



# CASE STUDY

## NAI HARNESSES & BOX BUILDS HELP CONTROL MINING OPERATIONS IN CHINA



### PROBLEM

A mining control company could not build harnesses and assemble enclosures internally as well as an outside interconnect supplier with experience in making rugged assemblies for hazardous environments.

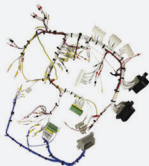
### SOLUTION

Outsource to a leading interconnect supplier to achieve better quality, reduced lead times and other benefits by sourcing components with global procurement resources.

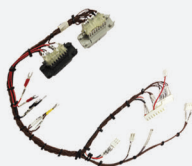
## NAI Harnesses & Assembled Enclosures Are Used in Mining Control Systems

NAI-CABLE HARNESS

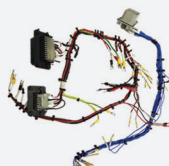
As Used In A Master Controller



As Used In A DSP Module



As Used In A Power Assembly Box



As Used In A Master Controller



As Used In A Mine Explosion-Proof and Intrinsically Safe Type Changeover Box



NAI-BOX BUILDS

Master Controller



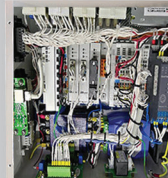
DSP Module



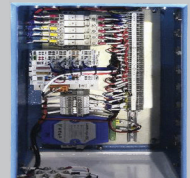
Power Assembly



Master Controller



Mine Explosion-Proof and Intrinsically Safe Changeover Enclosure



MINING CONTROL SYSTEM





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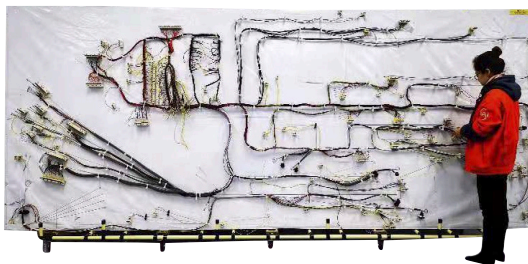
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## CUSTOM INTERCONNECT SOLUTIONS

### NAI SOLVES INTERCONNECT NEEDS FOR CHINESE MINING OPERATIONS

As a worldwide designer and manufacturer of custom interconnect solutions, NAI has assisted one of China's leading mining control companies by producing rugged harnesses and box builds for various mining operations. Specifically, the interconnects and box builds are assembled for different facets of control in large-scale operational equipment within the mines.

NAI manufacturing operations in Suzhou, China, recently began the project with the development and manufacture of very complex cable harnesses for installation within large explosion-proof enclosures. These cabinets are placed within mines for the operation and control of variable frequency drives and inverters. This equipment powers and controls conveyor belts, water and oil pumps, cooling fans, tape winding devices and brakes inside the mines. In addition, they provide alerts and notifications for transformers, motors, cables and other components when they are not operating within the expected temperature range, voltage range or other parameters. All operational drives utilize NAI interconnect solutions for the transmission of control signals, which essentially serve as the nerve system for the mining operations.

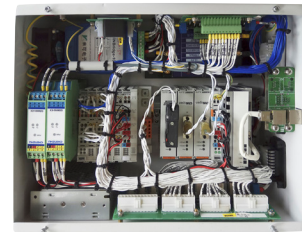


**Complex Harness for Electric Fracturing Pump Drive System Used in Shale Gas.**

The harnesses are designed specifically for the control drives in mining applications. Ten different cable harnesses have been designed, each of which is used for data communications and control, some with shielding for protection against EMI. Harnesses carrying power are also in planning and design stages. The typical data/control harness includes over 100 terminations, while the largest harness has more than 900 terminations. These assemblies have been designed to be very rugged and resilient in demanding environmental conditions.

The outsourcing of harnesses to NAI was very successful, so the customer began a second phase of development and manufacturing by having NAI produce a series of box builds. Each of these enclosures operates a different facet of a larger variable frequency drive and inverter system, and they are collectively installed within larger explosion-proof cabinets.

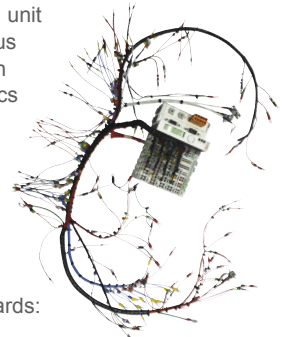
NAI assembles five different industrial-grade enclosures to house the customer's equipment for specific operations: a main controller for a high voltage inverter, a DSP module, a power controller, the main controller for the inverter and a control unit for intrinsic mine safety. Each of various complex harnesses are installed within these enclosures, along with electronics and other components. The customer then installs these smaller enclosures into the larger cabinets to house the main control system, and these are placed within the mines.



**Box Build for 3300V Intelligent Inverter for Mining.**

NAI products meet the requirements of the following tests, ratings or standards:

- GB3836.2-2010 for explosive atmospheric conditions
- High voltage test at 330V for power cable
- Connectors are IP67 rated for resistance to dust and water



**Harness for Mine Explosion-Proof and Intrinsically Safe Type Change-over Box.**

The customer for this mining project awarded the design and manufacturing of harnesses and box builds to NAI after their experience in producing these internally within their own manufacturing facilities. The company realized they were not as well suited to this kind of operation as NAI, and they ultimately preferred to focus on their main mining control equipment business and outsource this custom interconnect work to NAI. They acknowledged that, by using NAI, they reduced their quality risks and manufacturing lead times and they gained access to NAI's global supply chain for advantages with various components.

### ABOUT NAI

NAI designs and manufactures custom rugged cable assemblies and harnesses for a variety of industrial applications for mining machinery, construction and agricultural equipment, robotics, machine tools, material handling equipment, instrumentation & control and other industries with demanding requirements. Broad design capabilities, a global manufacturing footprint, rigorous Quality Management Systems, along with the ability to make things happen very quickly, combine to make NAI a totally unique and attractive supplier for interconnect solutions.