ZPMC

HW系列桥吊小车滑触线+无线通信系统

Series HW Slide Conductor Line + Wireless Communication System for Quayside Container Crane Trolley

2013年5月版 May, 2013 Edition

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一、概述

目前，桥吊小车的移动供电系统主要有电缆拖令和拖链两种形式：

1、电缆拖令存在的主要问题：

A、拖令小车滚轮在高速运行中易发生滚轮脱落、轴承卡死；

B、由于风载等原因，容易引起电缆的勾挂，如果不定期保养维护，会引起高空坠物等危险；

C、日常维护工作量巨大；

2、电缆拖链存在的主要问题：

A、塑料拖链系统由众多链节构成，活动关节较多，往往是一个链节损环、卡滞即导致整个系统的恶性故障；

B、塑料拖链耐气候性差，易老化、脆裂和磨损，一般的使用寿命为5-8年，必须定期检查更换，后期维护成本大。

C、气候条件对塑料拖链影响较大，尤其北方冰雪气候，事故易发，影响作业；

传统的桥吊小车移动供电产品已经很难满足现代码头装卸机械的高负荷运行(见图1，2，3，4)，为保证生产安全高效运作，寻求高可靠的小车移动供电方案迫在眉睫。

I、Overview

At present, there are two types of the mobile power supply system of the Qcc trolley which are cable festoon and cable towline as follow:

1. Cable festoon, its' main problems are as follow:

A. Festoon trolley wheel is easy to fall in the high-speed operation, and its bearing is also easy stuck;

B. Due to wind load and other reasons, easily lead to the cable hook, if non-scheduled maintenance, it will cause the risk of falling objects;

C. It needs lots of daily maintenance.

2. Cable towline, its' main problems are as follow:

A. The plastic towline system is consists of many chain units. If one of them damaged, the whole system can not work normally;

B. The plastic towline is easily aging and wear, the using life is only 5-8 years. So the maintaining cost is huge.

C. The bending parts of the plastic towline is easily aging and wear. And it is special not fit for the snow and freezing condition.

The traditional Qcc trolley mobile power supply products can not fit the demandment of high load operation of the modern terminal handling machinery(See Pic.1,2,3,4). In order to ensure the safe and efficient operation of the production, it is extremely urgent to design a high reliability type of mobile power supply.

（图1 Pic.1）

（图2 Pic.2）

（图3 Pic.3）

（图4 Pic.4）

二、桥吊小车滑触线供电方案

ZPMC宁波伟隆根据客户需要出发，积极开发了桥吊小车滑触线+无线通信系统，它解决了电缆拖令系统的电缆勾挂、高空坠物的问题，也解决了塑料拖链易老化、脆裂和拱起翻车的问题，宁波伟隆与宁波三期码头、西门子、川丰电气、华师大共同合作开发了桥吊小车滑触线+无线通信系统，是一种几乎免维护高可靠的小车移动供电的最佳解决方案(见图5)。
其主要优点：

◆安全可靠，无高空坠物之虞；
◆使用寿命长，一次投入，与主机同寿命；
◆全气候作业；
◆抗风载、冰雪能力强；
◆无线通信采用非接触式数据传输，可靠性高、免维护。

II、HW series Qcc trolley slide conductor line power supply system

Considering the needs of customers, ZPMC Ningbo Weilong develop the Qcc trolley slide conductor line + wireless communication system. It can help to solve the problem of cable festoon system's cables hooking, falling objects risk, as well as to solve the plastic towline easy to aging, brittle fracture and arch of the roll-over, Ningbo Weilong cooperate with the Ningbo terminals, Siemens, Chuanfeng electrical, East China Normal University to develop a Qcc trolley slide conductor line + wireless communication system. It is the best solution for a virtually maintenance free and reliable trolley mobile power supply(See Pic. 5).

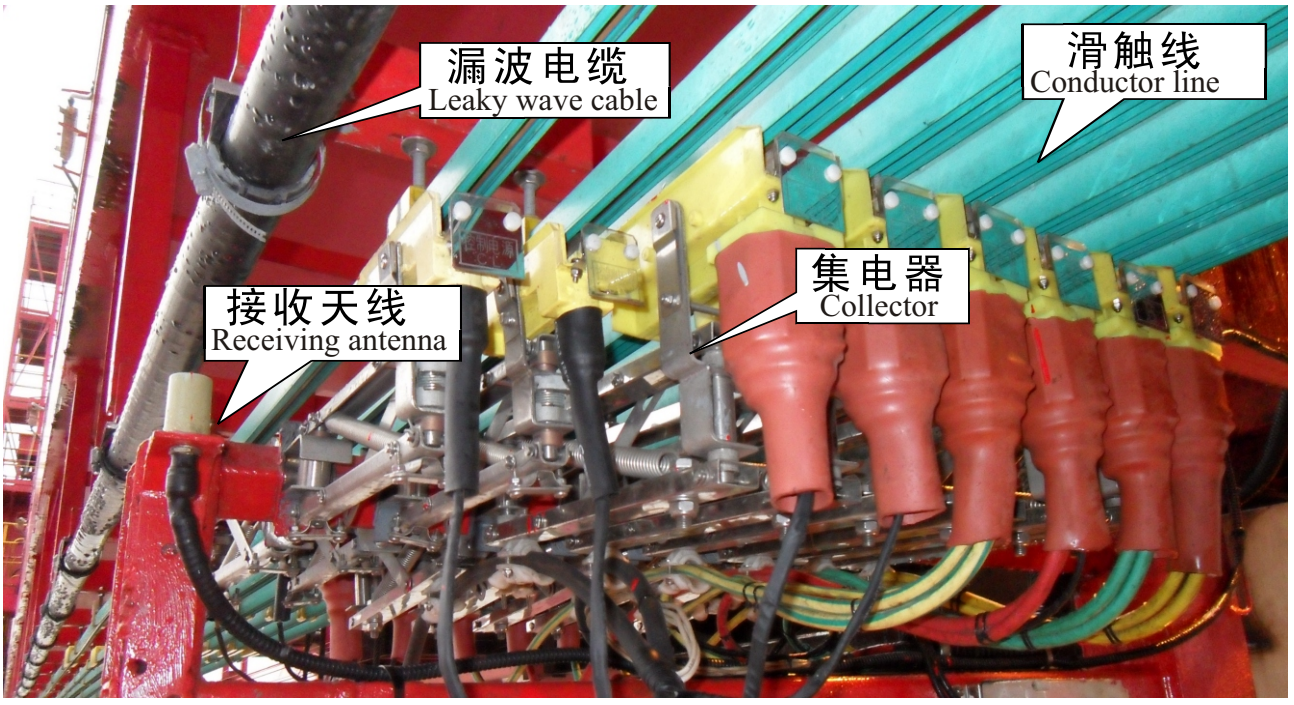
Safe and reliable, no falling objects risk;

Long working life, the same using life as main machine;

Fit for all kinds of weather conditions;

Strong ability of resistance to wind loads, snow and ice ;

Wireless communication using non-contact data transmission, high reliability, maintenance-free.



（图5 Pic.5）

三、桥吊小车滑触线系统的结构布置

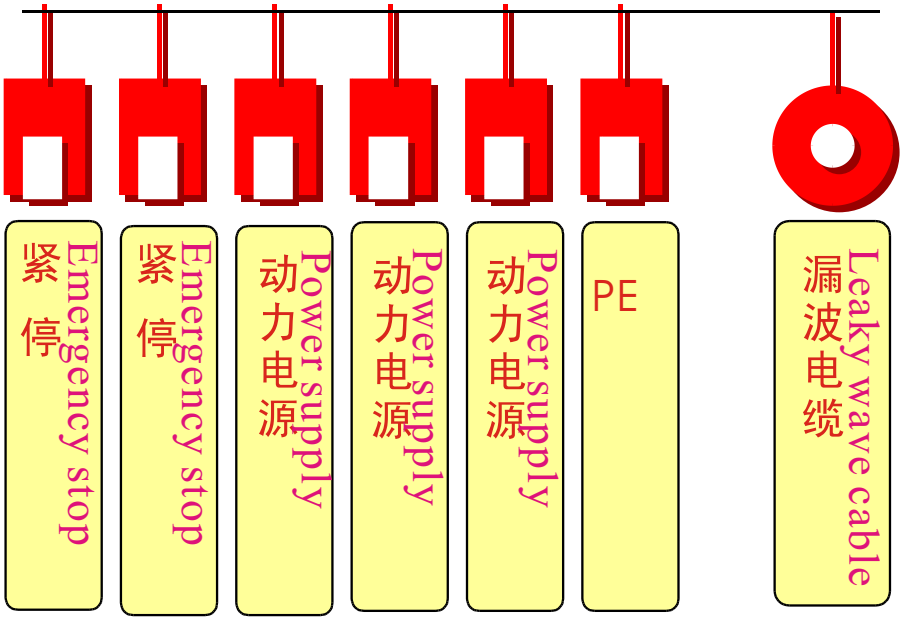
滑触线一般安装在小车左右侧的大梁底部，经过安装支架与大梁进行连接，在小车上安装检修平台，为了方便检查和维护滑触线；在滑触线底部安装有集电器，集电器由安装在小车上的牵引臂牵引，通过集电器上的碳刷装置引入小车三相电源和控制信号。

在滑触线维修平台上安装有三相带电指示灯和紧停操作站，供检查和维护时使用(见图6，7)。

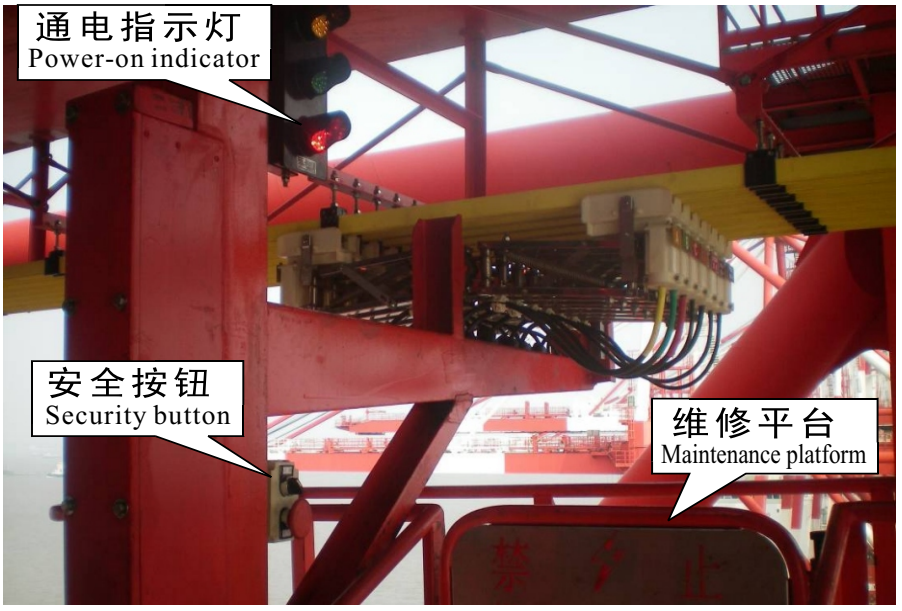
III、The structure layout of Qcc trolley slide conductor line system

Conductor line is usually installed at left or right side of trolley in the bottom of the beam, after mounting bracket and beam connections, installing a maintenance platform on trolley, in order to facilitate inspection and maintenance the conductor line; a collector has installed at the bottom of the conductor line , and collector traction by an arm traction from trolley, carbon brushes on the collector to lead three-phase power and control signal into trolley.

Maintenance platform of the conductor line has installed three-phase electric power-on indicator and e-stop operating station, used for inspection and maintenance(See Pic. 6,7).



（图6 Pic.6）



（图7 Pic.7）

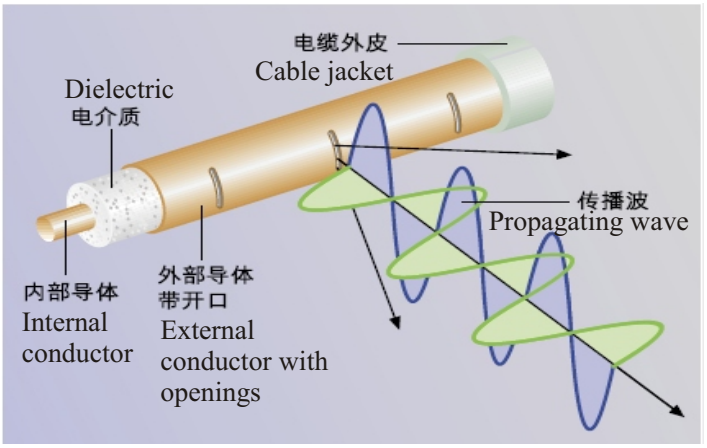
四、HW系列桥吊小车滑触线无线通讯系统

1、无线通信回路的设计根据桥吊的电控系统配置，采用工业以太网的方式接入，由电气房主控柜PLC站将与小车交换的信号转换成以太网方式传输到无线发射器，再经过无线发射器接入前后大梁的漏波电缆，在小车的集电器上安装有无线接收天线，通过接收天线传输到小车上的无线接收器，再接入小车PLC系统，完成电气房PLC与小车吊具屏PLC的通信；无线通信系统采用的是世界最先进的西门子工业无线以太网技术，可靠性高(见图8)。

2、无线通信系统采用2.4GHz无线通信频率，采用漏波电缆技术和定向接收天线技术，保证了无线信号的定向发射与接收，提高了抗干扰能力(见图9,10)。

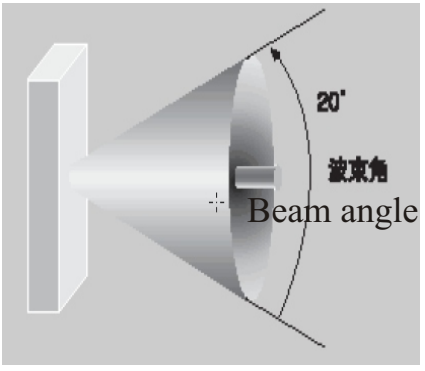
IV、 HW series Qcc trolley slide conductor line wireless communication system

1. Wireless communication circuit design based on the configuration of the Qcc's E-control system, adapt the industrial Ethernet access, the electrical room PLC station send signal to wireless transmitter by ethernet, then signal transferring into the leaky wave cable at front and back beams, the receive antenna on collector of trolley will receive signal, and transferring signal to receiver of trolley, and send signal to trolley PLC, at then finish the communication of e-room to trolley PLC ; wireless communication system is the world's most advanced Siemens industrial Wireless Ethernet technology (See Pic. 8).
2. The wireless communication system uses 2.4GHz wireless communication frequency, the leaky wave cable technology and directional receiving antenna, to ensure the orientation of transmitter and receiver of the wireless signal, and improved anti-jamming capability(See Pic. 9,10).



（图8 Pic.8）

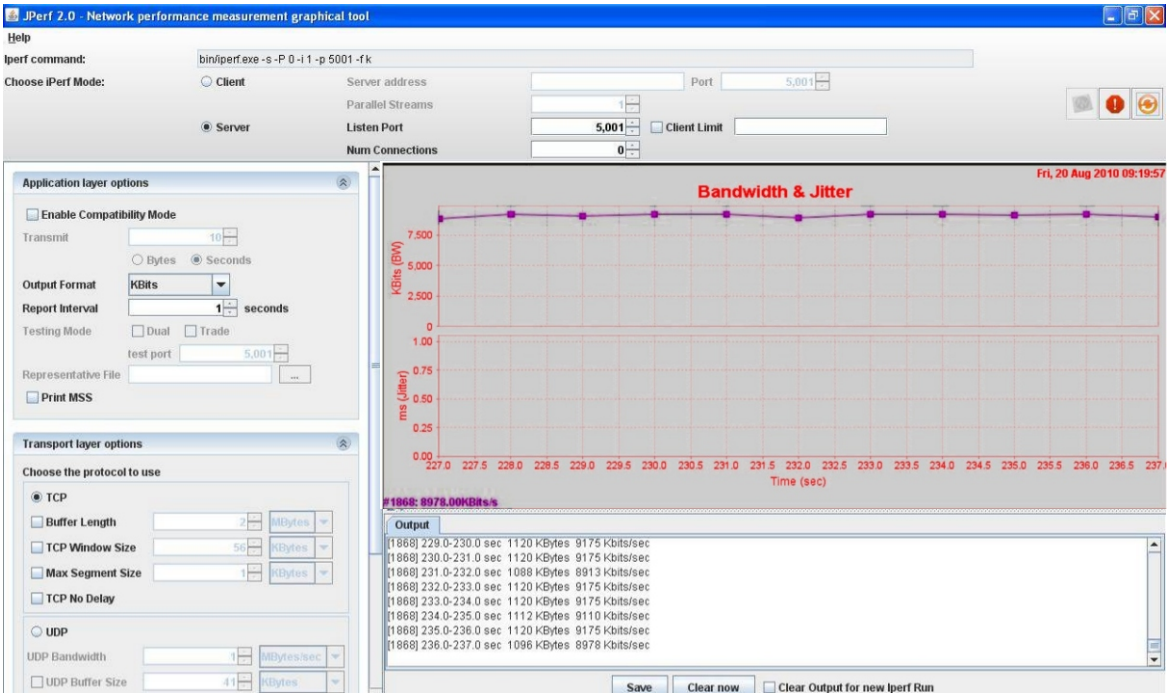
（图9 Pic.9）



（图10 Pic.10）

3、桥吊小车的电话和视频信号通过以太网的方式接入无线通信交换机，经过交换机接入无线发射器与控制信号同步发射，现场实际测试无线的带宽平均在8-10Mbit/s；可以满足岸桥音、视频的传输带宽需求(见图11)。

3.Qcc trolley telephone and video signals connecting into the wireless communication switch by the using of Ethernet, then access to the wireless transmitter and the control signal synchronous emission, on-site practical test wireless bandwidth is 8-10Mbit/s on average, and it can fit the needs of the Quayside contain crane (Qcc) audio and video transmission bandwidth(See Pic. 11).



（图11 Pic.11）

五、HW系列桥吊小车滑触线系统与拖令、拖链的性能比较

V、Compare of HW series Qcc trolley slide conductor line system, cable festoon and cable towline sysem

比较项目 Compare items / 供电方式 Power supply method	HW滑触线+无线通信系统 HW slide conductor line + wireless communication system	拖链系统 Towline system	拖令系统 Festoon system
1、使用性能及安全性 1.Safety and performance	高 High	中 Middle	低 Low
2、故障停机率 2. Faults frequency	故障几率极低 Very low	早期低、后期高 Low early and late high	随机发生，故障率高 Occur at random, high failure rate
3、日常检查周期，维护成本 3. Check preiod and maintenance costs.	3个月检查一次碳刷，维护成本低 Check carbon brushes per 3 months, low maintenance costs	每周一次， 后期维护成本高 Once a week, high maintenance costs later	每周一次， 维护成本高 Once a week, high maintenance costs
4、20年配件维护费用 4. Accessory costs for 20 years.	1~2年更换一次碳刷 Replace the carbon brushes per 1-2 years	后期经常更换损坏的拖链和电缆 Change the damaged towline and cable frequently later	不定期更换损坏的滚轮和电缆 Change the damaged wheel and cable if need
5、使用周期 5. Using life.	主件与桥吊同寿命 The same using life with the crane	5-8年/全套更新 Replace all per 5-8 years	8-10年/全套更新 Replace all per 8-10 years

六、HW系列桥吊小车滑触线系统的应用业绩

从拖令、拖链到滑触线是未来桥吊小车移动供电的必然发展方向，它克服了以往拖令、拖链系统的各种缺点，具有性价比高、免维护、寿命长等无可比拟的优点，在国内许多码头的桥吊小车上已经逐步开始推广应用，得到广大用户的认可和欢迎(见图12、13、14、15、16、17)。

宁波三期桥吊小车滑触线系统 2010-09

Slide Conductor Line system on NBCT, NINGBO, 2010

(图12 Pic.12)

VI、Application performance of HW series Qcc trolley slide conductor line system

From cable festoon to towline and then to slide conductor line, it is the inevitable direction of development of Qcc trolley mobile power supply in the future, it overcomes the past(cable festoon, towline), shortcomings, with cost-effective, maintenance-free, long life, etc. It has incomparable advantages, many domestic terminals has been gradually begin to apply slide conductor line + wireless communication system, its good performance has accepted and welcomed by all users(See Pic. 12,13,14,15,16,17,).

上港振东桥吊小车滑触线系统 2011-02

Slide Conductor Line System on SIPG, SHANGHAI,2011

(图13 Pic.13)

天津五洲桥吊小车滑触线系统 2011-04

Slide Conductor Line System on FICT, TIANJIN, 2011

(图14 Pic.14)

山东日照桥吊小车滑触线系统 2011-10

Slide Conductor Line System on RIZHAO, 2011

(图15 Pic.15)

大连港桥吊小车滑触线系统 2012-01

Slide Conductor Line System on DPCM, DALIAN, 2011

(图16 Pic.16)

宁波五期桥吊小车滑触线系统 2012-03

Slide Conductor Line system on NBCT, NINGBO, 2012

(图17 Pic.17)

滑触供电 无线通信 安全可靠 行业领先

Slide conductor power supply, Wireless communication, Safety and reliable, Industry leading!

HW系列桥吊小车滑触线系统通过72小时连续作业验收考核无故障，是一种高可靠、免维护、寿命长的移动供电系统，是桥吊小车移动供电发展的理想产品。

Series HW Qcc trolley slide conductor line system has through 72 hours of continuous operation acceptance test without failure, it is a highly reliable, maintenance-free, long-life mobile power supply systems. So it is the most suitable product for the monile power supply.

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