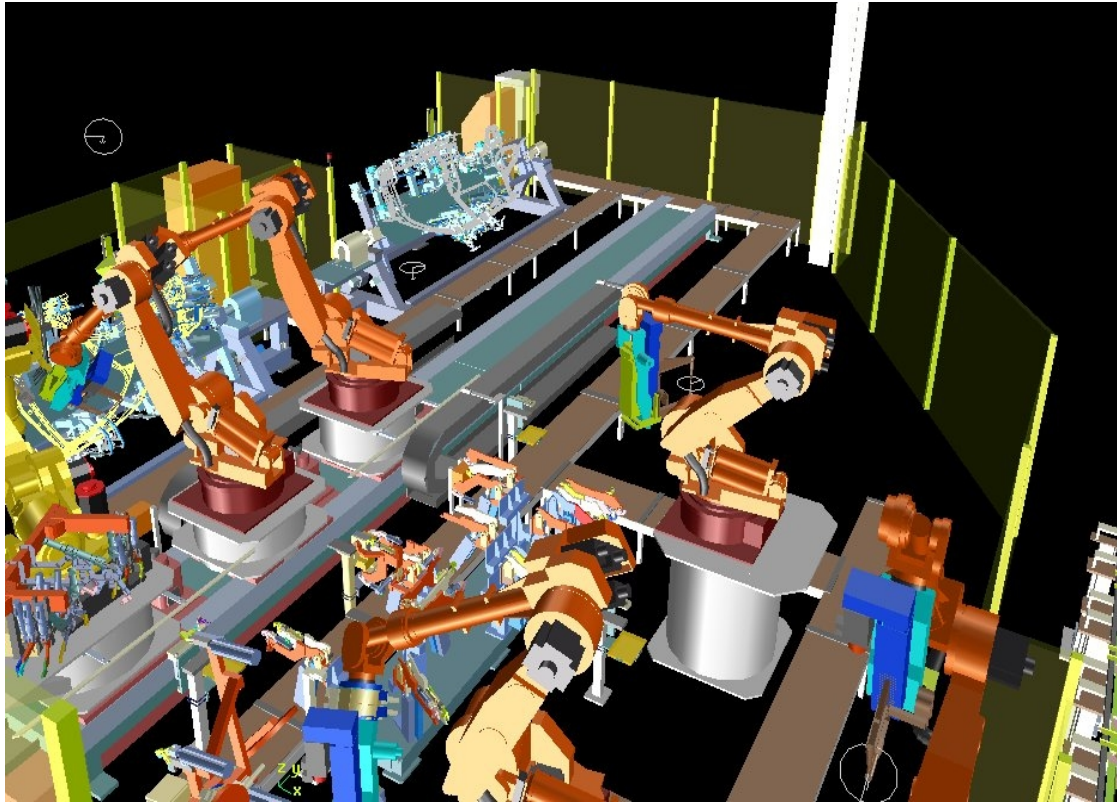


## AC&E case study

### Optimising the efficiency of automated lines in Nissan's UK plant



**Robots have been a feature of the Nissan plant since it was first opened in 1984. Today it uses both Fanuc and Nachi robots on its Primera, Almera and Micra lines, for welding, handling, and painting operations. Such investment in automation has been an important part of the Sunderland plant becoming most productive car manufacturing facility in Europe.**

CimStation Robotics (CSR) offline programming software was first used in Sunderland in the lead up to production of the new Primera in 2001. It has since been used to support engineering study and off-line robot teach on a number of new model programs, and also to support increased productivity on current model lines.

CSR is a powerful 3D simulation software tool, enabling manufacturing engineers to quickly simulate and evaluate alternative methods for automating a manufacturing process. Using existing in-house CAD data, CSR accurately simulates interactions between work cell components to optimise equipment selection, fine-tune equipment positioning, and maximize production throughput. Nissan Japan has used CSR for a number of years to model and simulate robots. It now uses an enhanced version of the software that includes pre-programmed CSR modules, allowing Nissan to extend the range of programmable features for its robots.

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At Sunderland the production planning team works with 3D models generated by IDEAS CAD software. Nissan body-in-white engineer, Adam Garbutt welcomes the flexibility offered by offline programming, "Before off-line methods, we had a limited window, usually during the night shift and at weekends, to programme the robots on-line. CSR allows robots to be programmed without access to the line. We can also prepare robot programmes for new models before physical parts are available."

CSR has been an important tool in the implementation of the Nissan flexible manufacturing system, which utilises a large number of robots sharing workspace. "Robot motion at 100% speed can be up to 5 metres per second with a 160kg tool. As a result, the implications of a robot collision can be significant facility damage and down-time. CSR allows us to prove out and optimise robot paths and interactions at 100%, reducing the risk to production." notes Garbutt.

CSR is used by both engineering and production departments within Nissan. This approach ensures a common understanding, and production ownership of the final robot programs.

Flexibility of robot operation is essential where a robot's production life can be up to 20 years. Nissan maximises the benefits of its investment in robots by re-using existing robots and lines where possible. Such free movement of robots relies on the ability to quickly integrate them within production lines with the minimum of disruption to production. "CimStation gives us the capability to produce a robot path before a robot is installed. This gives us the ability to avoid a complete robot teach in the cell, greatly reducing the time required, and with it risk to production. CSR also allows us to change robot types, for example where we are replacing an obsolete or unsuitable robot type, we can use CSR to upload the existing program in one format, and then download in another." explains Garbutt.

Nissan has used CSR for a number of engineering studies. The ability to accurately determine robot reach and facility interference before any physical facility or panels are available is an important tool in feasibility study and cost avoidance. An example of this was a recent robot cell proposal to automate a manual welding operation on Almera and Primera. CSR was used to evaluate the cell layout, weld gun access, cycle time, and safety system requirements. The visualisation of the cell in CSR allowed the proposal to be clearly presented to health and safety and production for their input. The study allowed Nissan to develop a cell taking into account all design considerations, and which, as a result was proven to be too expensive to be feasible. Without CSR the cell could have been much further into development, or potentially installed before some issues were raised, giving significant cost avoidance.

For further details of CimStation Robotics (CSR) contact AC&E on +44 (0)1925 830085, e-mail [info@acel.co.uk](mailto:info@acel.co.uk) or visit [www.acel.co.uk](http://www.acel.co.uk).