

CASE STUDY:

## Supporting large-scale railway innovation

An international engineering and technology firm works with additive manufacturing experts at Ricoh to meet demanding cybersecurity standards and keep construction projects on schedule with made-to-measure production printers.

### COMPANY & CHALLENGE

Established over a century ago, this global technology company provides a wide range of large-scale infrastructure and manufacturing projects for clients across a wide range of sectors. In the UK, the company helps rail operators to build, maintain and develop new and existing infrastructure.

Constructing and maintaining railway infrastructure is technically complex and hazardous. To help on-site engineers stay safe and work with precision, this leading technology company provides detailed project plans. After taking on a series of large-scale development contracts in the UK, how could the company increase design and printing capacity to keep projects running safely and on schedule?

"We must prepare printed blueprints on a daily basis to keep engineers up to date with the hazard profile on site and ensure that work runs on schedule."

Company Spokesperson



## OBJECTIVES

On-site workers must stay alert at all times when building and repairing railways, taking care to avoid live high-voltage wires and active railway lines—all while undertaking highly technical engineering tasks. And with rail infrastructure requiring highly specialised, expensive materials and equipment, any mistake or delay in construction can have a huge impact on overall costs.

To keep engineers safe and ensure that projects run on time, the technology company responsible for the construction equips its engineers with highly detailed blueprints that outline daily building schedules, and highlight hazardous zones on the worksite.

A spokesperson at the technology company comments: "Railways are dynamic environments and the safety challenges for workers change each day. For instance, a track closed for repairs one day could be re-opened for travel on the next. As a result, we must prepare printed blueprints on a daily basis to keep engineers up to date with the hazard profile on site and ensure that work runs on schedule."

Recently, this technology firm took on a series of long-term rail development projects in the UK, including a multi-billion pound initiative aimed at increasing rail capacity at a key transport hub. To help these new projects run smoothly and safely, the company generated even more daily blueprints and set out to expand its fleet of production printers.

As well as creating granular-level plans and integrating with the company's existing management software, the new production printers had to meet robust security standards. For this, the company wanted to embed Public Key Infrastructure (PKI) card readers to regulate access and monitor usage, as well as protect against unauthorised tampering with cable ports.

## SOLUTION

To achieve these objectives, the company approached Ricoh, which proposed installing large volumes of [Rico Pro™ C5300s](#) devices to increase design and production print capacity. And to enable easy monitoring of the new devices, Ricoh would integrate these production printers with the company's existing [Rico Streamline NX®](#) management suite.



We've relied on Ricoh Streamline NX to keep our print and document workflows operating seamlessly for many years. More than 350,000 employees use the solution in 70 countries daily. The reliability, robustness and flexibility of the solution is excellent.

*Company Spokesperson*



The spokesperson continues: "We've relied on Ricoh Streamline NX to keep our print and document workflows operating seamlessly for many years. More than 350,000 employees use the solution in 70 countries daily. The reliability, robustness and flexibility of the solution is excellent, so we wanted to integrate it with our new Ricoh production printers to keep our design operations running smoothly."

Jonathan Nixon, Global Solutions Architect at Ricoh comments: "In order for Ricoh production printers to be approved by the company's dedicated cybersecurity team, we would need to embed the PKI card readers on the devices and create made-to-measure security covers for the cable ports. Doing this quickly would be very challenging, so we turned to the specialist Ricoh 3D team based in Telford for assistance."

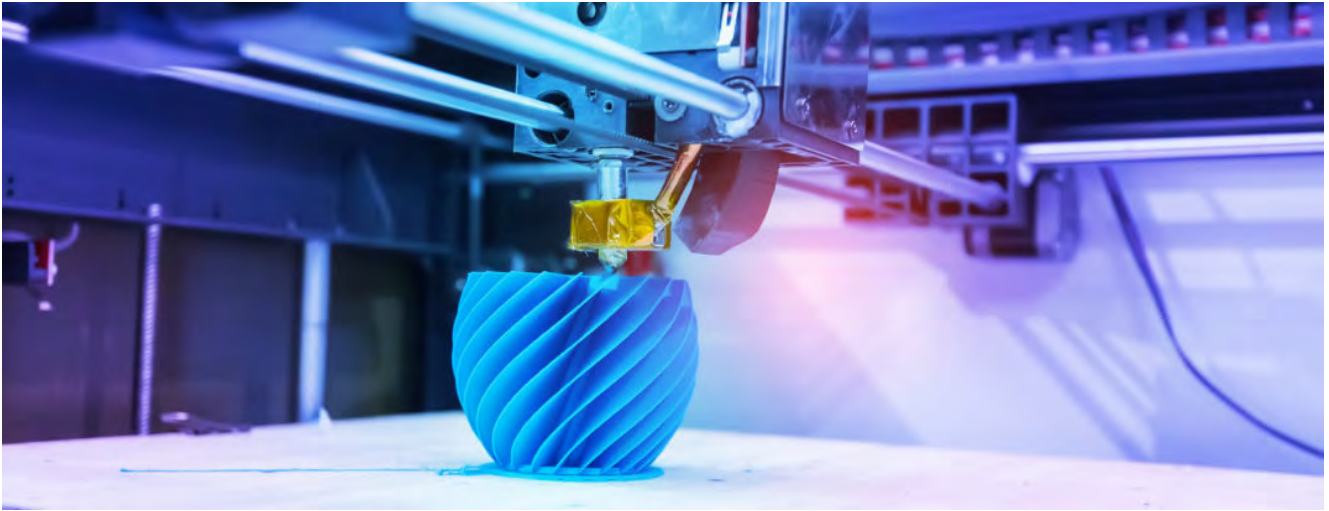
After receiving the brief for the required printer modifications, Ricoh 3D conducted a detailed manufacturing analysis to determine which technologies and materials could meet the design, lead time, volume, and cost objectives of the project.

Based on its analysis, the Ricoh 3D team identified that additive manufacturing was the best available technology for meeting the rapid turnaround time of 12-weeks set by the technology company.

As well as ensuring that the modifications would not compromise the Ricoh device's existing compliance with safety standards, the solution also needed to support easy installation in the field and satisfy Ricoh's industry-leading green procurement protocols. After considering a wide variety of options, Ricoh 3D selected Multi-Jet Fusion (MJF) Nylon 12 material, chosen for its robustness, excellent malleability and low flammability profile.

Once the materials had been selected and the additional components designed using the original computer-aided design (CAD) blueprints for the Ricoh Pro™ C5300s printers, Ricoh created prototype PKI readers and cable covers to the exact specification and model of the physical machines. As the Ricoh 3D team were working remotely at the time to help prevent the spread of the COVID-19 pandemic, they had to co-ordinate designs using entirely digital workflows. Thanks to the team's strong collaboration and ability to work flexibly, Ricoh was able to 3D print and start testing the prototype parts on the same day the engineers finalised the designs.

Mark Dickin, Additive Manufacturing & Moulding Engineering Manager at Ricoh 3D, explains: "Anyone can do rapid prototyping, but producing functional end-use parts using high-grade engineering polymers requires expertise and careful planning. For instance, it was essential that the additional parts for the devices could match the service life of the Ricoh production printers and stand up to daily use without becoming brittle, or warping."



As well as leveraging its extensive additive manufacturing expertise, the Ricoh 3D team also applied its in-depth knowledge of the requirements of the company's dedicated cybersecurity team, which Ricoh 3D were already familiar with from working on a previous project with the technology firm.

Mark Dickin continues: "Given that this was a customer-facing part, we also aimed to achieve a professional cosmetic finish using a black technical coating to complement the Ricoh Pro™ C5300s unit. As well showcasing our ability to meet client expectations for high-quality, safe, and standards-compliant printer modifications to a stringent deadline, this project demonstrates the true value of additive manufacturing."

He adds: "From an engineering perspective, additive manufacturing enabled us to eliminate the need to commission specialised tools that may never be used again, or stock spare parts in warehouses—reducing costs. With additive manufacturing we can also offer complete flexibility to our customers with a print-on-demand service and provide a wide range of customisation options. We simply wouldn't have been able to provide the same level of service using traditional mass production manufacturing techniques."



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*Mark Dickin, Additive Manufacturing & Moulding Engineering Manager at Ricoh 3D*





## BENEFITS

After scaling up its design operations with Ricoh printers, the company is now even better placed to keep construction projects progressing safely and on schedule.

Thanks to the high level of detail provided by Ricoh production printers, the technology company can ensure that all of the key details on blueprints will be preserved during printing and after being photocopied. Ensuring such a high level of detail in these plans helps on-site workers identify potential hazards marked in red, helping them to maintain site safety at all times.

The technology company has already installed three modified Ricoh production printers on-site and is on track to deploy the remaining devices in the coming months.

\*Due to the proactive approach taken by the Ricoh sales and additive manufacturing teams to get new production printers up to the company's security standards, this project was awarded the Ricoh Quarterly Award for Innovation.\*



Ricoh always goes the extra-mile to ensure that they meet our needs. What's more, Ricoh's investment in cutting-edge technologies and access to a wide range of innovative technologies in-house, such as additive manufacturing, gives us added confidence that they will be the right strategic partner to help us grow our business in the years ahead.

*Company Spokesperson*



## ABOUT RICOH

Ricoh offers innovative services and solutions for the digital workplace, enabling people and companies to use smart working more widely. For 85 years, Ricoh has helped to transform workplaces with document management solutions, IT services, communication services, commercial and industrial printing, digital cameras and industrial products.

Headquartered in Tokyo, Ricoh operates in more than 200 countries. In the financial year ending March 2020, the company had global sales of \$19.06 billion.

For more information, visit [www.ricoh-europe.com](http://www.ricoh-europe.com)

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