司2020—2022人才培训规划》，确立人才优先发展的战略地位。2020年，中国通号制定管理人才、科技人才、技术人才的评价管理办法，明确选拔、考核、晋升的发展通道；初步制定《关于建立和完善技术和管理人员双向流动职业发展通道的实施意见》，分类员工职业发展通道，构建人尽其才、各展其才的人才发展格局；制定下发《干部选拔任用工作二十六条》，规范细化干部选拔任用流程。

**Development incentives:** In order to further attract and retain outstanding talents, CRSC enhanced top-level design for talent work, formulated Talent Development Outline of China Railway Signal & Communication Co., LTD. and 2020-2022 Talent Training Plan of China Railway Signal & Communication Co., LTD., and determined the strategic position of priority for talent development. In 2020, CRSC developed administrative measures on the assessment of management, research and technical talents, and specified the development pathways of selection, appraisal and promotion; it also preliminarily formulated the Implementing Opinions on Establishing and Improving Two-way Career Development Pathway of Technical and Management Talents to classify employees' career development pathways and construct a talent development pattern of giving full scope to the talents and tapping their potentialities to the fullest; moreover, CRSC also formulated and distributed 26 Provisions for Selection and Appointment of Cadres to standardize the selection and appointment procedures of cadres.



2020年10月，中国通号举办所属企业董事会规范运作暨董事履职能力提升专题培训班

In October 2020, CRSC held a Training Workshop in Normal Operations of Board of Directors and Director Capability Enhancement among all subsidiaries



## 员工关爱 Caring for Employees

中国通号着力为员工营造有利于身心健康的工作环境，重视员工工作与生活的平衡，持续提高员工满意度。

CRSC is committed to creating a favorable working environment for employees for the sake of their physical and mental health, puts value on the balance of their work and life, and constantly improves their satisfaction.



**职业健康:** 中国通号严格执行国家、地方有关职工劳动保护的法律法规，为员工创造安全、卫生、舒适的劳动工作条件，消除和预防劳动生产过程中可能发生的伤亡、职业病和急性职业中毒，保障员工以健康的身体状态参加工作。安全监察部门和负责劳动保护的部门按照各自职责检查、督促、落实，工会依法代表员工对劳动保护工作实行群众监督。

**Occupational Health:** CRSC strictly followed national and local laws and regulations on labor protection for employees, created safe, clean and comfortable working conditions, prevented and eliminated possible injuries, fatalities, occupational diseases and acute occupational poisoning during labor production process, and guaranteed that the employees participated in the work with a healthy status. Safety supervision departments and other departments responsible for labor protection shall inspect and implement their labor protection work within the scope of their responsibilities, and the labor union shall supervise the labor protection work on behalf of the employees.



**丰富文体生活:** 公司重视对员工的人文关怀，先后参与开展“中国梦·铁路情·劳动美”“书香三八”“全民健身日”等活动，丰富员工精神生活。

**Abundant Sports and Cultural Activities:** CRSC puts high value on humanistic care for employees, and successively organized different kinds of activities like “Chinese Dream, Railway Complex, and Beauty of Work”, “Book Fair on March 8” and “National Fitness Day” to nourish the employees’ mental health.



2020年10月，中国通号举办在京地区员工广播操比赛

In October 2020, CRSC held Setting-up Exercises Competition among employees in Beijing



中国通号党委领导慰问退休员工

CRSC's Party Committee Leaders were expressing solicitude for retired employees

为一线职工送去慰问品和暖心问候

CRSC brought gift bags and warm greetings to frontline employees



**女性员工关怀:** 公司制定《女职工劳动保护实施办法》，建立和完善性别平等制度机制；推进建设女职工“爱心屋”，为在职女职工购买特殊疾病互助保障。

**Caring for Female Employees:** CRSC formulated the Measures for the Implementation of Labor Protection for Female Employees, established and perfected gender equality mechanisms, advanced the construction of “Love Room” for female employees, and purchased special disease mutual-aid insurance for on-duty female employees.



**一线员工关怀:** 公司努力改善一线员工生产生活条件，开展“职工之家”创建活动；制定“三工”建设推进方案，下拨专项建设资金；坚持开展“送温暖”“送清凉”等慰问。

**Caring for Front-line Workers:** CRSC exerted efforts to improve the production and living conditions for frontline employees, organized activities to build “Home of Staff”, formulated the advancement schemes of Three-Kinds-of-Employee Constructions for key projects, appropriated dedicated construction funds, and insisted on bringing warmth and coolness to employees at right seasons.



**困难员工关怀:** 公司制定《工会帮扶救助实施办法》，通过节日慰问、病困员工慰问等活动，帮助解决员工在生活、医疗、子女等方面的困难。2020年，公司共发放病困员工慰问物资149.6万元。

**Caring for Needy Employees:** CRSC formulated the Measures for the Implementation of Aids and Reliefs by Labor Union, and helped employees to solve their difficulties in life, health care and children raising and other respects through festival allowance, reliefs for diseased or needy employees and other activities. In 2020, CRSC distributed 1,496,000 RMB worth of materials to those diseased or needy employees.





# 偕行共促发展

## Cooperation Promotes Development

作为中国高铁“走出去”的联盟重要成员单位之一，中国通号积极助力打造“中国高铁”名片，推动国际基础设施建设和互联互通。公司不断健全供应链管理体系，与各地方政府、企业、学术机构开展合作，助力构建更负责、更公平、更开放、更可持续的行业生态。

As one of the important member units of China's high-speed rail "going out" alliance, CRSC actively contributes to the creation of the "China High-speed Rail" business card and promotes international infrastructure construction and interconnection. The company continues to improve its supply chain management system and cooperates with local governments, enterprises, and academic institutions to help build a more responsible, fairer, more open and more sustainable industry ecosystem.

助力“一带一路” Empowering the BRI	100
开展战略合作 Engaging in Strategic Cooperation	102
打造责任供应链 Building Responsible Supply Chain	104

## 助力“一带一路”

### Empowering the BRI

秉持开放、合作、团结、共赢的信念，中国通号为项目所在地提供中国轨道交通解决方案及产品，让数字化、自动化、电气化和信息化智能技术方案，帮助当地铁路、轨道交通等基础设施实现互联互通。截至2020年底，公司组建了亚太、南部非洲、北部非洲、欧洲及中东、美洲五大区域中心，境外经营机构数量15个。

2020年，在新冠疫情影响全球背景下，公司在做好境外疫情防控的前提下，稳步推进印尼雅万高铁、匈塞铁路贝旧段、泰国复线铁路改造等海外项目复工复产，全力保障巴基斯坦拉合尔橙线项目开通运营，成功签订磨万铁路万象-万象南段、泰国复线铁路华富里-北榄坡段、孟加拉帕德玛大桥铁路连接线、埃及斋月十日城等项目，持续完善国际经营网络布局。同时，中国通号积极推进信号产品在项目所在地的认证，推进自有技术与各个国家特点和需求相融合，推进高铁技术国际化。目前，中国通号自主研发技术兼容欧洲标准，核心产品获得欧盟认证。

#### 中国通号自主技术与核心装备助力匈塞铁路改造升级

CRSC's independent technology and core equipment helped the upgrading of the Hungary-Serbia railway

匈塞铁路项目是我国在欧盟实施的首个铁路基础设施项目，是中国—中东欧合作的旗舰项目。匈塞铁路自塞尔维亚首都贝尔格莱德市至匈牙利首都布达佩斯市，全长352公里。原线路始建于19世纪末，经现代化改造之后，匈塞铁路将成为客货共用电气化双线铁路，设计最高时速达200公里，贝尔格莱德和布达佩斯两地之间的车程将从8小时缩短至3小时以内。

中国通号于2018年底承担塞尔维亚境内贝尔格莱德中心-旧帕佐瓦区段（以下简称贝旧段）项目通信、信息及信息专业系统集成及服务，线路长度34.5公里，将该段线路信号系统升级为ETCS-2级列控系统，线上线下设施设备全部满足欧盟铁路互联互通技术规范要求。

2019年6月，中国通号为匈塞高铁量身打造的ETCS-2系统实验室在贝尔格莱德落成，该实验室可以展示完整的调度指挥和列车运行控制功能，并具备开展系统功能测试、接口测试、互联互通测试和列控数据交付测试等功能，可以大大减少现场测试工作量，为匈塞高速铁路建设提供核心技术支持，同时还可作为匈塞铁路信号设备运行维护的基地，为当地铁路运营维护技术人员提供培训环境。

2020年，继全电子联锁、调度集中系统（CTC）、集中监测系统（CSM）等设备在匈塞铁路进行现场实施后，中国通号自主研发的高铁列车运行控制地面系统核心装备再次获得认可，中标匈塞铁路贝旧段，落地欧洲市场。

中国通号项目执行团队在集成设计、产品认证、施工安装等方面工作均取得阶段性进展。在参建各方的共同努力下，贝旧段左线已于2020年10月27日正式开通。



塞尔维亚总统武契奇在中国通号施工工艺展板前听取讲解  
Serbian President Vucic listened to the explanation before the construction technology exhibition board

Upholding the beliefs of openness, cooperation, unity, and win-win, CRSC provides China rail transit solutions and products for project locations, enabling digitalization, automation, electrification, and informatization smart technology solutions to help local railway, rail transit and other infrastructures realize interconnection. As of the end of 2020, the company has established five regional centers in Asia Pacific, Southern Africa, Northern Africa, Europe and the Middle East, and the Americas, with 15 overseas operating organizations.

In 2020, in the context of the global impact of COVID-19, the company steadily promoted the resumption of work and production of overseas projects such as Indonesia's Jakarta-Bandung high-speed railway, the old section of the Hungary-Serbia railway, and the reconstruction of the Thai double-track railway under the premise of preventing and controlling overseas epidemics, made every effort to ensure that the Lahore Orange Line project in Pakistan opens and operates, successfully signed projects such as the Boten-Vientiane railway Vientiane-Vientiane southern section, the Lopburi-Nak Lampo section of the Thai double-track railway, the railway connection line of the Padma Bridge in Bangladesh, and the 10th of Ramadan City of Egypt etc., promoting the integration of own technology with the characteristics and needs of various countries, and promoting the internationalization of high-speed rail technology. At present, CRSC's independently developed technology is compatible with European standards, and its core products have obtained EU certification.

The Hungary-Serbia railway project is our country's first railway infrastructure project implemented in the EU, and is the flagship project of China-Central and Eastern Europe cooperation. The Hungary-Serbia Railway runs from Belgrade, the capital of Serbia, to Budapest, the capital of Hungary, with a total length of 352 kilometers. The original line was built at the end of the 19th century. After modernization, the Hungary-Serbia Railway will become a shared electrified double-track railway for passenger and freight. The designed maximum speed is 200 kilometers per hour. The journey between Belgrade and Budapest will be shortened from 8 hours to within 3 hours.

At the end of 2018, CRSC undertook the integration and service of the communication, information and information professional system of the Belgrade Center-Old Pazova section (hereinafter referred to as Belgrade-Old section) in Serbia. The line length is 34.5 kilometers. The signal system of this section is upgraded to ETCS-2 level train control system, on-line and off-line facilities and equipment all meet the requirements of EU railway interconnection technical specifications.

In June 2019, the ETCS-2 system laboratory tailored by CRSC for the Hungary-Serbia high-speed rail was completed in Belgrade. The laboratory can display complete dispatch command and train operation control functions, and has the ability to carry out system function tests and interface tests, interoperability testing and train control data delivery testing, which can greatly reduce the workload of on-site testing and provide core technical support for the construction of the Hungary-Serbia high-speed railway. At the same time, it can also serve as a base for the operation and maintenance of the Hungary-Serbia railway signal equipment for local railway operations, providing a training environment for local railway operation and maintenance technicians.

In 2020, following the on-site implementation of equipment such as fully electronic interlocking, centralized dispatching system (CTC), and centralized monitoring system (CSM) on the Hungary-Serbia Railway, the core equipment of the high-speed rail train operation control ground system independently developed by CRSC was once again recognized, won the bid for the old Belgrade section of the Hungary-Serbia Railway and landed in the European market.

The CRSC project executive team has made phased progress in integration design, product certification, construction and installation. With the joint efforts of all parties involved in the construction, the left line of Belgrade-Old section was officially opened on October 27, 2020.



## 开展战略合作

### Engaging in Strategic Cooperation

中国通号积极与政府、优秀企业、科研院校等展开合作，对接人才、资本、技术、信息等要素，通过优势互补，创造共同价值，服务经济社会发展。2020年，中国通号继续与中国高铁全产业链相关企业通力合作，落实重大项目；发起并参与中央企业北斗产业协同发展平台，推动北斗系统深化应用；与四川交投、中华保险、华为、北京交通大学等达成战略合作，共谋发展。

CRSC actively cooperates with the government, outstanding enterprises, scientific research institutions, etc., connecting talents, capital, technology, information and other elements, through complementary advantages, creating common value, and serving economic and social development. In 2020, CRSC continued to cooperate fully with related enterprises in China's high-speed rail industry chain to implement major projects; initiated and participated in the state-owned enterprise Beidou industry collaborative development platform to promote the deepening of the application of the Beidou system. It has reached strategic cooperation with Sichuan Transportation Investment, China Insurance, Huawei, Beijing Jiaotong University and others to seek common development.



#### 中国通号与北京交通大学签署战略合作协议

CRSC and Beijing Jiaotong University signed a strategic cooperation agreement

2020年12月，中国通号与北京交通大学签订战略合作协议。此次战略合作协议的签署，将继续推动双方加强产学研深入合作，促进国家轨道交通自主技术全面发展。双方将以此次合作为契机，以科技创新为引领，发挥北京交通大学的应用基础研究作用、发挥中国通号企业平台作用，强强联合，打造校企合作的样板与标杆，为发展国家轨道交通产业协同发力。

In December 2020, CRSC signed a strategic cooperation agreement with Beijing Jiaotong University. The signing of this strategic cooperation agreement between the two parties will continue to push the two parties to strengthen in-depth cooperation in industry, university and research, and promote the comprehensive development of national rail transit independent technologies. The two parties will take this cooperation as an opportunity, led by technological innovation, play the role of Beijing Jiaotong University in applied basic research, play the role of the CRSC enterprise platform, join forces and create a model and benchmark for school-enterprise cooperation, making concerted efforts to develop the national rail transit industry.



#### 中国通号与华为签署战略合作协议

CRSC signed a strategic cooperation agreement with Huawei

2020年10月，中国通号与华为技术有限公司签署战略合作协议。根据协议，中国通号将与华为在联合创新、平台建设、应用示范、技术交流等方面深度合作，携手为铁路、城市轨道交通、智慧城市等打造联合创新解决方案。

In October 2020, CRSC signed a strategic cooperation agreement with Huawei Technologies Co., Ltd. According to the agreement, CRSC will cooperate in-depth with Huawei in joint innovation, platform construction, application demonstration, technical exchanges, etc., to jointly create joint innovative solutions for railways, urban rail transit, and smart cities.



#### 中国通号的“进博会”时间

CRSC showed presence on the Third China International Import Expo

2020年11月，在第三届进博会上，中国通号旗下卡斯柯公司、北京工业集团、西安工业集团与来自德国、法国、瑞士、日本、奥地利等各国企业就ATP特殊部件、输入输出板、司机显示单元、编码里程计、车载板卡、计轴系统等物资设备进行合作签约。中国通号交易分团采购签约活动取得圆满成功，参展成果再创新突破，签约项目量、质均全面超过前两届。

中国通号秉承“开放创新、合作共赢”的理念，坚持扩大与国外优秀企业的合作领域与合作规模，深化交流合作，实现成果共享，持续促进中国通号价值链、供应链的不断完善，实现企业高质量发展，推动自主列控技术服务全球轨道交通建设，提升中国通号品牌价值。

In November 2020, on the Third China International Import Expo, Casco, CRSC Beijing Railway Signal Co., Ltd. and CRSC (Xi'an) Rail Transit Industry Group under CRSC signed contracts with enterprises from countries like Germany, France, Switzerland, Japan and Austria in terms of ATP special parts, input/output boards, driver display units, coding odometer, vehicle-mounted boards, axle counter system and other materials and devices. CRSC procurement team signing activities were successfully held, the participating results made new breakthroughs, and the number and quality of signed projects outperformed those on the first two China International Import Expo.

CRSC upholds the philosophy of “openness, innovation and win-win cooperation”, insists on expanding the cooperation with overseas outstanding enterprises, deepening exchange and cooperation and realizing achievement sharing, continues to promote the improvement of CRSC's value chain and supply chain, achieves high-quality development, advances the global rail transport construction of independent train control technologies and services, and enhances the brand value of CRSC.

案例  
Case

# 打造责任供应链

## Building Responsible Supply Chain

中国通号制定供应商、承包商专项管理办法，并制定供应商信用评价管理办法和黑名单管理办法等相关制度，建立采购管理体系，并通过加强供应商资格审查、建立供应商动态考评机制，加强供应链管理，推进诚信体系建设。2020年，中国通号加快推进采购电商平台建设，推进传统供应链的智慧化转型。

CRSC formulated specialized management systems for suppliers and contractors, developed supplier credit evaluation and management measures, blacklist management measures and other relevant systems, established procurement management systems, and advanced the construction of credit system by strengthening supplier qualification review, establishing dynamic appraisal mechanisms for suppliers and enhancing supply chain management. In 2020, CRSC accelerated the construction of procurement e-commerce platform, and advanced the smart transformation of traditional supply chain.



01

### 阳光采购

Sunshine procurement

制定采购工作目标及考核指标，全面监督开标、评标等重点采购环节，定期开展单一采购自查自纠，杜绝不合理单一来源采购。

Formulate procurement goals and evaluation indicators, comprehensively supervise key procurement links such as bid opening and evaluation, and regularly conduct self-examination and correction of single procurement to prevent unreasonable single-source procurement.

02

### 供应商准入

Supplier access

综合资质、财务状况、技术能力、产品及服务质量等多项因素，对采购物料质量控制，加强供应商资格条件审核，严禁不符合程序和规定要求的厂家进入合格供方名录。

Take into account qualifications, financial status, technical capabilities, product and service quality, and other factors to standardize quality control over procured materials and to strengthen the supplier qualification review; suppliers that do not conform to procedural and regulatory requirements are not allowed to be listed on Qualified Supplier Directory.

03

### 供应商质量评估

Supplier quality assessment

强化供应商产品质量安全风险考核力度，对关键及重要供应商实施年度审查，对供应商技术工艺、生产作业过程质量进行监督检查。2020年，对3,404家生产建设物资供应商开展年度评价工作，与存在不良行为的供应商调整了合作关系。

Strengthen the efforts on appraising quality and safety risks of products from suppliers, carry out annual review of key and important suppliers, and supervise the supplier's technical processes, quality supervision and inspection of production operations. In 2020, CRSC conducted annual assessment on 3,404 suppliers of production and construction materials, and adjusted the cooperation with those suppliers with bad behaviors.

04

### 供应商信用评价

Supplier credit evaluation

开展供应商信用等级评价，全系统通报信用评价结果，对出现不良行为供应商采取降低信用评级、退出合格供应商名录，一定期限内不再允许申请加入。2020年公司通报供应商产品质量潜在不良行为14家、一般不良行为1家、较大不良行为1家，均采取相应措施并落实整改。

Conduct credit evaluations of suppliers, report credit evaluation results throughout the system, and take downgrades of credit ratings and withdraw from qualified suppliers' lists for suppliers with bad behavior. Application for joining is no longer allowed within a certain period. In 2020, CRSC identified 14 suppliers with potential poor quality behaviors, 1 supplier with ordinary bad behavior and 1 supplier with major bad behavior, and took corresponding measures to rectify these bad behaviors.

05

### 供应商成长

Supplier growth

建立责任供应链激励机制，定期举办供应商大会、供方质量沟通会，用心倾听供应商的困惑与诉求，为供应商提供专业指导和支持，助其提高产品和服务质量，改善自身经营管理。

Establish a responsible supply chain incentive mechanism, regularly organize supplier meetings and supplier quality communication meetings, listen to suppliers' concerns and demands, provide professional guidance and support for suppliers, and help them improve product and service quality and self-management.



# 助力社会和谐

## Facilitating Social Harmony

中国通号在追求自我发展、创造经济效益的同时，始终坚持回馈社会，积极响应国家号召，承担定点扶贫任务，从产业、消费、教育、健康、民生等领域，助力河南省社旗县脱贫。以实际行动支援抗疫抗洪救灾等工作，在项目所在地开展各类志愿服务活动，助力社会和谐。

CRSC always insisted on feedbacking society and actively responded to national calls to undertake poverty alleviation tasks when pursuing self-development and created economic profits. It facilitated Sheqi County, Henan province overcoming poverty from industry, consumption, education, healthcare and people's livelihood. CRSC facilitated social harmony in a variety of ways, such as taking practical actions to support anti-epidemic activities and fight the flood and provide relief and carrying out all kinds of volunteer service activities in project sites.

<b>助力脱贫攻坚</b>	<b>108</b>
<b>Facilitating Poverty Alleviation</b>	
<b>抗击新冠疫情</b>	<b>112</b>
<b>Fighting Against COVID-19</b>	
<b>开展志愿活动</b>	<b>114</b>
<b>Conducting Voluntary Activities</b>	



## 助力脱贫攻坚

### Facilitating Poverty Alleviation

扶贫开发事关人民福祉，事关国家长治久安。自2003年定点帮扶河南省社旗县以来，中国通号牢记使命担当，强化组织领导，严格责任落实，认真贯彻精准扶贫、精准脱贫方略，多措并举打好产业扶贫、消费扶贫、教育扶贫、健康扶贫等脱贫攻坚“组合拳”，为社旗县脱贫摘帽和贫困群众脱贫致富贡献力量。2020年，中国通号集团公司投入扶贫资金500万元，累计投入无偿扶贫资金1,513万元，引进无偿帮扶资金33万元。在中国通号和各方力量的共同帮扶下，社旗县于2020年2月正式退出国家级贫困县序列。

Poverty alleviation development relates a lot to the well-being of the people and long-term political stability. Since CRSC undertook the task of targeted poverty alleviation of Sheqi, Henan in 2003, it bore in mind its mission, strengthen organization and leadership, strictly responsibility implementation, conscientiously implemented the targeted poverty alleviation strategy and took a combination of measures like poverty alleviation by developing industries, consumption, education and healthcare to contribute its share to help Sheqi County lift out of its poverty hat and poor people cast off poverty to get rich. In 2020, CRSC invested poverty alleviation funds of 5,000,000 RMB, invested non-reimbursable poverty alleviation funds of 15.13 million RMB in total, and introduced free assistance funds 330,000 RMB. Under the cooperative support of CRSC and other organizations, Sheqi County formally withdrew from the national poverty-stricken counties list.



2020年9月，中国通号党委书记、董事长周志亮实地调研社旗县定点扶贫工作

In September 2020, Zhou Zhiliang, Secretary of CPC, Chairman, was conducting a filed survey of poverty alleviation of Sheqi County

## 中国通号扶贫“成绩单” (2003-2020)

### CRSC Poverty Alleviation Record (2003 - 2020)





## 中国通号定点帮扶河南省社旗县举措

### Measures Taken by CRSC for Targeted Poverty Alleviation of Sheqi County



#### 消费扶贫

Poverty alleviation by consumption

公司各工会购买社旗等贫困县农产品

CRSC labor unions purchased agricultural products from poor counties like Sheqi County.

在员工超市设立“扶贫产品展销柜台”，引导职工参与购买

Established a “sales counter for poverty alleviation products” and guided employees buy them

扶贫干部积极拓宽销售渠道，动员社会力量参与扶贫

Poverty alleviation cadres actively expanded sales channels and mobilized social forces to take part in poverty alleviation



#### 民生扶贫

Poverty alleviation by people's livelihood

出资改善重点贫困村基础设施

Invested to improve key infrastructure of poor villages

改善贫困村卫生环境，帮助建造污水设施、购买垃圾清运车等

Improved hygiene environment of poor villages, helped construct sewage disposal facilities, purchased garbage pickup trucks, etc.

筹资帮助贫困村修建文化广场、休闲走廊、健身广场等民生工程

Raised money to help poor villages construct livelihood projects including culture square, leisure corridor, exercise plaza, etc.



#### 健康扶贫

Poverty alleviation by healthcare

累计出资210万元，捐建卫生院，捐赠医疗设备，为困难群众垫付医疗费等，积极帮助贫困地区完善医疗设施，解决看病难的问题

Totally invested 2.1 million yuan, constructed health centers, donated medical devices, made advance payment for people in straitened circumstances, actively improved medical facilities in poor areas to solve the difficulty of getting medical service

持续开展“同舟工程——中央企业救急难”行动，资助96名因病、因灾贫困群众48万元

Constantly conducted “Hand-in-Hand Project – Central Government Participating in Emergency Rescue” activities, totally subsidized 480 thousand yuan to 96 poverty-stricken people due to diseases and disasters

坚持开展“献爱心、送温暖”活动，累计走访慰问贫困家庭1,100户

Insisted in carrying out “Charitable Contribution” activities and totally visited and expressed condolences to 1,100 poor families



#### 产业扶贫

Poverty alleviation by developing industries

发展农业合作社、建设扶贫车间、成立家庭农场等，助力社旗县增强“造血”功能

Developed agricultural cooperatives, constructed poverty alleviation workshops, founded family farms and carried out other measures to facilitate Sheqi County strengthening its capabilities

联合当地扶贫企业成立中通大爱农产品有限公司，统筹当地农副产品加工企业、农业合作社，整合特色农副产品，注册“老家赊店”商标，带动农产品种植、加工、销售一体化产业发展

Cooperated with local poverty alleviation enterprises to establish Zhongtong Great Love Agricultural Products Co., Ltd., overall planned local agricultural and sideline products processing enterprises, agricultural cooperatives, integrated characteristic agricultural and sideline products, registered the trademark of “Laojia Shedian” and drove industrial development integrating agricultural product planting, processing and sales



#### 教育扶贫

Poverty alleviation by education

先后捐建8所中小学，累计捐款捐物135万余元，改善4,000多学生的求学环境

Successively endowed eight primary and secondary schools, denoted money and goods of more than 1.35 million yuan and improved over 4,000 students' study environment

开展“金秋助学”“慈孤救助”活动，出资173万元资助785名贫困家庭大学生、219名农村孤儿“助学圆梦”

Carried out “Autumn Edu-Aid” and “Orphan Rescue” activities and invested 1.73 million yuan to subsidize 785 university students from poor families and 219 rural orphans to study



#### 党建扶贫

Poverty alleviation by Party construction

拨付专项党费帮助贫困村加强党组织建设

Special Party funds were appropriated to help poor villages strengthen party building

所属企业党组织与贫困村党支部开展结对帮扶

Subordinate enterprise party organization established partner assistance with party branches of poor villages

举办基层干部、致富带头人、技术人员培训班，培训基层干部

Organized training courses for grass-roots cadres, leaders for getting rich and technicians

组织全县村党支部书记到兰考县、濮阳西辛庄村考察学习脱贫攻坚经验

Organized all party branch secretaries of the county to visit Lankao county and West Xinzhuang Village, Puyang to learn poverty alleviation experience

## 抗击新冠疫情

### Fighting against COVID-19

新冠肺炎疫情是百年来全球发生的最严重的传染病大流行，是新中国成立以来我国遭遇的传播速度最快、感染范围最广、防控难度最大的重大突发公共卫生事件。中国通号抓紧布置、靠前指挥，第一时间行动，统筹做好抗击疫情、复工复产各项任务，与全国人民一起并肩作战，千方百计降低疫情对经济社会发展影响。

COVID-19 was the worst global infectious disease pandemic in recent 100 years as well as a major public health emergency with the fastest transmission speed, the widest infection scope and the greatest difficulty in epidemic prevention and control. CRSC promptly made arrangement, commanded near the frontline, took immediate actions, coordinated to fight against the epidemic and fulfilled tasks of resumption of work and production, and fought COVID-19 epidemic side by side with the rest of the country to reduce the impact of the epidemic on economic and social development by all means.

### 迅速响应 落实防控责任

### Responding quickly and fulfilling responsibilities of Epidemic Prevention and Control

中国通号迅速成立疫情防控领导小组，全面领导疫情防控工作。第一时间学习传达中央精神，对做好疫情防控工作及时研究，着眼防控全局、聚焦防控要点，对疫情防控工作进行系统部署，提出明确要求，统筹开展疫情防控和生产经营工作。中国通号各企业迅速行动，成立疫情防控小组，狠抓落实，切实保障职工群众生命安全和身体健康。

CRSC quickly set up the epidemic prevention and control leading group to conduct the overall leadership of epidemic prevention and control. CRSC also learned and conveyed the Central Committee's essential points in the first place to timely investigate epidemic prevention and control, focused on the overall situation of epidemic prevention and control and its main points, made systematical arrangements and clear requests and planned epidemic prevention and control and production and operation as a whole. CRSC enterprises promptly took actions and established epidemic prevention and control groups to do substantial work and effectively protected the life safety and health of employees.

### 防控疫情 有序复工复产

### Conducting epidemic prevention and control for orderly resumption of work and production

在疫情严峻大考面前，中国通号在做好防控的同时，复工复产、主动作为，在员工零感染的前提下，2月10日起具备条件的二级企业相继复工复产，并于2月底实现全系统复工复产率达到100%。疫情防控步入常态化后，中国通号实现“零感染”防线的持续巩固。

Facing the test brought by the serious epidemic, CRSC did well in epidemic prevention and control and meanwhile acted proactively to arrange resumption of work and production. On the premise of zero infection of employees, qualified second-class CRSC enterprises successively resumed to work and production from February 10, and the resumption rate of the whole system reached 100% by the end of February. After the normalization of epidemic prevention and control, CRSC realized continuous consolidation of the "zero infection" defense line.

## 技术研发 科技助力抗疫

### Engaging in technological research and development for scientific fighting against the epidemic

复工复产关键时期，各公共场所因返程高峰人流量激增，做好体温监测、疫情防控工作至关重要。中国通号凭借在电力、信号巡检机器人等设备的研发经验，及视频识别、红外探测等方面的丰富技术积累，根据疫情防控需要，将技术快速转型并投入到了体温筛查系统的研发中。2020年2月，研究设计院集团自主研发的红外体温筛查系统投入使用，大大提高测温准确度及效率。同时，为更好地满足不同用户的需要，研究设计院集团还推出适用于不同场景的三档红外体温筛查系统产品，由用户自行选择配置成本，达到广泛应用的效果。中国通号为北京市丰台区政府、北京空间技术研制试验中心等政府、企事业单位捐赠了测温系统，用通号科技实力助力抗击疫情。

In the critical periods of resumption of work and production, body temperature monitoring and epidemic prevention and control became essential due to a surge in return traffic at travel peak in public places. Relying on experience in developing power and signal patrol inspection robots and rich technology accumulation of video recognition and infrared detection, CRSC quickly transformed its technologies and devoted into the development of body temperature screening system to meet epidemic prevention and control demands. In February 2020, CRSC Research & Design Institute Group launched third-gear infrared body temperature screening systematic products applicable to different scenarios. Users could choose configuration cost, and the products were widely used. CRSC also donated body temperature monitoring system to government departments and enterprise and public enterprises like Fengtai District Government of Beijing and China Academy of Space Technology, using CRSC technological strength to help combat COVID-19 epidemic.

## 同心战疫 彰显企业担当

### Combating the epidemic with one heart, manifesting our sense of responsibility

在抗击新冠肺炎疫情的关键时刻，中国通号以集团公司名义通过国务院国资委专门账户，向湖北省捐赠3,000万元现金，助力打赢疫情防控阻击战；党员干部累计捐款185万元；团员青年累计捐款24万余元。

In the critical periods of fighting against COVID-19 epidemic, CRSC donated 30 million yuan to Hubei province in the name of CRSC Group via the special account of SASAC of the State Council to help Hubei win the blocking action of epidemic prevention and control. CRSC party members and cadres totally donated 1.85 million yuan; and the league members donated more than 240 thousand yuan.

为保障员工身心健康，中国通号投入2,065万元专项资金用于防控，采购口罩、消毒液、纸巾等防疫物资；各级工会开展职工队伍稳定风险排查，并制定应对措施，与员工开展谈心谈话，为员工提供心理支持；组织开展劳动竞赛，鼓舞员工士气，携手员工以实际行动，助力夺取疫情防控和经济发展“双胜利”。

To guarantee employees' physical and mental health, CRSC spent special funds of 20.65 million yuan on epidemic prevention and control, purchasing epidemic prevention materials including face masks, disinfectant and tissues. Local labor unions at all levels conducted employee team stability risk investigation, formulated corresponding measures and talked with employees to provide them mental support. CRSC also organized labor emulation to encourage employee morale and take actual actions together with employees to facilitate the "dual victory" of epidemic prevention and control and economic development.



## 开展志愿活动

### Conducting Voluntary Activities

中国通号积极组织、开展公益实践活动，并鼓励、引导下属企业及员工参与社会志愿服务活动，用实际行动服务社区、温暖人心，贡献社区发展。

CRSC actively organized and carried out public benefit practical activities and encouraged and guided subordinate enterprises and employees to participate in voluntary activities to serve communities, warm people's heart and contribute to community development with practical actions.

#### 中国通号志愿者坚守疫情防控第一线

##### CRSC volunteers staying on the frontline of epidemic prevention and control

2020年，疫情防控的号角一经吹响，全国上下即刻进入战斗状态。中国通号志愿者主动请缨，积极加入疫情防控工作中。他们奋战在一线，付出在一线，在疫情防控阻击战中展示中国通号人的责任和担当。

In 2020, the whole country immediately went into the war of epidemic prevention and control once the call to prevent and control the epidemic was raised. CRSC volunteers volunteered to take the responsibility and actively took part in the epidemic prevention and control work. They worked hard at the frontline, made great contributions and manifested CRSC people's responsibilities in the blocking action of epidemic prevention and control.



中国通号北京工业集团上通公司迅速行动，招募志愿者，成立了10人防疫志愿服务队，在火车站开展客流引导等服务

CRSC Beijing Railway Signal Co., Ltd. Shanghai branch promptly took actions to recruit volunteers and established a ten-member epidemic prevention volunteer service team to provide services like visitor guidance in railway stations



通号建设集团湖北分公司员工李敏辉在疫情期间担任武汉应急仓库管理负责人，参与一线抗疫

Li Minhui, an employee of CRSC Construction Group Hubei branch, acted as Wuhan emergency warehouse management person in charge during COVID-19 epidemic and fought against COVID-19 epidemic in the frontline



2020年10月，中国通号卡斯柯与深圳地铁携手组织“共同守护 海洋家园”净滩活动，志愿者们共清理393.81公斤海洋垃圾，用实际行动致力于“还海洋以洁净”

In October 2020, CRSC CASO cooperated with Shenzhen Metro to organize the coast cleanup activity themed on "Joint Protection of Ocean Home". Volunteers totally cleaned up marine trash of 393.81 kilograms, devoting themselves to "Cleaning up the Ocean" with practical actions



中国通号拉林铁路项目经理部与当地藏族同胞开展座谈会，了解需求

Project Manager Department of CRSC Lhasa-Linzhi Railway held seminars with local Tibetan compatriots to understand their needs



“六一”儿童节，中国通号拉林铁路项目经理部看望藏族同胞小朋友

On Children's Day, Project Manager Department of CRSC Lhasa-Linzhi Railway visited Tibetan compatriots' children



通号轨道怀柳项目部开展敬老志愿活动

CRSC Huailiu Project Department conducted the voluntary activity of visiting the elderly

## ESG指标索引

### HKEX ESG Reporting Guide

指标披露 General Disclosures and KPIs		页码 Page No.
范畴: 环境 A: Environment		
A1: 排放物 Aspect A1: Emissions		
一般披露 General disclosure		
A1.1	排放物种类及相关排放数据 The types of emissions and respective emissions data	P84
A1.2	温室气体排放量 (以吨计算) 及 (如适用) 密度 (如以每产量单位、每项设施计算) Greenhouse gas emissions(in tons) and, where appropriate, intensity (e.g. per unit of production volume, per facility)	P82
A1.3	所产生有害废弃物总量 (以吨计算) 及 (如适用) 密度 (如以每产量单位、每项设施计算) Total hazardous waste produced (in tons) and, where appropriate, intensity (e.g. per unit of production volume, per facility)	P84
A1.4	所产生无害废弃物总量 (以吨计算) 及 (如适用) 密度 (如以每产量单位、每项设施计算) Total non-hazardous waste produced (in tons) and, where appropriate, intensity (e.g. per unit of production volume, per facility)	P84
A1.5	描述所订立的排放量目标及为达到这些目标所采取的步骤 Describe emission targets set and the steps taken to achieve these goals	P80
A1.6	描述处理有害及无害废弃物的方法及描述所订立的减废目标及为达到这些目标所采取的步骤 Description of how hazardous and non-hazardous wastes are handled, the waste reduction goals set and the steps taken to achieve these goals	P83
A2: 资源使用 Aspect A2: Use of resources		
一般披露 General disclosure		
A2.1	按类型划分的直接及/或间接能源 (如电、气或油) 总耗量 (以千个千瓦时计算) 及密度 (如以每产量单位、每项设施计算) Direct and/or indirect energy consumption by type (e.g. electricity, gas or oil) in total (kWh in '000s) and intensity (e.g. per unit of production volume, per facility)	P78
A2.2	总耗水量及密度 (如以每产量单位、每项设施计算) Water consumption in total and intensity (e.g. per unit of production volume, per facility)	P79
A2.3	描述所订立的能源使用效益目标及为达到这些目标采取的步骤 Description of energy use efficiency initiatives and steps taken to achieve these targets	P79
A2.4	描述求取适用水源上可有任何问题, 以及所订立的用水效益目标及为达到这些目标所采取的步骤 Description of issues (if any) in sourcing water that is fit for purpose, water use efficiency initiatives and steps taken to achieve these targets	P78
A2.5	制成品所用包装材料的总量 (以吨计算) 及 (如适用) 每生产单位占量 Total packaging material used for finished products (in tons) and, if applicable, with reference to per unit produced	P78

指标披露 General Disclosures and KPIs		页码 Page No.
A3: 环境及天然资源 Aspect A3: Environment and natural resources		
一般披露 General disclosure		
A3.1	描述业务活动对环境及天然资源的重大影响及已采取管理有关影响的行动 Description of the significant impacts of activities on the environment and natural resources and the actions taken to manage them	P78
A4: 气候变化 Aspect A4: Climate Change		
一般披露 General disclosure		
A4.1	描述已经及可能会对发行人产生影响的重大气候相关事宜, 及应对行动 Description of the significant climate issues that have and may affect the issuer, and actions taken to address them	P80
范畴: 社会 B: Society		
雇佣及劳工准则 Employment and Labor Standards		
B1: 雇佣 Aspect B1: Employment		
一般披露 General disclosure		
B1.1	按性别、雇佣类型 (如全职或兼职)、年龄组别及地区划分的雇员总数 Total workforce by gender, employment type(e.g. full-time or part-time), age group and geographical region	P90-91
B1.2	按性别、年龄组别及地区划分的雇员流失比率 Employee turnover rate by gender, age group and geographical region	P90-91
B2: 健康与安全 Aspect B2: Health and safety		
一般披露 General disclosure		
B2.1	过去三年 (包括汇报年度) 每年因工亡故的人数及比率 Number and rate of work-related fatalities in the past three years (including the reporting year)	P73
B2.2	因工伤损失工作日数 Lost days due to work injury	P73
B2.3	描述所采纳的职业健康与安全措施, 以及相关执行及监察方法 Description of occupational health and safety measures adopted, how they are implemented and monitored	P64-75



指标披露 General Disclosures and KPIs		页码 Page No.
<b>B3: 发展及培训</b> Aspect B3: Development and training		
一般披露 General disclosure		
B3.1	按性别及雇员类别 (如高级管理层、中级管理层) 划分的受训雇员百分比 The percentage of employees trained by gender and employee category (e.g. senior management, middle management)	P93-95
B3.2	按性别及雇员类别划分, 每名雇员完成受训的平均时数 The average training hours completed per employee by gender and employee category	P93-95
<b>B4: 劳工准则</b> Aspect B4: Labor guidelines		
一般披露 General disclosure		
B4.1	描述检讨招聘惯例的措施以避免童工及强制劳工 Description of measures to review employment practices to avoid child and forced labor	P90-91
B4.2	描述在发现违规情况时消除有关情况所采取的步骤 Description of steps taken to eliminate such practices when discovered	P90-91
运营管理 Operational practices		
<b>B5: 供应链管理</b> Aspect B5: Supply chain management		
一般披露 General disclosure		
B5.1	按地区划分的供货商数目 Number of suppliers by geographical region	P105
B5.2	描述有关聘用供货商的惯例, 向其执行有关惯例的供货商数目, 以及有关相关执行及监察方法 Description of practices relating to engaging suppliers, number of suppliers where the practices are being implemented, how they are implemented and monitored	P104-105
B5.3	描述有关识别供应链每个环节的环境及社会风险的惯例, 以及相关执行及监察方法 Description of practices relating to identifying environmental and social risks at each link of the supply chain, how they are implemented and monitored	P104-105
B5.4	描述在拣选供应商时促使多用环保产品及服务的管理, 以及相关执行及监察方法 Description of management promoting the use of environmental products and services in selecting selection, how they are implemented and monitored	P104-105
<b>B6: 产品责任</b> Aspect B6: Product responsibility		
一般披露 General disclosure		
B6.1	已售或已运送产品总数中因安全与健康理由而须回收的百分比 Percentage of total products sold or shipped subject to recalls for safety and health reasons	P64
B6.2	接获关于产品及服务的投诉数目以及应对方法 Number of products and service-related complaints received and how they are dealt with	P64

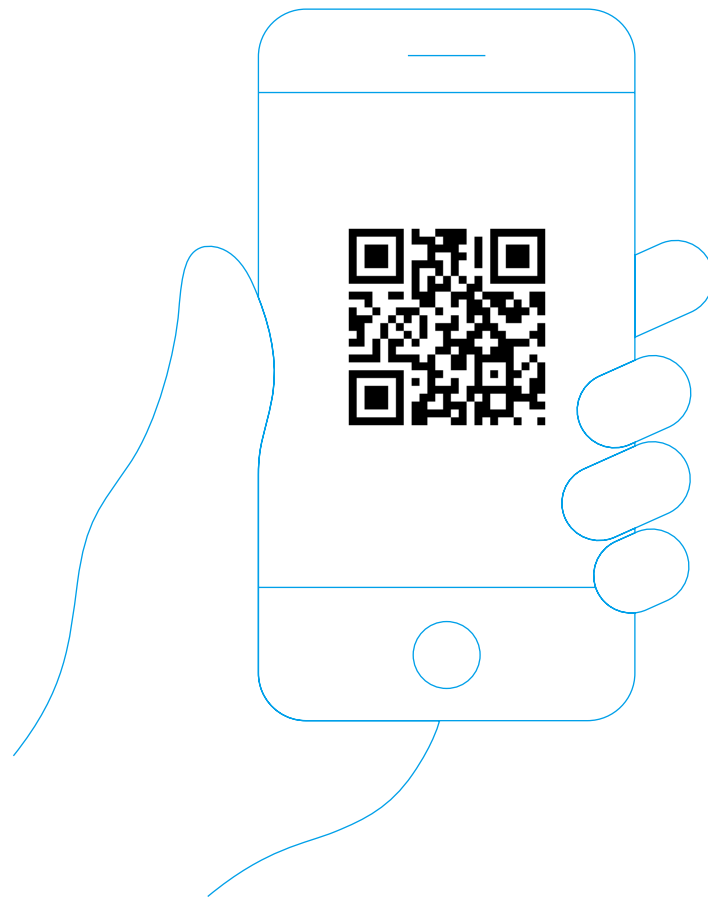
指标披露 General Disclosures and KPIs		页码 Page No.
B6.3	描述与维护及保障知识产权有关的惯例 Description of practices relating to observing and protecting intellectual property rights	P50-59
B6.4	描述质量检定过程及产品回收程序 Description of quality assurance process and recall procedures	P62-75
B6.5	描述消费者资料保障及私隐政策, 以及相关执行及监察方法 Description of consumer data protection and privacy policies, implementation and monitoring methods	P62-75
<b>B7: 反贪污</b> Aspect B7: Anti-corruption		
一般披露 General disclosure		
B7.1	于汇报期内对发行人或其雇员提出并已审结的贪污诉讼案件的数目及诉讼结果 Number of concluded legal cases regarding corrupt practices brought against the issuer or its employees during the reporting period and the outcomes of the cases	P29
B7.2	描述防范措施及举报程序, 以及相关执行及监察方法 Description of preventive measures and whistle-blowing procedures, how they are implemented and monitored	P29-31
B7.3	描述向董事及员工提供的反贪污培训 Description of the anti-corruption training provided to directors and staff	P29-31
社区 Community		
<b>B8: 社区投资</b> Aspect B8: Community investment		
一般披露 General disclosure		
B8.1	专注贡献范畴 (如教育、环境事宜、劳工需求、健康、文化、体育) Focus areas of contribution (e.g. education, environmental concerns, labor needs, health, culture, sport)	P107-115
B8.2	在专注范畴所动用资源 (如金钱或时间) Resources contributed (e.g. money or time) to the focus area	P107-115

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中国铁路通信信号股份有限公司

地址：北京市丰台区南四环汽车博物馆南路 1 号院中国通号大厦

邮编：100070

电话：010-50809090

网址：[www.crsc.com.cn](http://www.crsc.com.cn)

Email：[crsc@crsc.com.cn](mailto:crsc@crsc.com.cn)