



SEIKI SYSTEMS LTD

Manufacturing Software Solutions

NETWORKED MANUFACTURING SYSTEM

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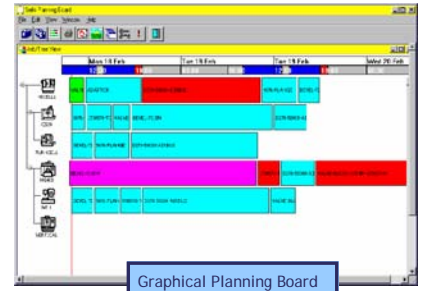
NMS CASE STUDY

Machine monitoring generates manifold benefits in real-time

The progressive installation of networked manufacturing software (NMS) has proven to be a major contributor to hiking production efficiency to over 72 per cent at Integrated Hydraulics based in Warwick. For as well as allowing the company to run in a paperless environment, it ensures the secure, traceable and efficient transfer of part programs and tooling/fixturing information direct from the production department to the six CNC machining centres on the shopfloor.

While DNC and production support information was important, NMS is also capturing a host of critical data on the efficiency and utilisation of the machines and this has formed the backbone of a continuous improvement strategy at the company. According to production engineer Tony Cave: "NMS gives us the means to measure our production efficiency, identify areas of downtime, schedule jobs more efficiently and obtain accurate cost information. It also helps our operators too, as they can see what's scheduled for a machine or working shift and know that the relevant tools, programs and components are always there before the job is started."

Monitoring the performance of the six machining centres which include three horizontals with pallet systems, NMS has had a major influence on manufacturing efficiency. By running in a paperless production environment, created through the Seiki Systems manufacturing software, all drawings, tooling information, workholding data, work queue information and part programs are downloaded direct to shopfloor PCs set on workbenches adjacent to each machine. Moreover, the company now has the ability to assess the performance and hence utilisation of each machining centre through 24 hours a day. Not only does this identify areas causing downtime, it provides an analysis of the actual causes and provides the current background to implement corrective measures.



Integrated Hydraulics has taken full advantage of the modular constructed system which enabled the company to justify a progressive build-up of the network over a number of years and in particular expand the system as new machining centres have been installed. In the early days, the system was just used to handle all DNC program functions. However, as the benefits of being able to automatically monitor the performance in real time of its investment in machine tools, the business benefited as production engineers were able to run and schedule the machines more efficiently and thus gain ever-higher levels of productivity. So when two new vertical machining centres were added in November 2003, two additional shopfloor terminals were purchased and linked into the network. As Tony Cave explained: "NMS has had a major impact on our machining operations. We can pinpoint specific areas to focus where improvements can be made. In the last 12 months alone, we know the system has helped us improve production efficiency by a further 5 per cent. Now with the recent addition of Seiki Systems' new Graphical Work Planning BOARD (GPB), which provides real time graphical display of jobs for each machine, we are able to improve further the flexibility



of our production planning through a live visual display of just what is happening to schedules on the shopfloor." Not only will this enhance the data from the company's MRP system so they can instantly see where jobs are going to miss delivery dates, they are able to take action well before there's a problem. He says: "While fire fighting is great to get over immediate problems, this capability to see ahead will also ease any headaches from juggling urgent jobs and take away any worry about the longer term affect further down the schedule."

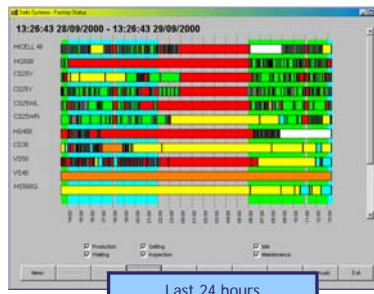
Established over 30 years ago and employing some 180 people at two adjacent locations in Warwick, Integrated Hydraulics is a recognised world leader in the design, manufacture and supply of hydraulic screw-in cartridge valves and hydraulic integrated circuits (manifold blocks). These are used in numerous industry sectors as diverse as construction, mechanical handling, waste management, marine, mining, quarrying and agriculture which includes many of the well known names in each discipline. The company also has a sales and manufacturing operation in the USA.

The production of manifolds covers a wide range of blocks in both aluminium and steel with section sizes from 25mm² up to 150mm² and in lengths up to 300mm. These components are multi-fixtured, typically four at a time, enabling some 5,000 blocks to be produced each month working through a two shift 17.75 hourly pattern. With smallish batch sizes, most jobs are changed over at least every other day which would normally lead to unacceptable levels of downtime. As Tony Cave commented: "We don't have the luxury of continuous production on the same job, which means machine utilisation levels can be really high. But, with the aid of our monitoring system we are now recording a production efficiency level over 72 per cent, which is a massive improvement. Eventually, we aim to take this to 80 per cent which we see as being the optimum for our sort of work."

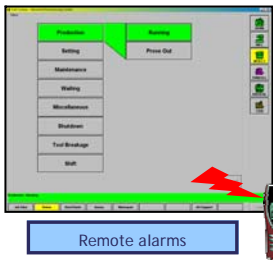
Machine monitoring generates manifold benefits in real-time, cont.

It was on the multi-pallet machines with the multiple fixtured parts that Integrated Hydraulics worked very closely with Seiki Systems to develop a method of live scheduling the individual parts on the machine. Comments David Trowell, General Manager of Seiki Systems: "This took several months to develop because of the complexity of the issue but we can now achieve such precise control over production of individual parts at Integrated Hydraulics that no work scheduler anywhere in the world can match."

Tony Cave reaffirms the situation telling how Integrated Hydraulics can mix any combination of parts on its multi-pallet machines, inform the operator where and when to load the pallet and track, via different colour representations on the screen, where the parts are, predict when they will be finished and be notified when the job is complete or warn when there is a problem. The NMS machine status display covers: production, waiting, alarm-type, setting, maintenance, housekeeping and programming. Each has various sub-menus for more detailed information. Data can be viewed with respect to a specific job part number or machine and various bar and pie charts along with numerous tabulated lists can be produced to show performance in any of these areas. "Such visual information provides an immediate dynamic picture of the complete manufacturing process," insists Tony Cave. A common colour code is used throughout the screen displays whereby green relates to production running, red is machine waiting, yellow is under setting and blue is housekeeping or not cleared for work. Job breakdown analysis reports show actual times and costs against planned figures, so direct comparisons can be easily and quickly made. Job details also highlight all the various time elements along with scrap rates and the all important average time to produce a 'good' part which is imperative to understand the profitability of a job and highlight any deficiencies for future batches.



Having a real-time view of machining has proven to be a boon to key production engineering staff, along with assistance from shopfloor supervisors, who also have access to the system. The machine monitoring function is integrated with the company's email system and this has made a massive improvement in communications between production engineers, machine shop supervisors, the tooling section and machine operators. For example, in the event of a machine breakdown, messages are automatically sent to both maintenance and production engineers, so all parties involved are immediately kept up to date. One of the very first things highlighted by NMS was just how much time operators spent waiting for tools. After studying various operating periods on different machines and examining specific job details, it became clear that tooling delays were a major contribution to low machine utilisation.



Once the awareness was flagged-up, a remedy was devised through the setting up of a special tooling section with its own Seiki Systems terminal, adjacent to production engineering. Here, kits of tool are now prepared to job lists taken from the software. A job cannot be queued until the tooling is available and this has been cleared on the schedule. "Delays due to lack of tooling are now virtually a thing of the past," maintains Tony Cave. While Integrated Hydraulics has no direct comparisons with recorded machining performance even for just a few years ago, simply because it had no access to such data. In reality it's in no doubt as to the return on the investment from the system and achieving a 70 per cent machine utilisation is a figure most production machine shops would go green with envy to have.

What is it?

- Quality Level DNC
- Display work instructions, drawings and other manufacturing data to machine operators
- Real-time view of equipment status
- Real-time shopfloor data collection (SFDC)
- Real-time automatic and manual machine tool monitoring
- Machine tool utilisation analysis
- Overall Equipment Effectiveness (OEE) calculations
- Job report - SFDC analysis tool
- Tooling module - rapid access to tooling information for each NC program
- Probe data capture plug-in

The benefits are:-

- Cost reductions due to improved efficiency
- Ability to make decisions based on facts
- Identify failing assets early
- A complete audit trail
- Proof of meeting quality demands of a customer



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