

全国中文核心期刊
中国科技核心期刊
RICESE 中国核心学术期刊

■ 中国学术期刊综合评价数据库统计源期刊 ■ 中国知网 中国学术期刊网络出版总库全文收录
■ 中国科技期刊精品数据库收录 ■ 美国《化学文摘》《乌利希期刊指南》收录 ■ 俄罗斯《文摘杂志》收录

煤矿安全

ISSN 1003-496X
CN 21-1232 TD

3
2018

SAFETY IN COAL MINES

Vol. 49 No. 3

煤科集团沈阳研究院有限公司

主办

1970年创刊·月刊

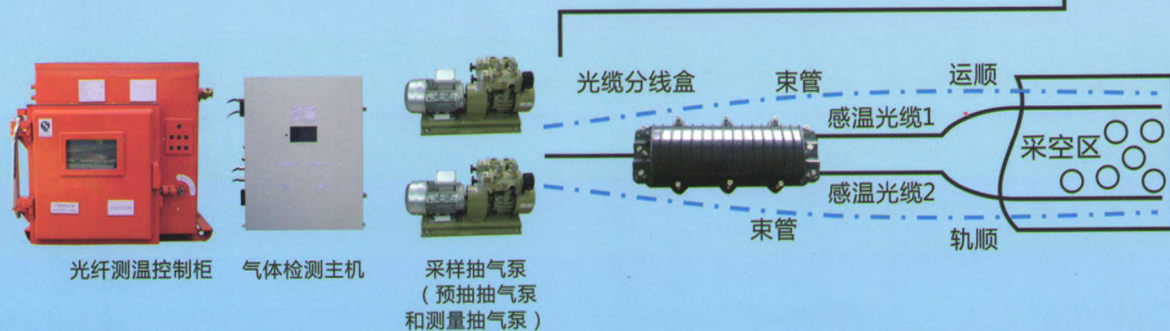
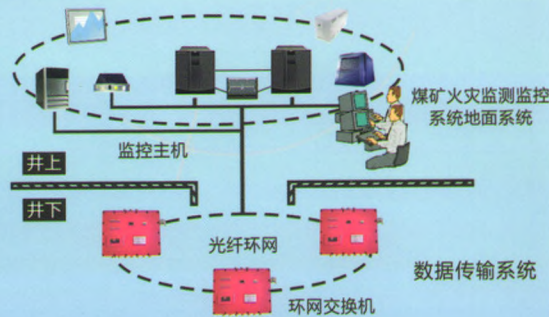
GLTECH

光力科技
股票代码: 300480



QK1817622

矿用分布式激光火情监测系统



- ◎ 火最完善的火灾预测模型, 包含温度、CO、CH₄、C₂H₄、C₂H₂、O₂、CO₂, 集分布式光纤传感和激光多气体检测技术为一体。
- ◎ 气体检测采用高分辨率激光吸收光谱技术, 消除气体交叉干扰, 测量不受粉尘、水汽的影响。
- ◎ 温度检测采用光纤传感技术, 本质安全, 铺设简单, 无需维护, 测量准确, 可对采空区发火点精确定位。
- ◎ 本地实时连续测量, 响应速度快, 不受管路影响。

ISSN 1003-496X



WWW.GLTECH.CN

TEL: 0371-6785 8887 E-MAIL: info@gltech.cn CSH: 400-0057-577

ADD: 郑州高新技术产业开发区长椿路十号

9 771003 496183

万方数据

煤矿安全

MEIKUANG ANQUAN

月刊(1970年创刊)

2018年3月

第49卷第3期(总第524期)

主管单位

煤科集团沈阳研究院有限公司

主办单位

煤科集团沈阳研究院有限公司

主 编 罗海珠

副 主 编 梁绍权

编辑部主任 王福厚

广告发行主管 刘明智

出版单位 《煤矿安全》编辑部

地 址 辽宁省抚顺市经济开发区
滨河路11号

邮政编码 113122

电 话 (024)56616988 56616987
56616981 56613526

电子信箱 mkaq@163.com
mkaqgg@163.com(广告)

网 址 www.mkaqzz.com

发行范围 公开发行

发行单位 《煤矿安全》编辑部
或全国各地邮局

邮发代号 8-293

印刷单位 煤炭科学研究总院抚顺分院
胶版印刷厂

中国标准连续出版物号 ISSN 1003-496X
CN 21-1232/TD

企业法人营业执照注册号 210400000026129

商标注册证 第1144537号

出版日期 3月20日

定 价 20.00元

北京联络处 (010)64464228



“煤传”数字杂志



《煤矿安全》微信公众号

目 次

试验·研究

- 雾化喷嘴夹角对瓦斯水合分离的影响 刘传海,吴强,张保勇,张家豪,张强,吴琼(1)
- 煤与瓦斯突出煤层CO₂相变致裂增透技术试验研究 郭永沼(5)
- 煤层注空气置换-驱替甲烷作用研究 邢述团,杨宏民,陈立伟(9)
- 等容变压下不同煤的瓦斯放散规律研究 黄再娟,章晓岚,赵欣(13)
- 薛湖煤矿穿层水力冲孔周围煤体变形规律研究 宝坤,张明杰,魏国营(17)
- 地勘环境煤的瓦斯解吸规律实验模拟研究 李奇,秦玉全(21)
- 复合防火喷涂封堵材料特性研究 赵文彬,董清府,薄福利,李振武,王均双,杨春辉(24)
- 高矿化度矿井水地下回灌对毛乌素沙漠地下水水质的影响 赵彩凤,杨建(29)
- 渗流作用下软弱覆岩相似模拟实验探究 陈卓立,夏洪春,胡涛,战胜(33)
- 煤与页岩渗透性对比实验研究 刘浩,侯吉峰,姜永东,赵丽娟(36)
- FZ-H800巷道注浆堵水加固水泥基外加剂试验研究

刘立民,李延辉,闫旭,张付涛,张进鹏(40)

- 基于偏应力第三不变量的窄煤柱合理宽度确定 何富连,肖鹏,来永辉,李政(44)
- 固体充填胶结沿空留巷巷帮支护体优化设计

张升,刘洋,刘恒凤,姜淑印,刘治成,徐怀胜(48)

- 爆破荷载对不同龄期混凝土支护体影响的数值模拟 宗琦,吴捷豪,马栾清(52)

- 新型爆破封孔材料的制备与应用 王杰,张雷林,伍清(56)

- 煤岩微观图像的K-均值和数学形态学分割算法研究 张景飞,郭倩,朱同功,郭攀(60)

- 高位硬厚关键层下开采弹性能分布研究 武泉林,方秋(65)

技术·创新

- 教学三矿机采面割煤产尘运移与控制技术 王兵建,李远知(68)

- 复杂条件下煤层气钻井堵漏技术研究 倪光清,薛晓辉,周炳朝,王有国(72)

- 露天矿小窑空洞火区治理技术 汤笑飞,史广义,张微(75)

- 中间搭桥技术在哈尔乌素露天煤矿的应用 张宝卫(79)

- 大采高液压支架带压移架技术 曹连民,张亚珠,郭徽,孙士娇,张震(83)

- 动压影响下留窄煤柱沿空掘巷围岩控制技术 冯廷灿,邹德均,周诗建(87)

设计·开发

- 高效空冷器在赵楼煤矿采煤工作面的应用 辛嵩,高攀攀,简俊常,刘恒,杨岩(91)

- 基于以太网的煤矿监控分站软件升级技术 赵越(95)

- 基于大数据的矿井灾害预警模型 徐磊,李希建(98)

- ZDY4300LP型履带钻机的研制 刘智(102)

- 双动力螺旋钻杆合理参数模拟研究 王坤,郭文亮,冯光,宫晓琴,辛宇鹏(105)

- 工业以太网在盐井一矿中的应用 张金豪(109)

- 杭来湾煤矿大直径钻井工程钻头选型 郭辉(112)

- 山浪矿ZDT17680/23/45型端头分体式支架组 宋涛(115)

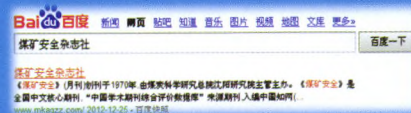
- 无人机电载雷达在露天矿边坡位移监测中的应用 贺凯(118)

应用·实践

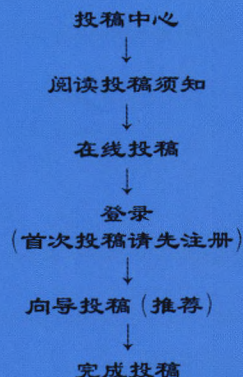
- 突出煤层综掘工作面湿润剂高压喷雾降尘应用 余贵军,王和堂(121)

《煤矿安全》杂志唯一投稿平台:

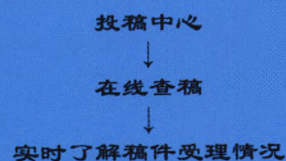
www.mkaqzz.com



投稿流程:



查稿流程:



注: 投稿请用IE浏览器

CFG 桩复合地基在沉陷区差异沉降不良地基处理中的应用 孙世国,魏帅颖,张玉娟(125)

综合物探技术在工作面导水构造探测中的应用

李江华,廉玉广,焦 阳,李梓毓,樊林林(129)

黏土原浆高压喷射制备工艺

刘书杰(133)

近距离煤层下行开采下煤层回采巷道布置

任仲久(136)

分析·探讨

煤矿井下煤层渗透率直接测定方法研究及应用

陶云奇,闫本正,刘 东(140)

基于有限元软件的煤层气水平井井壁稳定数值模拟

张丹丹,冯雨实,李永臣,任小庆,康海涛,吴 辽(144)

煤岩孔隙结构分形特征表征方法研究

徐 欣,徐书奇,邢悦明,贾慧敏(148)

综放工作面瓦斯积聚影响因素模拟研究

王洪胜,吴 兵,雷柏伟(151)

煤层群上保护层开采保护效果现场考察

文 虎,樊世星,卢 平,刘文永,程小蛟(155)

松软厚煤层巷道层位对突出危险性的影响分析

杨守国,王武超,李树刚(160)

含瓦斯煤粒前期扩散理论模型及解析解

薛洪来,关 城,付 帅,董利辉,王菲茵(164)

井下直流电法超前探测低阻区水与瓦斯视电阻率响应分析

王恩营,李 锐,刘仰光,王红卫,李沛涛,刘山清(168)

基于 AHP 的煤层润湿性模糊综合评判分析

罗根华,李梦雪,马云东(172)

宝鼎矿区水害发生机理

金永飞,李山山,李海涛(175)

基于 ANSYS 的综掘工作面通风参数优化

王文才,张 伟,耿 荣,陈 阳,邓连军,尹 旭(178)

基于液气相变吸热的深井掘进工作面降温数值模拟

张连昆,康天合,谢耀社,王月芳,董宏斌,董再田(182)

直墙半圆拱形巷道变形破坏影响因素分析

廖志恒(187)

基于 Visual Modflow 的矿井涌水量模拟和动态预测研究

刘 基,王强民,杨 建(190)

条带充填保水开采导水断裂带高度多因素影响分析

柳 晶,李根威(194)

倾角对煤岩组合体力学及冲击倾向性影响的颗粒流分析

赵宏林,赵 越(198)

采煤工作面过断层预掘巷道间岩柱尺寸研究

金志远,崔 波,许猛堂(202)

巨厚基本顶大采高工作面顶板破断特征

申路路,王 伸,张群磊,郑金雷(205)

大倾角煤层回采巷道底鼓机理及控制技术

韩 磊,侯水云,张小康(209)

基于应力解除理论的三维采动应力测量模拟分析

庞 乐,王连国,肖天博,张晓东(213)

沿空留巷充填体蠕变特性数值模拟

周 睿(218)

黑山露天矿浅部火烧区边坡稳定性研究

田 华,李新鹏,韩 流,舒继森(222)

新疆白砾滩露天煤矿边坡稳定性研究

关崇峻(225)

监察·管理

安全工程类创新型人才培养模式探讨

阙 哲,李凤实,王晓蕾,张树江(229)

上榆泉煤矿洗选中心清单化安全管理的探索与应用

蒋涵元,宋万军(232)

中国平煤神马集团整合矿井安全管理短板及对策

涂兴子,赵红利(235)

基于改进 ANP 的煤炭企业应急能力评估模型及应用

王德鲁,丁永欣,邵 青(237)

基于鱼骨图模型的露天煤矿高温爆破施工安全研究

崔晓荣(242)

煤矿安监执法信息管理平台设计研究

刘 建,郗 彤,刘传安(245)

本刊声明:

☆ 本刊所有来稿自投稿之日起 3 个月内未收到“稿件采用通知书”,作者可另行处理,在此之前请勿一稿多投。

☆ 根据编辑加工原则,本刊可能会对采用的稿件进行必要的删改,不同意删改的,请在投稿时声明。

☆ 本刊有出电子版、网络版、与网站技术交流和与各数据库合作的权利,作者著作权使用费(包括上述几种方式),并与本刊稿酬一次性付清。如作者不同意将文章以上述形式收录,请在来稿时声明。

SAFETY in COAL MINES

Monthly(Started in 1970)

March 2018

Vol.49, No.3(Total 524)

Competent Authority

CCTEG Shenyang Research Institute

Sponsor

CCTEG Shenyang Research Institute

Chief Editor LUO Haizhu

Deputy Chief Editor LIANG Shaoquan

Editorial Director WANG Fuhou

Advertisement & Distribution LIU Mingzhi

Publisher Editorial Office of
《SAFETY in COAL MINES》

Address No.11 of Binhe Road, Fushun
Economic Developing-area, Liaoning, China

Post code 113122

Tel 86-24-56616988 56616987
56616981 56613526

E-Mail mkaq@163.com
mkaqgg@163.com(advertisement)

Website www.mkaqzz.com

Issuer Public Offering

Subscribe(to) Editorial Office of 《SAFETY in
COAL MINES》 or Local Post Offices

Postal Distribution Code 8-293

Printed by Offset Printing Factory of
Fushun Branch of CCRI

China Standard Serial
Numbering ISSN 1003-496X
CN 21-1232/TD

Business License No. 210400000026129

Trademark Registered
Certificate No.1144537

Publishing Date March 20

Price 20 yuan

Beijing Liaison Office 86-10-64464228

万方数据

CONTENTS

Test·Research

Effect of Atomization Nozzle Angle on Hydration Separation of Gas

LIU Chuanhai, WU Qiang, ZHANG Baoyong, ZHANG Jiahao, ZHANG Qiang, WU Qiong(1)

Experimental Study on Permeability Increasing Technique with CO₂ Phase Transition Fracturing in Coal and Gas Outburst Coal Seam

ZOU Yongming(5)

Study on Displacement and Replacement of Methane in Coal Seam by Air Injection

XING Shutuan, YANG Hongmin, CHEN Liwei(9)

Study on Laws of Gas Diffusion Under Constant Volume and Pressure Swing

HUANG Zaijuan, ZHANG Xiaolan, ZHAO Xin(13)

Study on Coal Deformation Law of Hydraulic Flushing Passing Through Layer in Xuehu Coal Mine

BAO Kun, ZHANG Mingjie, WEI Guoying(17)

Simulation Experiment Study on Gas Desorption Law of Coal in Geological Exploration Environment

LI Qi, QIN Yujin(21)

Study on Characteristics of Composite Fire Extinguishing Spray Sealing Material

ZHAO Wenbin, DONG Qingfu, BO Fuli, LI Zhenwu, WANG Junshuang, YANG Chunhui(24)

Influence of Groundwater Recharge with High Salinity Mine Water on Groundwater Quality in Mu Us Desert

ZHAO Caifeng, YANG Jian(29)

Study on Similar Simulation Experiment of Weak Strata Under the Action of Seepage

CHEN Zhuoli, XIA Hongchun, HU Tao, ZHAN Sheng(33)

Experimental Comparison Study on Permeability of Coal and Shale

LIU Hao, HOU Jifeng, JIANG Yongdong, ZHAO Lijuan(36)

Experimental Study on Grouting and Water Blocking Reinforcement of Cement Based Admixture in FZ-H800 Roadway

LIU Limin, LI Yanhui, YAN Xu, ZHANG Futao, ZHANG Jinpeng(40)

Reasonable Width of Narrow Coal Pillar Based on the Third Invariant of Deviatoric Stress

HE Fulian, XIAO Peng, LAI Yonghui, LI Zheng(44)

Optimal Design of Laneway's Side Support for Gob-side Entry Retaining with Solid Cemented Backfilling

ZHANG Sheng, LIU Yang, LIU Hengfeng, JIANG Shuyin, LIU Zhicheng, XU Huaisheng(48)

Numerical Simulation of the Influence of Blasting Vibration on Concrete Support with Different Ages

ZONG Qi, WU Jiehao, MA Zhiqing(52)

Preparation and Application of New Sealing Material for Blasting

WANG Jie, ZHANG Leilin, WU Qing(56)

Study on K-mean and Mathematical Morphology Segmentation Algorithm of Coal and Rock Micro Images

ZHANG Jingfei, GUO Qian, ZHU Tonggong, GUO Pan(60)

Study on Distribution of Elastic Energy Under High Hard and Thick Key Strata Mining

WU Quanlin, FANG Qiu(65)

Technology·Innovation

Migration and Control Technology of Shearer-generated Dust in Mechanized Coal Mining Working Face of Jiaoxue No.3 Coalmine

WANG Bingjian, LI Yuanzhi(68)

Study on Leakage Plugging Technology of CBM Drilling Under Complex Geological Conditions

NI Guangqing, XUE Xiaohui, ZHOU Bingchao, WANG Youguo(72)

Control Technology for Small Mines Hollow Fire Area in Open-pit Mine

TANG Xiaofei, SHI Guangyi, ZHANG Wei(75)

Application of Pit-middle Bridging Technology in Haerwusu Surface Coal Mine

ZHANG Baowei(79)

Advancing Support with Pressure Technology for Hydraulic Support with Large Mining Height

CAO Lianmin, ZHANG Yazhu, GUO Hui, SUN Shijiao, ZHANG Zhen(83)

Surrounding Rock Control Technology of Narrow Coal Pillar Gob-side Entry Driving Under Dynamic Pressure

FENG Tingcan, ZOU Dejun, ZHOU Shijian(87)

Design·Development

Application of High Efficiency Air Cooler for Coal Mining Face in Zhaolou Coal Mine

XIN Song, GAO Panpan, JIAN Junchang, LIU Heng, YANG Yan(91)

Software Upgrading Technology for Coal Mine Monitoring Substation Based on Ethernet

ZHAO Yue(95)

Mine Disaster Warning Model Based on Big Data

XU Lei, LI Xijian(98)

Development of ZDY4300LP Crawler Drilling Rig

LIU Zhi(102)

Reasonable Parameters Simulation and Study on Dual-power Drilling Rod

WANG Kun, GUO Wenliang, FENG Guang, GONG Xiaojin, XIN Yupeng(105)

Application of Industrial Ethernet in Yanjing No.1 Mine

ZHANG Jinhao(109)

Type Selection of Drilling Bit for Large Diameter Drilling in Hanglaiwan Coal Mine

GUO Hui(112)

ZDT17680/23/45 Type Face-end Split Hydraulic Support in Shanlang Coal Mine

SONG Tao(115)

Application of Unmanned Aerial Loaded Radar in Slope Displacement Monitoring of Open-pit Mine

HE Kai(118)

Application·Practice

Application of High Pressure Spray and Dust Reduction with Wetting Agent in Fully Mechanized

Heading Face of Outburst Coal Seam

YU Guijun, WANG Hetang(121)

Application of CFG Pile Composite Foundation in Treatment of Differential Settlement of Bad Foundation

SUN Shiguo, WEI Shuaiying, ZHANG Yujuan(125)

Application of Comprehensive Geophysical Exploration Technique in Exploration of Water Conductive Structures in Working Face **LI Jiahua, LIAN Yuguang, JIAO Yang, LI Ziyu, FAN Linlin**(129)
 Preparation Technology of High Pressure Jet Flow of Clay Slurry **LIU Shujie**(133)
 Layout of Mining Roadway in Downward Mining Lower Seam in Close Distance Coal Seam **REN Zhongjiu**(136)

Analysis·Discussion

Study and Application of Direct Determination Method in Coal Seam Permeability of Coal Mine **TAO Yunqi, YAN Benzhen, LIU Dong**(140)
 Numerical Simulation of Wellbore Stability for CBM Horizontal Well by Finite Element Software **ZHANG Dandan, FENG Yushi, LI Yongchen, REN Xiaoqing, KANG Haitao, WU Liao**(144)
 Study on Characterization Method of Fractal Features of Pore Structure for Coal Rock **XU Xin, XU Shuqi, XING Yueming, JIA Huimin**(148)
 Numerical Simulation Study on Influence Factors of Gas Accumulation at Fully Mechanized Caving Face **WANG Hongsheng, WU Bing, LEI Baiwei**(151)
 Investigation on Protective Effect of Upper Protective Coal Seam Mining in Coal Seam Group **WEN Hu, FAN Shixing, LU Ping, LIU Wenyong, CHENG Xiaojiao**(155)
 Analysis of Influence of Soft and Thick Coal Seam Roadway Horizon on Coal and Gas Outburst Hazard **YANG Shouguo, WANG Wuchao, LI Shugang**(160)
 Theoretical Model of Early Diffusion in Coal Particles Containing Methane and Its Analytical Solution **XUE Honglai, GUAN Cheng, FU Shuai, DONG Lihui, WANG Feiyin**(164)
 Analysis of Apparent Resistivity Response on Water and Gas in Low Resistivity Zone by Underground DC Advance Method **WANG Enying, LI Rui, LIU Yangguang, WANG Hongwei, LI Peitao, LIU Shanqing**(168)
 Fuzzy Comprehensive Evaluation Analysis of Coal Seam Wettability Based on AHP **LUO Genhua, LI Mengxue, MA Yundong**(172)
 Occurrence Mechanism of Water Disaster in Baoding Mining Area **JIN Yongfei, LI Shanshan, LI Haitao**(175)
 Ventilation Parameters Optimization of Fully Mechanized Excavation Face Based on ANSYS **WANG Wencai, ZHANG Wei, GENG Rong, CHEN Yang, DENG Lianjun, YIN Xu**(178)
 Numerical Simulation on Heading Face Cooling of Deep Coal Mine Based on Liquid-gas Phase Transition Technology **ZHANG Liankun, KANG Tianhe, XIE Yaoshe, WANG Yuefang, DONG Hongbin, DONG Zaitian**(182)
 Analysis of Influence Factors on Deformation and Failure of Straight Wall Semi-circular Arched Tunnel **LIAO Zhiheng**(187)
 Mine Inflow Simulation and Dynamic Prediction Based on Visual Modflow **LIU Ji, WANG Qiangmin, YANG Jian**(190)
 Multi-factor Influence Analysis of Water Conductivity Fractured Zone Height in Strip Filling Water Preserved Mining **LIU Jing, LI Genwei**(194)
 Influence of Dip Angle of Coal and Rock Combination on Outburst Tendency Based on Particle Flow Code **ZHAO Honglin, ZHAO Yue**(198)
 Research on Rock Pillar Dimension Between Two Pre-driven Roadways in Passing Through Fault of Coal Mining Face **JIN Zhiyuan, CUI bo, XU Mengtang**(202)
 Breaking Characteristics of Huge Thick Main Roof in Working Face with Large Mining Height **SHEN Lulu, WANG Shen, ZHANG Qunlei, ZHENG Jinlei**(205)
 Mechanism and Control Technology of Floor Heave in Mining Roadway of Large Dip Coal Seam **HAN Lei, HOU Shuiyun, ZHANG Xiaokang**(209)
 Simulation Analysis of Three-dimensional Mining Stress Measurement Based on Theory of Stress Relief Method **PANG Le, WANG Lianguo, XIAO Tianbo, ZHANG Xiaodong**(213)
 Numerical Simulation on Creep Properties of Filling Body of Gob-side Entry Retaining **ZHOU Rui**(218)
 Study on Slope Stability of Shallow Buried Area in Heishan Surface Mine **TIAN Hua, LI Xinpen, HAN Liu, SHU Jisen**(222)
 Slope Stability Study on Xinjiang Bailitan Open Pit Coal Mine **GUAN Chongjun**(225)

Supervision·Management

Discussion on Training Mode of Safety Engineering Innovative Talents **KAN Zhe, LI Fengshi, WANG Xiaolei, ZHANG Shujiang**(229)
 Exploration and Application of Checking List Safety Management in Washing Center of Shanguyuan Coal Mine **JIANG Hanyuan, SONG Wanjun**(232)
 Short Board and Countermeasures for Safety Management of Integrated Mine in China Pingmei Shenma Group **TU Xingzi, ZHAO Hongli**(235)
 Assessment Model and Application of Emergency Capability in Coal Enterprises Based on Improved ANP **WANG Delu, DING Yongxin, SHAO Qing**(237)
 Safety Analysis of High Temperature Blasting in Opencast Coal Mine Based on Fishbone Model **CUI Xiaorong**(242)
 Research on Design of Coal Mine Safety Supervision Information Management Platform **LIU Jian, GAO Tong, LIU Chuan'an**(245)

万方数据



煤科集团沈阳研究院
有限公司

系列产品

- ◆ 紧急避险系统
- ◆ 煤矿安全生产监控系统及人员定位系统
- ◆ 煤矿瓦斯抽放配套装备
- ◆ 矿井通风防火灭火装备
- ◆ 煤矿瓦斯基础参数测定仪器
- ◆ 矿山救护装备
- ◆ 低压供电系统配套装备
- ◆ 矿用钻机及配套装置
- ◆ 露天矿卡车调度系统及边坡监测装备
- ◆ 模拟仿真训练系列

立足服务
保障安全
依靠创新
共同发展

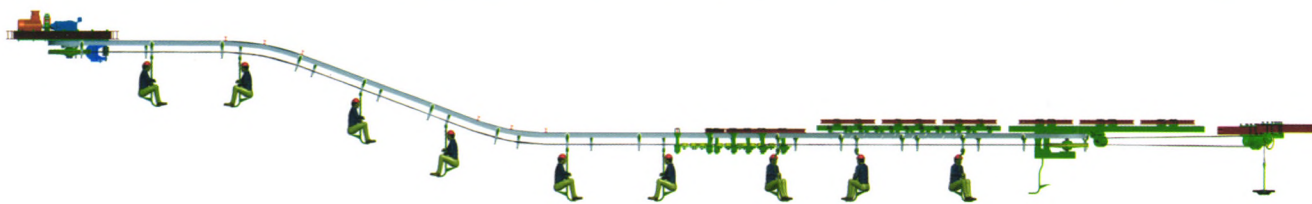
WWW.SYCCRI.COM

辽宁 抚顺 经济开发区滨河路11号
T 024-56616909 F 024-56616800

辽宁 沈阳 东滨河路108号
T 024-24117298 F 024-24117568

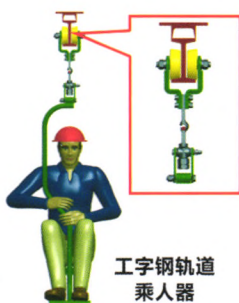


矿用绳牵引轨道式架空乘人装置(俗称“轨道猴车”)



★ 产品特点

- 不掉绳
- 不飞车
- 大坡度
- 无托绳轮和压绳轮
- 大运量
- 任意转弯
- 抱索器形式简单
- 物联网技术应用



工字钢轨道
乘人器

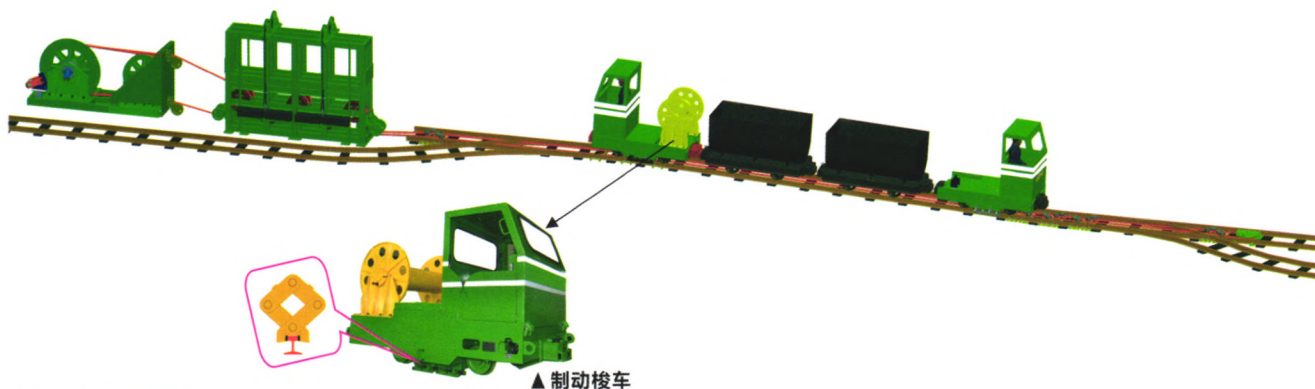


圆管轨道
乘人器



角钢轨道
乘人器

矿用无极绳连续牵引车(俗称“梭车”)



▲ 制动梭车

★ 产品特点

- | | | |
|----------------|---------------|------------------|
| 头车和尾车制动功能 | 互打点互通话功能 | 调速功能 |
| 漏泄通讯功能 | 后备保护功能 | 换油时间自动提醒功能 |
| 转弯运行功能 | 开机前强制检查功能 | 全线路语音提示功能(此功能选配) |
| 云技术应用功能(此功能选配) | 远程监控功能(此功能选配) | |



全球“猴车”科研、制造、销售、服务领军企业

营销专线: 0731-55672999 55672019
总机: 0731-55672666
网址: www.hx12666.com
地址: 湖南省韶山市高新区

售后专线: 0731-55672016 55672022
传真: 0731-55672012 55672100
E-mail: xiao12666@163.com
邮编: 411300

