



The Newsletter of System 3R Group

The articles in this edition can also be found at www.3review.com

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REALITY

Dynafix stars in 'Magnificent 7' pallet-changing performance

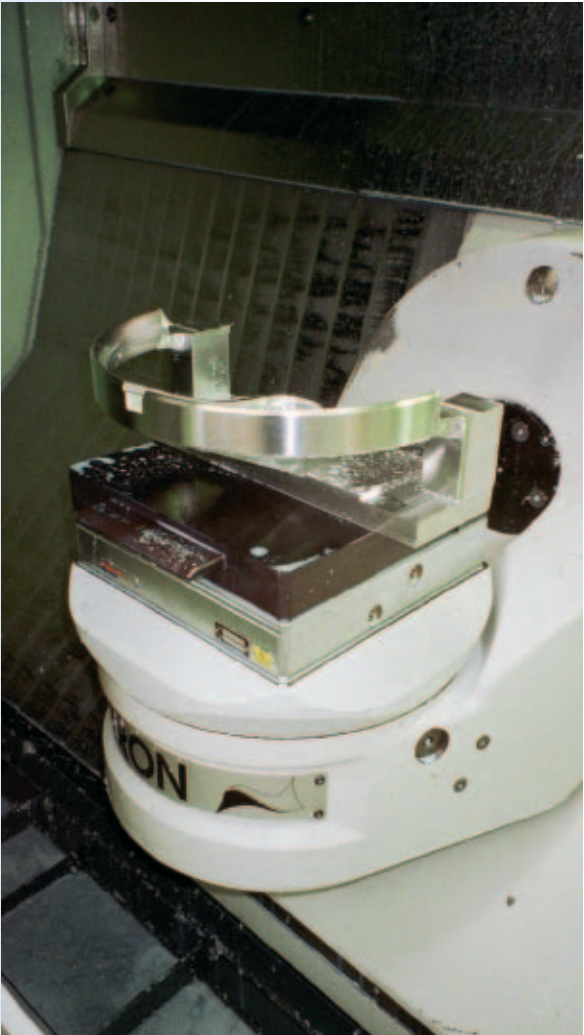


When Hemlock Engineering of Nottingham decided to invest over £1 million in new machining centres, software and support systems, they took a long hard look at what was available and what would give them the best ROI – as you would expect. They chose two of the fastest milling machines available – the Mikron XSM 600U – but in order to increase their efficiency fitted them with 7 automatic pallet changers. And that is where the Dynafix pallets from System 3R came into their own for assured 'lights-out' production.

"The automatic changer still required the added value of a zero-point clamping and palletisation system to give us the flexibility we needed as a specialist subcontractor," explained Nick Marks of Hemlock Engineering. "Dynafix allows us to mount a range of highly diverse components, vices, chucks, cubes, workpieces etc. in the pallet changer and then run each job within the cell."

As a subcontractor – cutting mainly aluminium components – Hemlock's work pattern covers a range of standard parts for their customers' Kanban requirements as well as one-off parts for their own prototyping company or 'specials' for other customers. Much of their business comes from the automotive industry, especially working in the superbike sector, and the development work in which they are involved often requires a range of individual parts for testing that may only vary by small amounts.

"The mix and match production facility that Dynafix gives us has helped us penetrate markets that were hitherto unavailable to



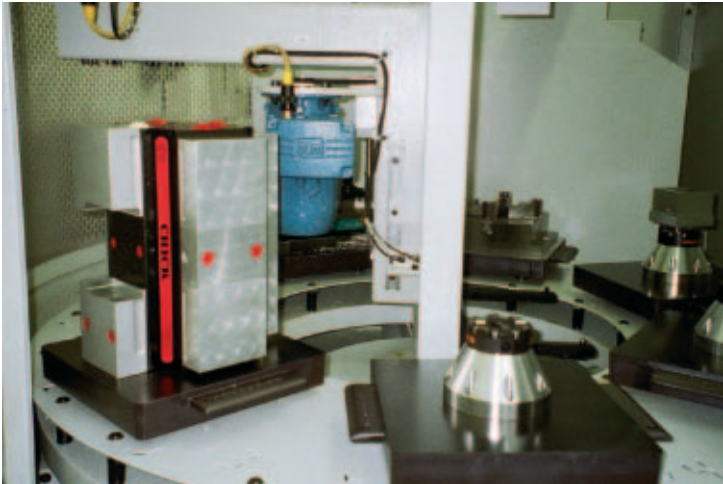
A job ready to go on its Dynafix pallet within the Mikron XSM 600U milling machine

Hemlock, such as aerospace," said Nick Marks. "The repeatability and accuracy is so good that we are totally confident in programming the cells and leaving them to run unmanned overnight or over the weekend. Previous required jig changes are also a thing of the past if a customer needs to alter any of the elements on a component – a big sigh of relief all round, especially from the designer!"

"Not only that, but if we need to interrupt production for one-off 'specials' we can take off a part and be running again in minutes. Then on returning the part to the machine, production continues without a hitch!"

As with all major investments, the smallest element may often be the key to its success. That is where Dynafix has played a starring role in what is proving to be a magnificent decision by Hemlock Engineering.

'Mix & Match' production is easy with Dynafix pallets in the 7 position automatic pallet changer



Micro achieved, nano achievable

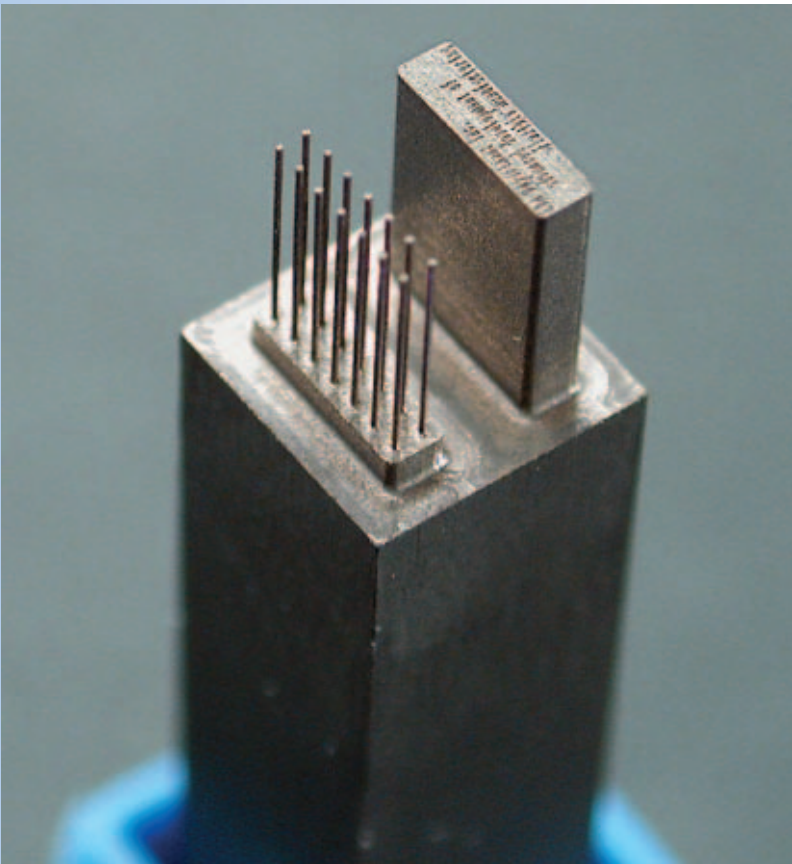


For many observers, operations at EDM Department Inc. in Bartlett, Illinois, are closer to groundbreaking research than engineering. When it comes to precision, this company really takes things further. Studying EDM Department's capabilities requires an extraordinary magnifying glass!

"Our drawings are usually in microinches," relates, Mark Raleigh, founder and GM. "We manufacture microcomponents with nanoproperties. Nonetheless, we have to admit that getting down to under 1 pinch is still a challenge."

The company primarily produces moulding tools for the development of new products in the medical technology, defence and communication industries – seldom tools for series production. For the same industries, it also makes prototype components and precision products in short series.

Mark Raleigh has extensive experience in precision. His positions have included one as the head of moulding tool production in the Molex Group where, almost 25 years ago, he evaluated what the market had to offer in the form of streamlined interfaces



for electrode manufacture and electrical discharge machining. Ever since then, System 3R's products have been a part of Mark's professional activities.

He started his own company just over ten years ago and, along with his staff of ten, is now totally oriented towards precision – not to say ultraprecision!

One example of the above is EDM Department's manufacture of graphite electrodes and the discharge machining, in tool steel, of 120-pinch holes to a depth of 1,700 pinches. Another is a tool for needles. The needles have to have a tip radius of 500 nano-inches! Delivery is only possible through combining the latest in milling and EDM technologies, e.g. nanopulsing and vibration-damped palletisation (VDP).

VDP – unique product development that increases precision

One generally recognised truth in manufacturing is that measures which reduce machine dead time are almost always considerably more profitable than

those that clip seconds off the machining process itself. This is where interfaces that enable rapid tooling are vital.

Another truth is that, in many machining processes, vibration sets a limit to production capacity. Precision and surface quality are both negatively affected by vibration. The minimisation of vibrations is thus highly desirable and, in practice, a system's damping capacity is of crucial importance.

System 3R has developed VDP - vibration-damped palletisation - a product programme offering unique damping properties and capabilities. VDP is patented and gives users a significant competitive edge.

Mark Raleigh explains: "With regard to electrode manufacture, VDP has markedly sharpened our capacity. Before, we could make microelectrodes with a length to diameter ratio of 12:1. We have now made electrodes where the ratio is 35:1. In fact, we can presently produce electrodes that, in the old days, were absolutely impossible using milling machines!"

One example of a microelectrode. Graphite, 14 needles, each with a diameter of 130 µm, i.e. barely the width of three human hairs!

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SYSTEM 3R IN ACTION

Always urgent!



Imagine an industrial developer who really needs a mock-up – a physical plastic model – so that he can “experience” his latest vacuum cleaner design. Or a designer who wants to test how the cast component she has come up with works in practice. In both cases, the ideas look good on the computer, but what will they be like in reality? This is a good time to contact Modellteknik in Eskilstuna, Sweden. Especially if things are urgent!

Modellteknik started in the 1960's as a supplier of models for the Swedish foundry industry. Since then, its operations have developed from pure craftsmanship to cutting-edge manufacturing. This is partnered by a total concept in mould manufacture, with streamlined production of one-offs and short series playing a vital role.

Amongst the technologies covered by the concept are: stock removal (metal and



Roger Andersson, MD: “Tripled spindle hours! You can imagine the effect on lead times and what our customers think of it.”

plastic); metal casting followed by stock removal; vacuum moulding or vacuum forming of plastic components; rapid prototyping (SLA/SLS/FDM); and, injection moulding of plastic parts.

The majority of assignments are still for short series of castings. Most usually so that the customer can verify design during the development of new products. Working very closely with a number of foundries, Modellteknik selects the casting method, produces the model and carries out any necessary subsequent machining. If the customer wishes, constituent components are fitted and the assembly delivered along with a measurement report.

An ever-increasing proportion of assignments now relate purely to stock removal and the one-off or short series production of components in steel, aluminium or plastic.

Tripling of spindle hours

Clearly enough, production deadlines at Modellteknik are very tight. “We have a high reputation for flexibility,” reveals MD Roger Andersson, “and we seldom have repeat jobs. It's fair to say that almost every tooling is unique. Thus, setting-up has to be done outside the machine so that the jigs with their workpieces can be quickly lifted in. We accomplish this with System 3R's Dynafix pallet system. All our 5-axis machines now have Dynafix and the results show in our throughput times. Spindle hours have tripled. Looking back, it's a wonder we could ever have been satisfied with our previously low degree of machine utilisation. It's almost a little embarrassing.”

Yet nothing is so good that it cannot be better. One year ago, the company installed its first automatic production cell – a five-axis DMU 50 and a WorkMaster robot with Dynafix and Macro pallets in its magazine. Preparation is handled by an operator in the immediate vicinity of the cell.



Roger Andersson: “This really is automated one-off production. We are particularly pleased with the adapter chuck. This enables the cell to switch automatically between smaller workpieces on Macro pallets and larger ones on Dynafix pallets. Superb flexibility! We are also impressed by the stability of the Macro chuck. The workpieces we attach to the Macro pallets are a good size!”

Results have been so impressive that it is now planned to enlarge to a double cell – a WorkMaster serving two machines.

Fingertip sensitivity

One of Modellteknik's few recurring jobs is a hand control to simulate the throttle of the JAS 39 Gripen, the pride of the Swedish aircraft industry. Roger explains: “We were not given any final drawings. The assignment was to create something that should be as close as possible to the real throttle control. The idea was that the ‘simulator’ should be used by maintenance technicians. However, our control is so good that it is now also used in the training of pilots.

“Thus, development started from zero. This hand control has 24 built-in functions, all of them extremely sensitive to movement. This

places great demands on design precision.”

With a growing number of countries including the JAS 39 Gripen in their defence systems, tiny Modellteknik is expanding its deliveries of these hand controls for maintenance and pilot training in simulators.



The simulated throttle control with 24 functions is highly responsive. Large movements must be avoided if the user is to retain fingertip control of the “equipment”



The superb and flexible automatic production cell

From henhouse to automatic production of precision products



Edumar Metaalbewerking of Someren in the Netherlands is a young company, with only ten years behind it. Brothers Eduard and Marius Wijlaars began producing built-in kitchens as a sideline, in a disused henhouse! It wasn't long before they switched to precision engineering. This was quite natural, since their sound professional experience was in that area.

In the late 1990s, ‘outsourcing’ became a buzzword in the European manufacturing industry - not least at ‘The Big Company’ in

Eindhoven. Work was farmed out and whole departments were made redundant. At a stroke, the brothers' operation was transformed from being a fun sideline to serious component production as a subcontractor. And the old henhouse has been replaced by a modern 400 m² workshop which was extended to 1000 m² late last year.

Lots of hard work, but today Edumar has 12 employees and a good name as a supplier of quality components in short runs with close tolerances. In the milling machines, the runs

A typical Edumar job



are often less than 100 units, and in the lathes seldom more than 1000. Occasionally they even undertake one-piece production.

Most of their customers are in the foodstuffs and semiconductor industries, but their biggest customer produces industrial glueing machines. The majority of their customers are in the Netherlands and Germany.

Step one

Eduard Wijlaars tells the story: “Both of us tend to be ‘firebrands’. If we see an opportunity we grab it before it can get away. Two years ago we heard about DMU50U, which is not a production machine in the usual meaning of the term. But the price was good and it could be delivered quickly, so we did a deal. And it has served us well.”

“But if you've invested in a machine you need

to keep it running. There were many evenings and weekends when we went down to the workshop to run the machine for a while. The ‘while’ became hours, which turned into whole evenings and nights. And the wife was sitting at home with three small children. It's fair to say that home life wasn't as it should be!”

“I began to wonder whether there was some kind of robot that could replace my hands. And last year we upgraded the machine with a WorkPal Compact Servo with 12 MacroMagnum pallets in the magazine. The machine has no air connection

through the machine table, so a special solution was needed. And what a success this automatic production cell turned out to be! Spindle-hours have increased by 400 percent and the investment was repaid in four months.”

Step two

A few months ago, Edumar installed the second automatic production cell – a DMU50 Linear Evolution and a WorkPartner with 30 positions for MacroMagnum in the magazine. Vices of two sizes are mounted on the pallets.

“An outstanding cell”, says Eduard. “The control system for pallet handling gives fantastic flexibility. It's easy to interrupt for urgent jobs. Just complete the urgent job and then resume the interrupted one.”

Jobs that we could never have taken on a few

years ago are no trouble today, thanks to the automatic cells producing overnight and at weekends. Edumar's future focus is quite clear – more automation.

“And my life has changed greatly. I can now spend more time with my family, safe in the knowledge that the automatic cells are producing. Last Saturday I was out shopping with the family and received a text message telling me that the batch was complete. The eldest boy told me I would have to hurry down to the workshop and reload!”

“The family used to think I spent too much time at the workshop; now they are telling me when I should go there”, concludes Eduard with a laugh.



The second cell with the workpiece in a vice on the MacroMagnum pallet



The first cell – an odd combination which boosted spindle-hours by 400%





AROUND THE WORLD

Effective medicine for increased productivity



Bakker Metaalbewerkingsbedrijf BV in Son, the Netherlands, has a widespread reputation for being able to produce tricky components – “If Bakker can’t, no one can!”

Tiny and complex, most of Bakker’s individual products fit into a cupped hand.



Rien Elling: “Thanks to increased competitiveness, automation creates more employment opportunities.”

Tolerances are predominantly within a few thousandths of a millimetre and, increasingly, the components have to be delivered semi-assembled.

A few years ago, telecommunications was the largest customer segment. Now, most projects come from the medical equipment industry. For example, components for radiation equipment used in the treatment of cancer. The next most important segments are defence and the optical industries.

MD Rien Elling explains: “Precision is not created by high-class machines alone. It depends largely on professionalism and a feel for accuracy. We have experienced workers with exactly these qualities. Bakker has been successfully producing precision components for almost 40 years. The feeling for exactness is in the walls.”



Copper components for radiation equipment; 3.5 hours of machining in four set-ups. Final weight, 4.5 kg.

Automatic milling cells were the next step. Rien Elling: “We worked double shifts in our 5-axis milling machines, but this wasn’t enough. We had to get out more spindle hours. It was quite simply a question of automating or fading away. Automation clearly strengthens competitiveness and, in its turn, creates more employment opportunities.”

The five-axis milling machines are from Bridgeport and Hermle. To start the automation off, one of the Hermle C800U’s was chosen. Being a portal machine, the table could only be accessed from the front. However, System 3R had the solution. Earlier in the year, System 3R had completed its first installation of a moveable track-mounted WorkPal Compact Servo at the premises of another Dutch company.

Spindle hours almost doubled

The first automatic cell was thus a five-axis Hermle and a WorkPal with 60 positions for Macro pallets in its magazine. Rien Elling relates: “We use this for components no bigger than 50 x 50 mm. A dovetail connection secures the workpiece to the pallet. The final operation, removing the dovetail, takes place in another machine.

“The installation has truly met our expectations. After only three weeks, and still

working double shifts, we’ve increased machine spindle hours from between 12 and 13 a day to 22. Almost a twofold increase!”

The goal is that, in the near future, 80 percent of Bakker’s production should be automated. Not least to reduce any mistakes attributable to the human factor. More flexible and stimulating assignments for operators, and not having to “perch” over machines for entire shifts, are also good medicine for productivity!



The automatic cell that has almost doubled the machine’s spindle hours.

“Live long and prosper”



Do you remember the 1960’s cult series Star Trek and Mr. Spock’s “live long and prosper”?

The phrase rather nicely captures the philosophy of Magor Mold in San Dimas, California. Long life and reward are two concepts that permeate all the company’s operations.

Many moulding tool manufacturers are striving to become suppliers to the quality-oriented medical equipment industry, a market in which Magor Mold has been active for several decades. In fact, tools for this industry make up a full 95 percent of Magor Mold’s production. Disposable items account for most of this percentage.

Wolfgang Buehler, President, reveals: “My uncle, Max Ruf, was already supplying tools for medical equipment in 1967. Everything accelerated in 1990 when Max and I merged our operations. Thus, it’s safe to say that we have long experience in medical technology. This applies not least to our operators. They are highly skilled and the average length of time they have been with us is over ten years.”

Workforce continuity and accumulated expertise give Magor Mold’s customers peace of mind when placing repeat orders and great confidence when new challenges emerge. Project supervisors play a crucial role in customer relations. Each supervisor has total responsibility from beginning to end of his or her projects. The end here is not delivery, but the end of the tool’s service life!

Five hundred million a year

At the high-volume end – up to half a billion a year – precision and long service lives remain two of the characteristics of Magor Mold’s tools. Tools that produce large volumes of precision items year after year. Wolfgang Buehler: “In recent years, the



Wolfgang Buehler: “Automation strengthens competitiveness and creates new employment opportunities.”

pressure on prices has increased considerably. Instead of thoroughly analysing an item’s long-term costs, many customers have tended to focus on the short term and tool prices. The question customers should ask themselves is, ‘one quality tool that will last a long time, or several tools each with a short life span?’ If you look at cost per item, we are indisputably very hard to beat.”

Continuity is also a feature of the company’s supplier relations. Magor Mold and System 3R have worked together ever since the Mini system was introduced at the end of the 1960’s. “Especially as regards electrode manufacture, System 3R have been of great help in increasing our productivity,” explains Wolfgang.

Automate or run down

“Besides a loyal and skilful workforce, a willingness to invest has also played a key role in our success. We follow technical

developments very closely and are always keen to acquire the best equipment. The early implementation of CNC technology is one example of this. We are now automating everything that can be automated.”

At the very beginning of the new millennium, the company installed its first automatic production cell. This was rapidly followed by several more. Today, Magor Mold has three die-sinking EDM cells: a Charmilles served by a WorkMaster (with, respectively, Macro and Dynafix pallets); a double cell with two Mitsubishi’s and a WorkMaster (this cell also has Macro and Dynafix in 98 magazine positions); and, another Charmilles with a WorkPartner.

On top of this, there are two automatic cells for electrode production. In both cases, these



The magnificent double cell, two die-sinking EDM machines and a WorkMaster. The longest a single job has run here is 42 hours – unmanned!

are Roku-Roku served by WorkPal (with a 60-position magazine for Macro pallets).

“Quite simply, automation is essential for continued operation,” concludes Wolfgang. “Without automation, moulding tool manufacture would disappear to low-cost countries. So that we in the western world can sharpen our competitiveness, it is vital that our productivity per employee increases. Contrary to the assertions of some diehards, automation saves jobs and creates new employment opportunities!”

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Satisfied customers bring success



Yoneyama Mold Co. Ltd. produces plastic injection moulding tools under the Y.MOLD brand name, mainly for the Japanese market. Just over half the customers are in the automotive industry. However manufacturers of white goods and telecommunications equipment are also well represented.

Since 1986, the company has been based in Ina, Nagano, where the 1,200 m2 factory now has 20 employees. Nearby, in a smaller facility, five workers are employed entirely in the short series production of precision components.

In response to competition from low-cost countries, Yoneyama decided to consolidate its position in the "Premier League" of Japanese moulding tool manufacture. This would be done by focusing operations on high-quality tools.

Automation brings strength



Factory Manager Nobuyuki Shimaoka: "Automatic production cells strengthen our position as a supplier of high-quality tools."

Factory Manager Nobuyuki Shimaoka relates: "One way of strengthening our position has been to outsource simpler tool parts to subcontractors. This allows us to concentrate on the more complex components. Another way has been to make maximum possible

use of automatic production cells. Partly because it's difficult to find skilled workers. Partly to minimise, as much as possible, faults due to the human factor and, last but not least, to increase the number of spindle hours in our machines."

The first automatic production cell, a

Mitsubishi die-sinking EDM machine and a 16-position WorkPal, was installed barely ten years ago. Upgrading has continued since then. For example, a double cell – a CMM, a Mitsubishi MA2000 die-sinking EDM machine and a WorkMaster; the Macro system for the spindle nose and MacroMagnum on the machine table.

It was then the turn of the milling machines – a Makino V55 with a 12-position magazine for machining workpieces on MacroMagnum pallets. This was quickly followed by a Makino V33 with 60 Macro pallets for electrode production.

The latest addition came last year in the

form of a Roku-Roku Mega III with a WorkPartner and System 3R's WorkShopManager software. This setup is used for the production of complex components. The magazine holds 20 MacroMagnum pallets, each with at least one vice. Some have four.

"A supreme combination," states the production manager. "We work only one shift, but still get almost 20 hours a day out of this cell. The cell will have completely paid for itself in two years. Indeed, we have well-advanced plans to turn it into a double cell with an identical machine on the other side of the robot."



The supreme milling cell with WorkPartner and WorkShopManager

IN 2008 SYSTEM 3R IS COMING TO AN EXHIBITION NEAR YOU

We are exhibiting at many of the world's major exhibitions this year in order to show you the very latest systems in improving productivity, enhancing competitiveness and increasing 'bottom line' performance.

Please let us know if you plan to visit us and if you need any tickets or other information. We look forward to welcoming you on to the System 3R stand.

For more details please visit our website www.system3r.com or contact your nearest 3R office.

City	Dates	Exhibition
Bangalore, India	15-18 February	Diemould
Leipzig, Germany	26-29 February	Intec
Utrecht, Netherlands	11-15 March	Technishoov
Paris, France	31 March – 3 April	Industrie
Dusseldorf, Germany	31 March – 3 April	Metav
Los Angeles, USA	31 March – 3 April	Westec
Helsinki, Finland	15-18 April	Finntec
Osaka, Japan	17-20 April	Inter mold
Birmingham, UK	21-25 April	MACH
Novi, USA	23-24 April	Moldmaking Expo
Taipei, Taiwan	1-5 May	Taipei CNC
Shanghai, China	12-16 May	Diemould China
West Springfield, USA	20-22 May	Eastec
Guangzhou, China	16-19 June	GIMT
Chicago, USA	8-13 September	IMTS
Milan, Italy	3-7 October	MSV
Fredericia, Denmark	7-10 October	Effectiv Produktion
Vienna, Austria	7-10 October	Intertool
Stockholm, Sweden	21-24 October	Tekniksa Mässan
Tokyo, Japan	30 Oct – 4 Nov	JIMTOF
Basle, Switzerland	18-22 November	PRODEX
Bangkok, Thailand	20-23 November	Thai Metalex
Frankfurt, Germany	3-6 December	Euromold



EMO 2007, Hannover, Germany

Aiming for the stars



Musashi Precision Machining Technology has a goal that demands unswerving resolution. As MD Takao Tezuka puts it: "We are not striving to be the biggest, but the best!"

In 2002, after just over 40 years in operation, the strategic decision was taken to focus the company's activities entirely on the subcontract production of complex components. Up to that point, the company had done a lot of machine turning. This was stopped in order to concentrate on the milling of precision parts.

Mushasi uses an in-house program (a CAS system) that is of great benefit in the frequent customer contacts that are necessary when preparing the production of components that are often extremely intricate.

The climate-controlled ($\pm 2^\circ\text{C}$) workshop in Menuma, Saitama, now houses 15 machining centres (vertical and horizontal) that run a three-shift system, 24 hours a day, six days a week.

Customers come from the aerospace, medical technology, semiconductor and automotive industries. The Japanese F1 stable features in the latter. Prototype manufacture makes up around 40 percent of the company's projects. The remaining 60 percent is production of short series. Seldom breaking into three figures, these are often so short that they scarcely qualify as series.

Machining is predominantly in aluminium. However, "difficult" materials such as titanium and magnesium are not uncommon. The company is, of course, quality certified.

Great flexibility

In connection with the streamlining of operations, a Matsuura dealer recommended the

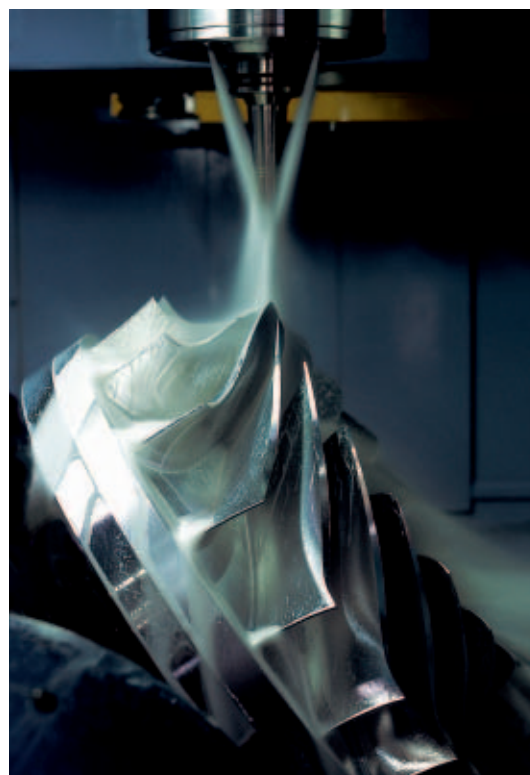
introduction of System 3R's pallet systems.

Factory Manager Kazayuki Takeuchi explains: "We chose the Macro system in the hope that the pallets would guarantee repetition accuracy, reduce retooling times, increase precision, decrease the risk of collisions and lower the consumption of materials.

"Our hopes have truly been fulfilled. Without losing precision, Macro jobs can be interrupted, taken out of the machine and completed later. This enables the changing of priorities and gives our operations great flexibility. Furthermore, material consumption has decreased by a third!"

Musashi uses Macro not only as a pallet for workpieces, but also as a reference element for its small vices.

Last summer, System 3R's indexable Delphin for large workpieces was also introduced. The company now has pallet changers in all its 5-axis Matsuura machines. One of these has double Macro chucks on the machine table and another has the Delphin system.



Pallet changers in all 5-axis machines sharpen competitiveness

System 3R International AB

Sorterargatan 1,
SE-162 50 VÄLLINGBY,
Sweden
tel +46-08 620 20 00,
fax +46-08 759 52 34,
e-mail info.se@system3r.com

ASIA

Far East, China & India

System 3R Far East
6 Harper Road
Leong Huat Building, 01-01
SINGAPORE SG-369 674
tel +65 6289 4811
fax +65-6289 3011
e-mail info.sg@system3r.com

Japan & Korea

System 3R Japan
Kaki Building
2-5-22, Suido Bankyou-ku
Tokyo 112-0005
tel +81-(0)3-5840-7383
fax +81 03-5840-8723
e-mail info.jp@system3r.com

EUROPE

System 3R Europe
Wasserweg 19
DE-64521, GROSS-GERAU
tel +49-06152 80 02-0
fax +49-06152 80 02 35
e-mail info.eu@system3r.com

Czech Republic & Slovakia

System 3R Czechia
Tiskarska 10/257
CZ-108 28 PRAHA 10
tel +420-02 34054 224
fax +420-02 34054 495
e-mail info.cz@system3r.com

France & Portugal

System 3R France
56 Boulevard de Courcerin
Les Espaces Multiservices 15
F-77183 CROISSY BEAUBURG
tel +33-01 60 95 90 80
fax +33-01 60 37 88 16
e-mail info.fr@system3r.com

Germany & BeNeLux

System 3R Deutschland
Wasserweg 19
DE-64521, GROSS-GERAU
tel +49-06152 80 02-0
fax +49-06152 80 02 35
e-mail info.de@system3r.com

Italy & Spain

System 3R Italia
Via Ponchielle n. 2/4
I-20063 CERNUSCO SUL NAVIGLIO (MI)
tel +39-02 92 38 821
fax +39-02 92 11 23 19
e-mail info.it@system3r.com

Scandinavia

System 3R Nordic
Sorterargatan 1
SE-161 50 VÄLLINGBY
tel +46-08 620 20 00
fax +46-08 38 81 84
e-mail info@system3r.se

Järfälla Hårdverkstad
Elektronikhöjden 8
SE-175 43 JÄRFÄLLA
tel +46-08 580 125 50
fax +46-08 580 126 55
e-mail info@jhw.se

Switzerland & Austria

System 3R Schweiz
Wilerstrasse 98
CH-9230 FLAWIL
tel +41-071 394 13 63
fax +41-071 394 13 60
e-mail info.ch@system3r.com

Turkey & Bulgaria

System 3R Türkiye
Abdi İpekçi Cad.
Özel İdare İş Merk 150/209
Bayrampaşa 34030 İSTANBUL
tel +90-212 613 8062-8063
fax +90-212 613 8069
e-mail system3r@superonline.com

United Kingdom

System 3R UK
Redvale House, New Road
PRINCES RISBOROUGH,
Buckinghamshire
HP27 0JN United Kingdom
tel +44-01844 27 44 55
fax +44-01844 34 88 00
e-mail info.uk@system3r.com

AMERICA

United States & Canada

System 3R USA
915 Busse Road,
Elk Grove Village IL 60007
tel +1 847 439 4888
fax +1 847 439 5099
e-mail info.us@system3r.com

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