SIEMENS

Automotive and transportation

Siemens Mobility

Siemens Mobility uses Teamcenter to optimize on-time train performance

Product

Teamcenter

Business challenges

Keep trains running at optimal operating levels

Improve the effectiveness of maintenance teams

Keys to success

Integrated service lifecycle management solution

Maintenance manuals based on core engineering data

Interactive, visual instructions

Results

700 documents produced by a team of four in 14 months

50 percent less time to produce maintenance tasks

Significantly lower cost

Publications available six months before first train delivery

30 percent reduction in time spent on maintenance

Effective change control

Easy re-use of information

Siemens PLM Software solution turns core engineering data into clear and concise instruction manuals for maintenance teams

More trains and more seats

The UK Government-sponsored Thameslink Programme is set to transform north-south travel through London, with 24 trains per peak hour through central London in December 2018, twice as many direct services between Brighton and London Bridge, longer carriages and more seats in morning peak time.

As part of the Thameslink Programme, new trains built by Siemens Mobility are due to begin operating in the spring of 2016. The fleet of 115 trains is comprised of 60 eight-car trains and 55 twelve-car trains totaling 1,140 vehicles. Looking after these over a period of 30 years is the responsibility of Siemens Mobility, which was awarded the contract to build the train and two new train depots; and undertake inspections every 20,000 miles, and significant overhauls after one million miles. Under the terms of a demanding performance regime, any issues with regard to the availability of trains will result in a direct penalty, so an effective maintenance regime is central to the success of the contract.

"The traditional method of compiling maintenance instructions has been to pass information from the train supplier to a publishing company," says Dave Hooper, director of the Thameslink program at Siemens Mobility. "This typically results in a first draft that requires substantial rewriting, plus an ongoing need for revision over the life of a train. In addition, amendments are often done in batches to minimize cost, so manuals are frequently not

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Siemens Mobility

up-to-date. Downtime caused by inadequate maintenance information is a long-standing issue across the rail industry."

In line with the significance of the whole project, Siemens Mobility has adopted an innovative alternative, a first for the United Kingdom rail industry. It has chosen to extract the content for instruction manuals directly from core engineering data, so that maintenance teams are drawing on exactly the same information as the manufacturing department. The overall aim is to improve performance and increase knowledge and control by compiling manuals in-house. Teamcenter® software, from product lifecycle management (PLM) specialist Siemens PLM Software, is playing a key role in combination with Cortona3D RapidAuthor software solutions. Cortona3D is a Siemens PLM Software technical partner.

Teamcenter for service lifecycle management

Teamcenter is used to obtain computer-aided design (CAD) models and bills-of-materials (BOM) data directly from the enterprise management system and create the manual structure. Cortona3D RapidAuthor, which is fully integrated with Teamcenter, is used by authors to transform the models into 3D animations. As the author produces the animation, RapidAuthor begins to produce the words for the steps required to explain the task. The author then uses an eXtensible Markup Language (XML) editor within RapidAuthor to add safety information, steps and graphics to the procedures. Teamcenter then structures graphics and text into numbered pages and publishes the final document.

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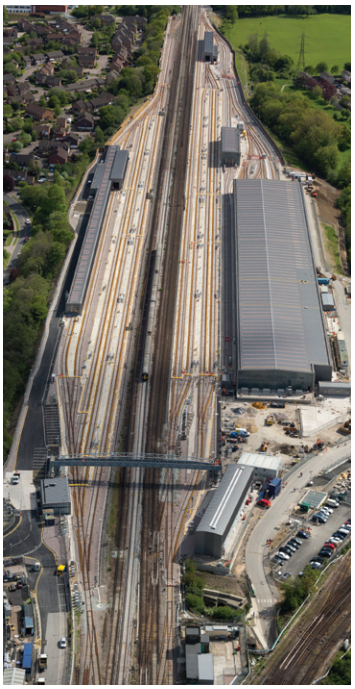
Each manual is in three parts: the basic details of the task, the specific procedure and functional testing. This enables a mix-and-match approach for routines that have overlapping tasks. The first section is a short description that highlights safety precautions and any specific competencies, materials and special tools required. The second section includes a marker with a link to the 3D model. This shows moving parts and demonstrates exactly how to remove or replace a component, particularly within small spaces. The final section is a clear and concise checklist to confirm completion, testing and asset management.

"We originally had about 1,000 tasks to prepare, but the mix-and-match approach brought that down to 650," says Straw. "In addition, we do not always have to prepare written instructions because the XML editor automatically generates relevant text based on the 3D model." One of the benefits of the solution is that RapidAuthor presents a redacted, as-built



view of components without all of the engineering data, so the privacy of intellectual property is assured.

Siemens Mobility relies on CAD-IT, a Siemens PLM Software solution partner, to provide technical support, configuration services and training. "The consultants at CAD-IT are extremely knowledgeable and helpful," Straw says. "They designed the automatic procedures that brought all the train engineering data into Teamcenter, created workflows for authoring and illustrating and developed style sheets that enable us to control the appearance of our documents."

Easy-to-understand words and images

The manuals are designed for easy use on the shop floor by technicians who will access data using Windows® software and will be required to acknowledge important safety reminders. When users view the animated 3D models, they can pause, point, hover and replay as necessary. A split-screen function enables them to see written instructions at the same time, with the relevant section highlighted as the 3D model turns. They can view by component or single assembly and when context is required – for example, if a part is being removed from a bogie – they may also be able to see a complex assembly such as the braking system. Siemens Mobility is also supplying operating instructions, guidance for cleaning teams and a spare parts catalog.

Ben Wardle, production manager, is responsible for validating the 650 tasks presented in the manuals. He leads a team of technicians undertaking maintenance on trains that have come off the assembly line in Germany and confirming that instructions are both accurate and achievable.

As a former maintenance technician, he is well aware of the challenges of inadequate information. "In my previous roles, it felt like we never had enough detail and were always identifying problems on the job. For example, some tasks were simply not possible and we often had to raise a non-conformance. It takes a lot of precious engineering time to agree how to handle and rectify such problems. Hopefully, with this project, we have resolved many initial queries before they become an issue. We are not leaving any ambiguity; there will be no confusion, which is what causes delays."

The right instructions, arriving on time

Scheduled overhauls, preventive maintenance and specialist procedures such as ultrasonic axle testing on a fleet of 115 trains allow for only one train to be unexpectedly out of action at any time. Minimizing the time that a train spends in a depot is therefore crucial.

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Solutions/Services

Teamcenter
www.siemens.com/teamcenter

Customer's primary business

Siemens Mobility works with customers to improve the efficiency, reliability, safety and environmental standards of road and rail transport. It is part of Siemens AG (Berlin and Munich), a global technology provider, active in more than 200 countries and focusing on the areas of electrification, automation and digitalization.
www.mobility.siemens.com

Customer location

London
England

Partner

CAD-IT

The first step is to provide accurate information when new trains are being commissioned and tested. Fourteen months into the project, the team of four authors had produced 700 documents. "I have worked in technical publication for 20 years, and our progress is absolutely phenomenal," says Straw. "Researching the content of maintenance manuals is normally the most important and time-consuming aspect of producing technical documents. With Teamcenter generating accurate content and RapidAuthor for visualization, we dramatically cut our preparation and research time. It has taken 50 percent less time to produce manuals, at significantly lower cost than previously, and we met our target to provide publications six months before the trains enter operation."

The second step is to provide clear and precise instructions. With the new solution and the work of the validation team, technicians have exactly the right information at the right time. As well as accessing 3D interactive data via a hand-held device, they can also print PDF documents easily. All instructions include the exact configurations for each serial-numbered vehicle, with any customized options and precise information about specific pieces of equipment.

"If you speak to any technicians, they love the manuals," says Wardle. "Previously they would have operated without any workflow. Now they have a complete link back to engineering documents. We estimate a 30 percent reduction in time spent on maintenance."

Control and flexibility

One of the major benefits of the solution is the control and flexibility that it delivers. By building and retaining knowledge in-house, communication is better and expenditure is controlled. If there are any engineering changes, new information will automatically flow from Teamcenter into the documents, whereas previously all change control was done manually.

Another key benefit is the cost-effective re-use of information. For new contracts, Siemens Mobility can draw on the preparation the company did for Thameslink. By rebranding style sheets and amending serial numbers, Siemens Mobility can quickly and easily prepare customized manuals for other customers. "In short, a high-quality manual has been prepared and we have created a platform to allow us to repeat this success for future fleets," Hooper concludes.

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