

SYSTEM INTEGRATOR

Fastems Oy Ab customer magazine • Special issue 2005

Lean manufacturing for the aerospace industry

Boost productivity with
less machines

Save costs through
automation





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A I R T R A V E L T A K I N G O F F

The past few years have been difficult for airline companies, but it now seems that there are clearer skies ahead. The difficulties culminated in the aftermath of 9/11 as air travel collapsed, after which most airlines have had to restructure their operations. Improved safety in airports and in the air has raised costs, while oil prices have simultaneously escalated. Amidst these changes, the market has seen the rise of budget airlines of whom many are succeeding quite well. So well, in fact, that the big airlines have also started to tap into the budget traveller and weekend shopper market. Growing airline traffic also means greater demand for equipment, for instance, aeroplanes.

Currently there are many challenging projects underway in this area, of which the Airbus A380 project has received the most interest. The Airbus A380, which saw its initial flight this spring, is the peak achievement in current aeroplane technology and encompassing the latest electronic technology. In addition, the A380 is the world's largest passenger aircraft and also offers variety of on-board leisure-time activities. The attention the A380 has raised is comparable to that of the Boeing 747 when it first landed some 30 years ago.

However, Boeing has taken on Airbus's challenge of the A380 by developing the Boeing 787, known as the "Dream Liner". The plane is not as large as the A380, but its structures contain many new technologies and materials. As the Airbus A380 is the peak achievement in today's generation of fully electronic control systems, the Boeing 787 takes the step into entirely new technology and paves the way for a new way to build aeroplanes. There are, of course, many other significant aeroplane development projects going on in parallel with these developments.

These are exciting times and we at Fastems have recognised this and developed new products to serve the needs of the aircraft industry. Fastems has for years been delivering flexible manufacturing systems for improving production efficiency and quality in the industry. Fastems has now introduced additional tools and products for production flexibility as well as automatic deburring. At Fastems, we are committed to taking on the challenge of future opportunities and to serving our customers to the fullest, in this way helping them to succeed in their own business.

The most important aeronautics industry events this year at which Fastems will be exhibiting include the Paris Aeronautics Fair 13–19 June, the EMO Fair 14–21 September and our own Open House Event in Tampere, Finland 26–30 September, where we will be showcasing a significant customer delivery. You are all welcome!

Wishing you a good summer and great success,

Seppo Lehtonen
Sales Director

ONE OF THE MOST ADVANCED UK SUBCONTRACTORS SERVING THE AEROSPACE INDUSTRY, SMITHS AEROSPACE-HAMBLE (FORMALLY HAMBLE STRUCTURES), HAS INVESTED MULTI-MILLIONS OF POUNDS INTO A NEW PRODUCTION PLANT OVER THE PAST FEW YEARS INCLUDING 15 CNC MACHINE TOOLS. FASTEMS SALES MANAGER ROBERT HUMPHREYS OF THE UK, REPORTS ON THE FASTEMS SUCCESS AT HAMBLE STRUCTURES.



It is easy to clamp parts at a Fastems LSF loading station with a revolving pallet table.

Smiths Aerospace-Hamble has a pre-eminent position in the field of aerospace component manufacture and is described by Boeing as being a "world class company" with a process quality system which is "second to none".

Devoted to producing leading-edge wing sets for the Boeing 737 and trailing-edge sets for Airbus aircrafts, the company has invested in two Fastems automated pallet-storage and retrieval systems, which link two sets of three machines – one system comprises of a 5-axis Makino MC1010-5XA machining centre and two Makino A77 4-axis models – the other cell comprising two Mori Seiki SH8000 5-axis machines and one SH630 4-axis machine – both sets forming flexible manufacturing systems (FMS). The new Fastems systems were installed in 1998 and 2001 following two older machine-tool manufactured FMSs, each having 2 and 3 machines respectively installed in stages between 1994 and 1997.

SUPER HIGH EFFICIENCY DELIVERS PRODUCTION

One of the FMSs only has 16 fixtured pallets within the 40-pallet storage capacity, however these pallets deliver 24-hour per day production with only two manned shifts,

one shift is unmanned. When planning production output, Smiths uses 90% as available capacity; the system actually delivers more than this.

COST SAVINGS THROUGH INCREASED SELF-MANUFACTURE

Super-high efficiency and the versatility to enlarge the system so easily has allowed Smiths Aerospace-Hamble to 'pull' more work in-house instead of outsourcing it to other firms, thereby processing more production hours with the same resources, thus maximising ROI and extending control over its manufacture. The latter is particularly desirable as continuity of supply is critical and much of the company's production is for just-in-time, line-side supply to aircraft factories worldwide.

FLEXIBILITY OF OPERATION AND EXPANSION

A further advantage gained from investing in Fastems systems is that the rail-guided stacker crane is able to move vertically to ac-

cess variable levels including different table heights of the machines. With 40 pallet positions, the initial Fastems system provided 20 per cent more storage capacity than the earlier mono-level systems whilst occupying only half the space. This was an important consideration when specifying the FMS, as the available shop floor area in the new facility was limited.

In both systems, the table height for the 4-axis machines is lower when compared to the height of the pallet changer for the 5-axis machines (typically 1,300 mm to 2,010 mm). To overcome this difficulty in the case of the former mono-level system, it was necessary to lower the foundations for the 5-axis machines and sink them into the floor, thus making them at the same height as the 4-axis machines. However, this has implications in terms of cost, access for servicing and, in some areas, flooding.

Flexibility to extend the system at minimum cost was an important consideration for Smiths Aerospace-Hamble. The Mori Seiki cell was extended in late 2004 to enable the integration of a second SH8000 5-axis machine. This extension work was carried out with minimum effect on operation of the FMS cell; production from the existing machines was maintained throughout.



Flexible manufacturing system automates aerospace component manufacture

Fastems takes off with French high-flier



FOUNDED FROM SCRATCH OVER FIFTEEN YEARS AGO, FIGEAC AERO, THE FRENCH AERONAUTICAL PARTS SUPPLIER, NOW HAS 340 EMPLOYEES AND A TURNOVER OF 33 MILLION EUROS. THE COMPANY OWES ITS TREMENDOUS DEVELOPMENT TO ITS KNOWLEDGE OF THE INDUSTRY, ITS ABILITY TO PENETRATE MARKETS BY WORKING WITH PRESTIGIOUS CLIENTS AND DEVELOPING PRODUCTION MACHINERY THAT MEETS THE NEEDS OF THOSE CLIENTS. TWO FASTEMS FLEXIBLE MANUFACTURING SYSTEMS (FMS) WERE INTRODUCED WITH GREAT EXPECTATIONS IN EARLY 2002. TO DATE, SYSTEMS HAVE PAID THEMSELVES BACK WITH REMARKABLE BENEFITS.

Figeac Aero has focused its business activities on the aeronautical markets, and is a leading subcontractor for large companies such as EADS, Dassault, Embraer, Boeing, and Pilatus. The company is currently involved in all the European aeronautical programmes.

Investment in manpower and resources is the core of the strategy developed by **Mr Maillard**, founder and President of Figeac Aero. The company's production machinery is one of the most efficient and fully functional in Europe, manufacturing parts up to 26 metres long from any material using 3-, 4- or 5-axis machines. Horizontal machining centres make up a large part of the machinery stock.

TAILOR-MADE AND FLEXIBLE

Simply having a large number of high-performance machines was not enough for Mr Maillard, however. He also wanted to optimise the use of resources, eliminate slack periods, reduce labour costs and improve the company's ability to respond to its clients. The concept of grouping a number of machines around a flexible manufacturing system seemed to be the most efficient in terms of productivity and flexibility, and this is where Fastems stepped in. Mr Maillard decided to embark on two parallel projects: one involving newly purchased machines and the other using existing machines. "Considering the specifics of our projects and our desire to acquire open and advanced systems, Fastems quickly established itself as the best partner for us due to its expertise and experience," explained Mr Maillard.

"The first system supplied two identical Matsuura Hmax 50 machining centres. This arrangement offers total flexibility as each

part can be manufactured on either one of the machines. One operator is required to ensure that the parts are loaded and to monitor the machines. The system was put into operation in January 2002.

"The second project involved integrating three existing machines with one single system: a Mitsui Seiki HS 5A 5x centre, a Mori Seiki SH 63 and a Mori Seiki SH633. One operator is required to run all three machines. We also had to consider the site restrictions in the area where the installation was planned. Fastems offered a tailor-made solution and assumed total responsibility for the project, including communication with the machining centres. This system has been operational since March 2002."

GREAT EXPECTATIONS...

"Reliability and user friendliness are the major factors for success in this type of investment, allowing our staff to concentrate on optimising production and improving processes," reports Mr Maillard.

"After just a few months of system operation, it already raised our expectations greatly, with its installation speed, outstanding system reliability and, above all, the enthusiastic response from our operators regarding its ease of use," he continues.

"The control software Fastems MMS, Manufacturing Management System, seemed extremely user-friendly, providing a clear real-time overview of the situation inside the FMS, including the position of each pallet, the status of each machine and the production status of each pallet. The production planning system, based on the FIFO principle, which takes the priority levels into account, was also a cause for high hopes. The system is fully automated, but the operators can intervene at any time and change the settings," Mr Maillard notes.

PROVEN ITSELF OVER THE YEARS

Today, Fastems' FMS solution has proved its efficiency in several ways and it is quite clear that FMS will be part of the plans if and when a new horizontal machining centre is invested in. The major benefit is flexibility: new production batches can be started and run with short reaction times and the minimum of disturbance to normal production flow. Therefore, the reaction time for unpredicted customer demands is very short and doesn't affect machine utilization rate, which is still very high. Reduction of lead time is another major improvement achieved during the FMS over the years.



The FMS at Figeac Aero was installed in 2002 to work with two milling centres for 22 pallets.

SECOME HAS BECOME A REGULAR SUPPLIER FOR WELL-KNOWN FRENCH AIRCRAFT AND WEAPONS COMPANIES. THE COMPANY'S AMBITIOUS INVESTMENT POLICY HAS LED TO NEW CUSTOMERS AND NEW DEALS. FASTEMS FLEXIBLE MANUFACTURING SYSTEM, FMS, WAS INSTALLED IN 2001 AND WILL BE EXTENDED BY A THIRD MACHINE, ONE ADDITIONAL LOADING STATION AND 12 ADDITIONAL PALLET PLACES NEXT SUMMER.



Automated equipment has Secome flying high



The aim of Secome is constant and profitable growth. The company manufactures precision parts such as hydraulic valves for the aircraft industry, in Beauchamp, France. Secome's creator, **Roger Cambray**, bases the development of his company on two key pillars: people and production equipment. As a highly motivated and skilled precision parts supplier, Mr Cambray is focused on maintaining production machinery that is able to guarantee the quality level needed to meet customer demands in highly competitive markets.

Secome was one of the first companies to invest in three NC machines in the early eighties. In 1990, Secome opted for a horizontal machining centre, which was a real challenge for a company with less than 30 employees. The company has also invested in CAM and PPS systems. At the end of 1999, Secome bought a new horizontal machining centre equipped with a six-pallet pool. These investments have brought real benefits in terms of machine utilisation and flexibility.

INCREASED AUTOMATED CAPACITY

In 2001, Mr Cambray considered investing in a second HMC, identical to the first one.

There were two options: to duplicate the same solution and simply double the capacity, or to opt for a flexible manufacturing system and increase the number of pallets available to both machines. The latter solution was chosen, since the pallet pool had obvious limitations.

"We decided on the FMS, since the pallet pool had an insufficient amount of pallets and there was no easy way to transfer the pallets from one machine to another. Also, it was not easy for an operator to manage two machines, and pallet pool handling was not flexible," Mr Cambray says.

Both Mitsui Seiki machines were linked to a Fastems FMS. It was possible to place thirty-six pallets in the FMS's storage unit and transfer them to any of the machines. This resulted in increased automated capacity and improved delivery capabilities for a wide range of parts in smaller batch sizes. "With these new machines linked to the system with a minimum investment, our future looked really bright," Mr Cambray smiles.

The FMS was installed in August 2001. The Fastems and Mitsui Seiki teams worked together on the interfaces and testing. Train-

ing started on August 20th and production was launched only a week later. After a year's operation, parts for aircraft clients were produced in small and repetitive batches (20-100/month).

REINFORCED TRUST

With its easy-to-use MMS control system and a motivated team, the FMS soon turned out to be a wise investment for Secome. The cutting time increased by 20% and the spindle utilisation rate grew to 80%. For frequently ordered parts, the time between customer orders and delivery has shortened noticeably, and the reaction time is almost zero for parts that are produced for more than twenty hours per month. According to Mr Cambray, up to 25 different items can now be produced simultaneously.

"If one machine is out of order or at full capacity, production is automatically planned according to the actual capacity without having to make big changes in pallets and fixtures. Work in progress has also decreased so that only current customer needs are processed."

Since 2000, the legal working time in





An FMS investment that guarantees flexibility and short reaction times has reinforced Secome's customer trust. Appearing here from left to right: Maxime Colombo and Frédéric Cambray from Secome and Sales Manager Philippe Noiton from Fastems.

France has been reduced from 38 hours to 35 hours a week. All companies have had to reorganise their production to improve their productivity, and many of the biggest companies have decided to outsource their machining to other countries. Others, like Secome, have invested in new automated equipment to increase machine productivity. On a global scale, the Fastems systems have reinforced Secome's customers' trust in their supplier.

"We have won new customers and new deals due to these investments, which guarantee flexibility and short reaction times while maintaining high-quality production. That is exactly what our customers expect from their supplier. And instead of operators spending time on changing fixtures, they can now focus on quality and productivity," Mr Cambray concludes.

READY FOR THE FUTURE!

As a result of its FMS investment, Secome has been determinedly able to beat the economic downturn: less than two years after the first FMS was installed, the company was considering the option of extending the FMS and adding a third machine. This extension will be carried out this summer: one more machine, one more LSF loading station and 12 additional pallet places.

Volvo Aero inve

VOLVO AERO IN TROLLHÄTTAN, SWEDEN, MANUFACTURES COMPONENTS FOR THE AIRCRAFT INDUSTRY. VOLVO AERO'S MAIN AREA OF COMPETENCE IS ENGINE TECHNOLOGY, IN WHICH THEY HAVE SUPERIOR CAPABILITIES. VOLVO AERO HAS INVESTED IN A COMPLETELY NEW PRODUCTION LINE, WITH THE AIM OF IMPROVING THE EFFICIENCY OF THEIR MANUFACTURING PROCESS AND SIGNIFICANTLY IMPROVING QUALITY. VOLVO AERO'S INVESTMENT MEANS THAT HIGH-QUALITY COMPONENTS AND PRODUCTS CAN BE MANUFACTURED COST-EFFECTIVELY IN THE FUTURE.

Volvo Aero invested in a flexible manufacturing system (FMS) with five Deckel Maho DMC 160 FD turn-milling machines. The system is also equipped with a fully automated central tool storage and an automated deburring unit.

FUTURE PROOF

The FMS is an MLS-HD system which has enough space for 50 material pallets and the same number of machine pallets. Furthermore, the system has three loading areas, each containing both a material and a loading station. The loading stations have revolving pallet tables so that when revolving, the cylindrical parts can be positioned with high-precision exactly in then middle of the pallet. The system tracks workpieces throughout the entire process. Advanced material control automatically orders a material pallet with the correct blanks to the loading area so that it is easy and efficient for the user to clamp a new part when the previous one is finished. The system has conveyors with which material pallets with blanks are fed in and pallets with finished components are taken out. Careful planning and location of the system on site means that the system is ready for future needs and can be expanded easily. Additionally, the system is linked to the plant's production planning system and orders are received via it.

EASY TOOL MAINTENANCE DURING PRODUCTION

Volvo Aero uses a variety of tools in its machining processes. This is because components are manufactured in various ways, some tools wear out quickly due to difficult materials, and because many materials that are used require specialised tools. In order to enable efficient production, Fastems has developed a centralised tool storage (CTS) with an Auto Tooler function. The CTS system makes it possible to store and maintain a large number of tools and at the same time provide rapid tool changes for the machine tools. Since the tools are stored in a centralised storage, carrying out tool maintenance is efficient and does not disturb the

production. Each tool is equipped with a code chip containing an ID code, which makes tool operations easy, quick, and secure at every stage of handling. A tool presetter and an automated tool bit storage are also integrated into the system. In addition, the control system has an Autopilot function, which helps the operators during loading and unloading of pallets by automating many tasks. All these functions make it possible to optimise production and improve its efficiency, because the operators do not create a bottleneck in the system.

ROBOTISED EFFICIENCY

Tools are taken out of the central tool storage for maintenance with two tool trolleys. The robot in the tool storage puts tools requiring maintenance to the trolleys and the operators can move the trolleys to the maintenance area in the factory. Machine tools receive replacement tools in batches of five. The tool storage robot collects the replacement tools to a change station and a gantry robot transfers the tools from the station to the machine tools and brings back changed tools. Of course, smaller batches can also be changed if fewer than five tools are required. The tools brought back are placed at the change station from where the tool storage robot then takes them back for storage or for maintenance.

NO EXTRA WAITING

The Autopilot operation ensures efficient manufacturing at the right time according to the production schedule. The Auto Tooler ensures that the tool magazine is loaded with the right tools, even when the previous pallet is still in the machine. This ensures that there is no waiting time because of tools when a machining job changes. Both operations also have a manual function so that the operator can carry out planning and selection using the computer's calculation capacity.

SAFE DEBURRING

The automatic deburring of all pieces immediately after machining is a challenging goal. The objective of deburring is given high prior-

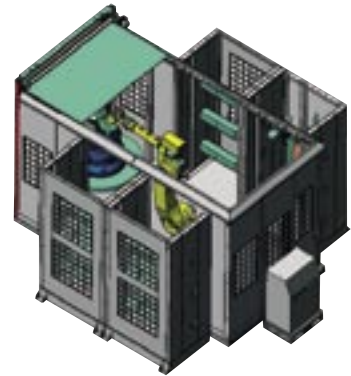
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ity, but Volvo Aero has also selected a manual deburring station where those last remaining points which the robots cannot reach or which are too tricky for them are treated. There is also an offline programming environment linked to the system which makes programming work easier.

The deburring station is in a closed space with extraction and filtration systems, which prevent hazardous particles from escaping into the plant. The Fanuc R2000i robot is equipped with an electric spindle motor and an ISO 30 tool change system. The tool magazine has enough space for 50 tools. There is also a tool change position which enables trouble-free tool maintenance. Deburring programs are loaded from the system and the system also has tool operation time monitoring programs and checks for wear and tear.



This project is equally as challenging for all participants: Volvo Aero, Deckel Maho, and Fastems. The system is due to be delivered in late 2005 and will be put into service in its entirety in early summer 2006.



A gantry robot transfers the tools between the machine tools and the central tool storage (CTS). Operators can take out tools from the CTS with a trolley, which is easy to move to the tool maintenance area in the factory.

Volvo Aero's flexible manufacturing system could be described as a factory within a factory. The system handles material, tool and information flows – logistics in its full extent – and provides the operators with an ergonomic and clean work environment.

Fly to new heights with Fastems



Fastems

Fastems flexible manufacturing technology takes your productivity to new heights. Committed to serving the aerospace component industry, we will help you achieve the most of the yearly available 8760 production hours.

Fly with us to:

EMO 2005, Hannover 14th – 21st of September 2005
Le Bourget 2005 Air Show, Paris 13th – 19th of June 2005
Fastems Open House, Tampere 28th – 30th September 2005

Fastems

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