

Innovation

# Deploying a Solutions System to Reform Existing Businesses

Disruptive innovation created by renewed customer focus

There is an accelerating worldwide shift to railways as a means of providing mass transportation with reduced environmental impact. Hitachi Metals has been operating in the rolling stock cable business in Japan and overseas for some time. In addition to the production of cables for rolling stock, we have launched a comprehensive solutions-based business with offerings ranging from cable design to the design and manufacture of harnesses, and the outfitting of harnesses. Seeking to strengthen our solutions system for European markets, in 2016 we established a harness assembly line for rolling stock cable at our location in the Czech Republic, which has excellent access to various European countries. We will elevate our railway segment to a new level in an effort to expand our share of the global market.

Commuter train for Scotland for which the Hitachi Group received orders

## Shift in emphasis from “goods” to “solutions and services”

Having reaffirmed the benefits of meeting the pent-up demand from global rolling stock manufacturers, we launched a comprehensive solutions-based business with offerings ranging from the design of cables for rolling stock and the design and manufacture of harnesses to the outfitting of harnesses, in addition to the production of cables. A harness is a modularized component in which multiple wires are bundled. In this way, we can combine around 1,000 wires into 50 harnesses for use in the first car of rolling stock. This allows a huge reduction in the number of components and helps improve outfitting, workability, and convenience for customers. To date, rolling stock manufacturers have designed cable and manufactured and fitted out harnesses in-house alongside rolling stock design, which entailed considerable time and cost for measurement and outfitting. In response, we deployed 3D CAD technologies to provide comprehensive one-stop solutions ranging from rolling stock cable manufacture and wire design to the design, manufacture, and outfitting of harnesses. In harness manufacturing technology, which is one of the solutions, we developed an innovative digital harness board, which we deployed in the Czech Republic in 2016.



Wires and cables for rolling stock



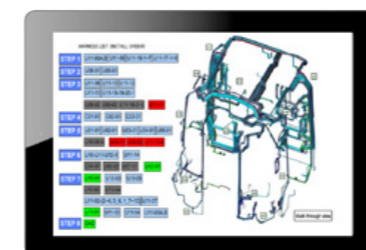
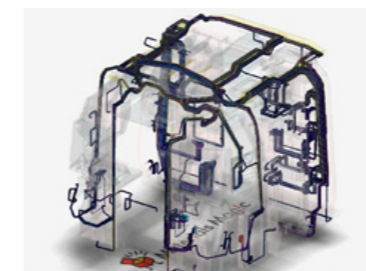
Class 800 train manufactured for the Intercity Express Programme (IEP) in the United Kingdom (order received by the Hitachi Group)

## Innovative solutions and services based on original concepts

Here, we handled the cable design function on behalf of the rolling stock manufacturer, utilizing 3D design data provided by the manufacturer to create the wiring for each cable using 3D CAD. We designed a modularized harness that allows cable outfitting to be done easily and efficiently. We also reused 3D harness design data to develop an outfitting navigation system. In addition, we developed a series of instructional animations for a tablet or PC showing customers the correct way to connect and outfit the harness. In these solutions and services, we rigorously explore ways to enhance customer benefits and our own value, which leads to a win-win outcome.

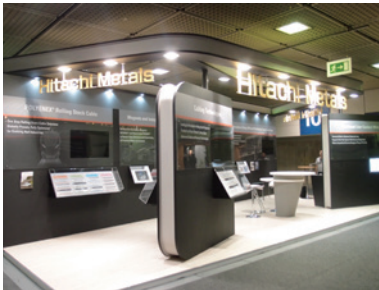
By also using IoT technologies to develop a digital harness board, we enhanced the efficiency and quality of harness manufacturing, which was previously highly reliant on operators.

Since all of these are breakthrough solutions and services, including the related business model, we have applied for 35 patents in Japan and overseas, ranging from cable design methods to outfitting navigation and digital harness boards.



3D design data screens  
Top: 3D wiring technology  
Bottom: Outfitting wiring technology

## Shifting emphasis from price competition to a powerful growth engine



Booth at InnoTrans 2016 trade fair

By providing comprehensive solutions and services, we have created added value that cannot be compared with our conventional cable sales business.

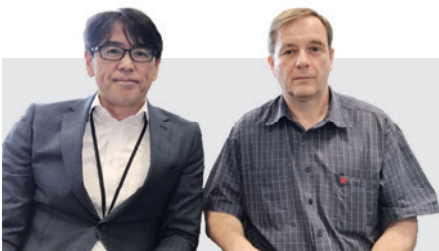
Using 3D in harness design greatly shortens the rolling stock design time for customers, and our outfitting navigation system has prevented outfitting error and lowered man-hours by 50%. This has greatly reduced lead times, from design to manufacture, for our rolling stock manufacturing customers. Furthermore, since the process can be simulated even without an actual vehicle, it is playing a positive role in the training of unskilled workers.

Enhancing the efficiency of harness manufacture and outfitting is a major issue for rolling stock manufacturers. Accordingly, Hitachi Metals received numerous specific inquiries when it exhibited these solutions and services at InnoTrans 2016, the International Trade Fair for Transport Technology, Innovative Components-Vehicles-Systems, held in September 2016, the largest of its kind. Some companies have already visited our harness assembly line at our location in the Czech Republic, and we look forward to attracting orders for new projects in the near future. Currently, we are the only company that provides comprehensive solutions, and this is attracting a great deal of interest because we are performing part of the manufacturer's role to deliver time and cost reductions.

With a new growth engine built on original comprehensive solutions, Hitachi Metals plans to increase sales in the railway segment by not only advancing its business laterally to domestic manufacturers but also expediting business growth on a global scale.

### Comparison of Wire Usage for Rolling Stock

Type	Wire volume	Vehicle length
Commuter train (4 cars)	150 km	90 m
High-speed train (5 cars)	220 km	125 m



### Innovative digital harness board developed from scratch

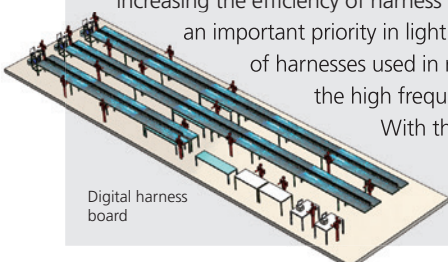
Kenji Kawase (left)  
Manager, 1st Engineering Sec., 2nd Engineering Dept.  
Electric Wire & Cable Business Unit, Cable Materials Company

Rostislav Varga (right)  
IT Manager, IT Section, Hitachi Cable Europe, s.r.o.

In the past, harnesses were produced using wooden boards onto which design drawing printouts were affixed. However, increasing the efficiency of harness manufacturing became an important priority in light of the numerous types of harnesses used in rolling stock, as well as the high frequency of model changes.

With this in mind, we developed our own groundbreaking digital harness

board that directly projects the harness design drawing. Thus, we created a manufacturing environment that enables flexible responses to design changes, in addition to model changes. We also introduced IoT technologies to handle automatic distribution, collation, and disconnection of cables, as well as work navigation, and we adopted traceability to allow visualization of work records and progress. In the Czech Republic, we have introduced a long assembly line that can manufacture harnesses up to 30 meters in length.



Digital harness board