



SEIKI SYSTEMS LTD

Manufacturing Software
Solutions

NMS & MACHINE MONITORING

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NMS & Machine Monitoring CASE STUDY

Software Seals Production Efficiency

Seiki Systems software provides the 'backbone' for communications at AESSEAL, one of the largest mechanical seal manufacturers in the world. As the only major new entrant to this demanding marketplace in the past 40 years, AESSEAL offers industry leading products backed by a strong service philosophy and next day delivery for standard seals.

Employing over 1000 staff in 49 offices around the world and with an annual turnover of £65 million, the majority of the cartridge mechanical seals produced by AESSEAL are made in the UK. The company operates three machine shops in the UK: Mill Close in Rotherham, predominantly machining components to top up stock levels in batches of 100 to 200; Mangham Road in Rotherham produces to customer sales orders - which may have plant-specific requirements; and Bradford which supports both these machine shops and also prepares the raw cartridge castings. With a strong focus on customer service AESSEAL holds an enormous component stock level, typically six to 12 months worth. As the seal design is kept modular the parts can be rationalised to expedite final assembly. This brings enormous business benefits as Stuart Welsh says: "Our competitors will often quote 10 or more weeks for a replacement seal, whereas 70 per cent of our orders are delivered next day."

Seiki Systems Networked Manufacturing System was initially purchased as a way of getting the CAM programs for the seal components onto the shop-floor. Today, it is used across all three sites in the UK to reliably feed CAM programs to the CNC machine tools. Customer specific seals go through the 30-strong design team using Solid Edge for modelling and following approval from the customer will be passed to the CAM department for the machining code to be written using Siemens NX v5 (Unigraphics) software prior to it being transferred via Seiki Systems DNC to the machine shop. The software links over the company's WAN to shopfloor-based PCs, where the Seiki Systems HMI looks after a number of machine tools in a cell. The engineer will look at the job list and pull programs down as the machine and raw material becomes available. Stuart Welsh says: "For the past six years we have also used Seiki Systems monitoring solution to get information back from the machine tools, so we can understand the utilisation of the machine shops. The Networked Manufacturing System provides real-time data capture of the shopfloor utilisation for the 60 multi axis turning and milling CNC machine tools we operate in the UK. Even the manual and semi CNC machines used for material preparation, such as sawing, are part of the data capture loop."



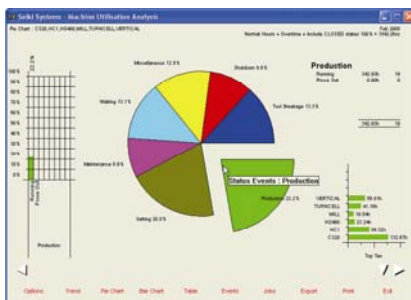
The relays in the CNC machine controls are hard wired to show power and in cycle. "We then use the scripting within Seiki Systems software to use robust logic functions to determine the machine status. We know the status of the program, if it has been downloaded, and if the job changes then the machine must be in set up. A cycle start will show the end of set up and cycle stop puts the system into waiting. The software's scripting language allows us, in conjunction with Seiki Systems, to write this logical sequence," Stuart Welsh explains.

He goes on to say: "The software is very good at allowing you to link into other external systems, so it can hook into the product data management (PDM) and document management system, and even the ERP system via Seiki Systems front end. So the shopfloor has the visibility of the job required, the drawing file, the model of the part, and any supporting information - such as critical set up information. Tool lists are also shown along with visual aids to depict how the tool should be assembled and how it should look on the machine. This gives the engineer on the machine the confidence that the machine tool is set correctly and that the process will cut the material right first time."

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Seiki Systems software also allows the machinists on the shopfloor to feedback information about how well the CAM program works. It interrogates the use of the CAM program so that any pertinent machining information is passed back to the CAM programmers, this may be something simple such as the need to reduce the feedrate slightly when machining phosphor bronze to avoid tool chatter. Stuart Welsh says: "It is good information that has significantly reduced scrap levels since it has been in use. For example, we machine specialist chemical resistant alloys for certain applications, such as Ferralium super duplex stainless steel or Hastelloy-C nickel-chromium-molybdenum alloy, and until you start to cut the material you do not get a feel for how well it machines in deep bores or internal undercuts and so on. This communication backbone is invaluable with new products being introduced."

Understanding the machine utilisation captured by the Seiki NMS system from a shopfloor management perspective is important to the future investment plans the company has. It provides hard data on machine capacity limits which become vital as more and more customer special seals with increased complexity and tighter tolerances are manufactured. The ability to interrogate data that has been collected in real-time directly from the shopfloor provides an enormous benefit. Essentially it provides a direct link between shopfloor activities and top floor production driven business processes, enabling the company to execute the manufacturing process more effectively and profitably.



As Stuart Welsh confirms: "With a growing business you have to justify additional or replacement machine tools, and we have recently acquired new machines to meet the demand for more complex components. A 9-axis Mori Seiki mill-turning centre allows both ends of a seal to be machined in one hit. This reduces the set up time because all of the tools are available and reduces the machining time as the part comes off complete. As we condense the time needed to get into production it becomes even more important to know how long the machine cycle actually takes for accurate overhead recovery - to know that we are making a profit."

The Seiki NMS software supports this functionality by providing an immediate, dynamic and visual picture of production activities by collecting data from and reporting on shopfloor processes. Automatic collection of productive and non-productive events occurring on the resources is captured, to build a record of each operating condition or status change as it occurs. All the data collected is date and time stamped (including the duration of each event) and can then be viewed as an event list or exported for further analysis.

Recovering overhead costs, such as the operational cost and depreciation of the machine tools, allows AESSEAL to accurately cost the components and therefore set the selling price of the seal. As the product range expands it becomes more important to cost accurately. Material costs are straightforward to measure. How time and, therefore overhead cost, has accrued is more variable with set up, the machining cycle, stoppages, inspection, all adding up to give a cost of manufacture. Seiki's Machine Utilisation Analysis module generates performance reports that are populated from data derived from the machine monitoring and shopfloor data collection. The reports are configurable so it is possible to undertake a detailed analysis of the entire shopfloor, an individual cell or even drill right down to the individual resource. It is then simple to identify trends in production, compare actual versus planned times and even see how many hours the machine tool has spent in maintenance during the month.

Stuart Welsh concludes: "The level of detail available enables planning and management of our production facilities as an internal profit centre, and is a key component in the delivery of 'Our Purpose': To give our customers such exceptional service that they need never consider alternative sources of supply."



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