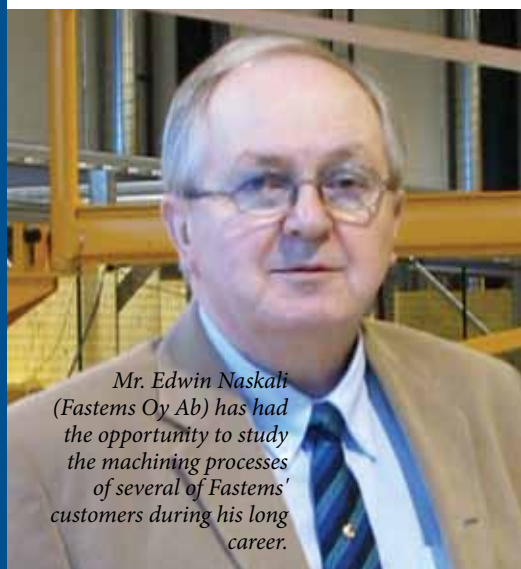


## MORE PRODUCTION HOURS - TOWARDS 8760



*Mr. Edwin Naskali (Fastems Oy Ab) has had the opportunity to study the machining processes of several of Fastems' customers during his long career.*

THE MODERN, PARTIALLY UNMANNED MANUFACTURING SYSTEMS PRESENT NEW CHALLENGES ON THE HANDLING AND CLAMPING OF WORKPIECES. DURING THE PAST FEW YEARS, INDIVIDUAL MACHINES AND DEVICES AS WELL AS MANUFACTURING METHODS HAVE IMPROVED SUBSTANTIALLY. THE FUTURE CHALLENGES CONCERN INTEGRATION AND MANAGEMENT OF THESE ELEMENTS.

### HANDLING AND CLAMPING OF WORKPIECES

The core business of Fastems is factory automation. Our concept makes it possible to integrate several types of machine tools and machining pallets in a single system. It is increasingly common for our customers to request management of clamping solutions, fixtures, cutting tools, and NC program management as part of these systems. This trend is supported by faster machining processes, new features in machine tools, and new robotics solutions. A successful automation solution for handling and clamping of workpieces requires complete reliability of the process and quality. This type of solution enables readiness for flexible small-batch production and quick product changes. Additionally, increasing the automation level should not cost too much!

### THE SIGNIFICANCE OF ZERO-POINT CLAMPING TECHNOLOGY

With zero-point clamping, the clamping elements position the workpiece accurately to the exact same position

in three coordinate directions every time. This principle can be successfully applied in several types of machining fixtures and automated workpiece handling solutions. There are already several commercial zero-point component manufacturers and the competition has lowered prices, which is making the method increasingly popular. There are several applications for this positioning and clamping method in automated workshop production.

### WIDE VARIETY OF APPLICATIONS

From Fastems' point of view, this technology could have even more applications. Tempting possibilities include automatic handling of zero-point modules, automatic loading of workpieces, and automatic changing of set-up. The entire process can be re-engineered based on zero-point mounting technology. One approach is a palletless FMS system. The retractable nipples can be fixed directly on the workpiece and no other fixture is needed. Robotics and zero-point clamping together open up new opportunities to increase the production capacity of a workshop. Robotic automation can be used in handling the zero-point fixtures and in automatic loading of the workpieces on the zero-point fixtures. Many improvements can also be achieved with automatic, flexible set-up.

Machine tools should be cutting all the time - the closer the ultimate 8760 hours a year, the better. The machines have become faster and cutting tools and raw materials have improved. In fact, metal cutting is more reliable than ever before! These factors also make it easier to start using zero-point clamping technology to get the most out of the production equipment.

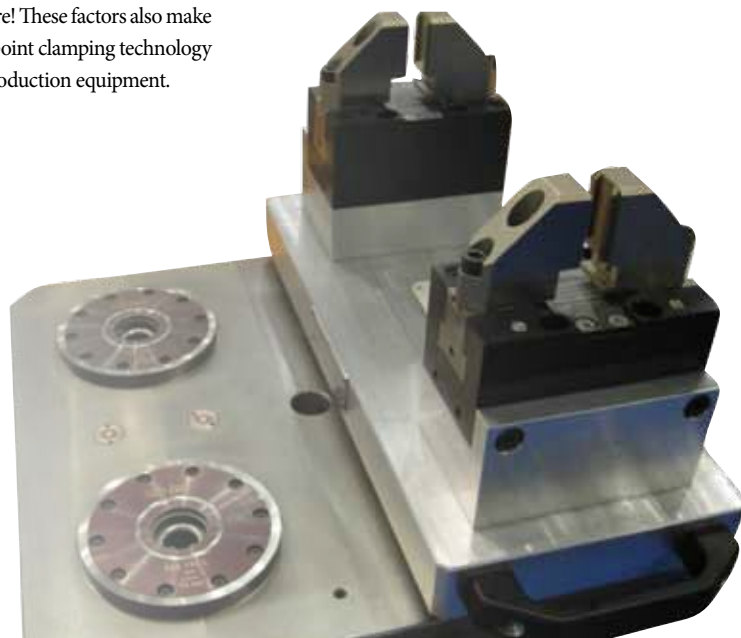
### ZERO-POINT CLAMPING TECHNOLOGY AS AN INVESTMENT

The payback period depends on the type of production, but in practice it is often a matter of months; sometimes only weeks. The factors that contribute to the savings are:

- Changing the workpiece becomes significantly faster
- Set-up can be made outside the machine tool
- Set-up becomes faster
- The fixturing system can be made modular and standard more easily
- Production efficiency is improved by increased automation
- Zero-point clamping technology can be utilized also in the existing, older production machinery

### FUTURE TRENDS

Zero-point clamping technology is on the rise thanks to good application examples and increased component supply. The benefits of this technology are becoming more known, but investment decisions are made only when successful references are available. The competitiveness of workshops requires profitable investments that utilize automation. When the focus is on production flexibility and shorter set-up times, the production machinery is utilized to its fullest.



# THE WORLD BELONGS TO THOSE WITH COURAGE

*Text: Martinus Menne*



A LOW-COST AND THUS COMPETITIVE PRODUCTION IN COMBINATION WITH AN EXTREMELY HIGH VARIANCE IN TERMS OF THE PRODUCTION OF PARTS REQUIRES A VERTICAL RANGE OF PRODUCTION, CONTINUOUS AUTOMATION AND A SHARP EYE ON MACHINE PREPARATION TIMES. ALOIS PÖTTINGER MASCHINENFABRIK FROM GRIESKIRCHEN IN UPPER AUSTRIA PROVES THAT THE TERM "INNOVATIVE STRENGTH" IS MORE THAN MERELY EMPTY WORDS. THEY DISPLAYED ENOUGH COURAGE TO BREAK FRESH GROUND BY LINKING HORIZONTAL MACHINING CENTERS TO A FASTEMS MULTI-LEVEL SYSTEM (MLS).

"We produce everything that does not drive on its own" is how Franz Eichinger, responsible for production planning at Alois Pöttinger Maschinenfabrik GmbH, sums up their product portfolio. Pöttinger have been manufacturing agricultural machines for grass land and soil cultivation since 1871. According to their own statements, the company, which is based in Grieskirchen, belongs to the most innovative in this product segment. The figures are proof of this. Pöttinger employ a total of 1,100 staff, of which 850 are active at their headquarters in Upper Austria. The company's development department has 32 design engineers. A third of them are focused on the optimization of existing machines and two thirds are responsible for new developments.

#### MANY VARIANTS – SHORT THROUGHPUT TIMES

An average of roughly 125 agricultural machines leave the plant in Grieskirchen every day. "At present, we are producing roughly 22,000 individual parts for our machines here at our headquarters. Both quantities and variants are increasing incredibly – and the time from production until final assembly currently takes about four hours", Franz Eichinger explains. To master such a challenge, you need a wide range of production combined with a high degree of automation. "We have everything at our own plant, from complete sheet processing and chip processing to welding and powder coating. 16 years ago, we invested in three horizontal machining centers

from Hitachi Seiki along with pallet pools. Over the past ten years, we haven't purchased any machines without automation any more."

You need to invest if you want to grow. Franz Eichinger is aware of that: "At present, we have an increase in orders of about 20 per cent and urgently need more space to expand our production capacities. That is why we built a large hall last year for our assembly work, with an area of 5,000 square meters. That gave us additional space in terms of actual production for new investments in automation. However, production area is always precious, which is why a solution in terms of height is always more elegant, since we have enough space there."

#### FLEXIBLE MANUFACTURING SYSTEM (FMS) INSTEAD OF A POOL SOLUTION

Pöttinger invested in such a solution in 2006 with a Fastems FMS, to which two horizontal MCH 250 machining centers from Heller were connected in a first expansion stage. This solution is intended as a replacement investment for the three Hitachi Seiki machines: "A pool solution like with the Hitachi machines quickly reaches its limits in terms of non-productive times. By contrast, the Fastems system provides us with a total of 117 pallet places that take up a relatively small space. We use 89 of them for workpieces and 28 for raw material. From the beginning, it was clear to us that we were going to integrate a zero-point clamping system into this system solution" Eichinger says.

#### POTENTIAL IN TERMS OF THE MACHINE PREPARATION TIMES

There are good reasons for this: "Once the automation potential for machining workpieces has been fully exploited, we can still make use of the machine preparation times. For decades now, we have already had very good experiences with zero-point clamping systems." In 1998, in other words during the pioneer time of this technology, Pöttinger already used such a system of Stark clamping systems in a vertical machining center. During the following years, all horizontal and vertical centers were equipped with this technology step-by-step. "The benefits are enormous production flexibility and extremely short preparation times at the machines", Eichinger emphasizes and adds: "Of course, every machine manufacturer initially prefer their own standard pallet solution, since they can build on their own experiences. The integration of a zero-point clamping system always requires a certain development time and frequently, several partners acting in concert, and that ultimately without being absolutely sure that such a system will really work smoothly."

#### CONSIDERABLE SAVINGS

However, Pöttinger accepted this challenge, along the lines of "the world belongs to those with courage", since this brought significant benefits in terms of the costs, as Eichinger works out: "One machine pallet for the MLS costs between 4,000 and 6,000 EUR. To convert the two machines to the zero-point clamping system, we needed to invest roughly 35,000 EUR per machining center, resulting in a total of about 70,000 EUR. If we had equipped all available 89 places in the MLS with machine pallets, that would have resulted in overall costs of about 400,000 EUR. So, it is worth it and provides enough motivation to try out an alternative."

#### TARGET-ORIENTED, COOPERATIVE DEVELOPMENT WORK

Pöttinger, Stark Spanntechnik, Heller and Fastems came together to develop a zero-point clamping system in a Fastems MLS with horizontal machining centers. To avoid an additional interface between the stacker crane of the MLS and the Heller machines, Eichinger insisted on a special machine pallet with direct support of the zero-point clamping system of the Speedy 2000 type.

The coupling elements required for the supply of media for the hydraulic and pneumatic systems have been integrated into the front side of the pallet and a docking unit has been set up as a counterpart, which ensures a force-fit connection for media flow.

The media supply and the PLC controller for correctly controlling the clamping and release of the zero-

# Fastems news letter



Left picture: Mr. Franz Eichinger - Leader of manufacturing engineering and fixture construction (right) and Mr. Oliver Steininger - Leader of mechanical production division I (left).  
Right picture: At present, the Fastems system has more than 117 pallet places, of which 89 are used for workpieces and 28 for raw material

point clamping system is ensured by the Fastems control software. To avoid having to integrate an additional hydraulic unit, the Finnish company developed a solution that uses the existing hydraulic unit of the machining centers for the media supply.

## TECHNICALLY MATURE NEW DEVELOPMENT

The zero-point clamping system itself consists of four clamping units and two precentering bolts on the machine pallet, as well as the jig plates or carrier plates for clamping the workpieces, which replace the base pallets. "We were able to develop these carrier plates ourselves, since we already use similar systems for our vertical centers", Eichinger explains.

This precentering of the carrier plate, when it is set down on to the zero-point clamping system by the stacker crane, reduces the wear of the clamping units significantly and sets the jig plate down with great precision. Essentially, it is necessary that on setting down or lifting up, the supporting points and the nipple supports are blown clear with compressed air in a targeted manner to remove any dirt, such as chips, coolant, etc. Clamping in the zero-point clamping system is performed via spring force.

After machining the workpieces and their discharge out of the working space, the machine pallet moves up to the docking station with the zero-point clamping system, the carrier plate is released hydraulically and picked up by the stacker crane. Then, the carrier plate is transferred into the MLS according to the destination.

## PRODUCTIVITY ALSO AT THE BACK SIDE

The system is set up on its own in the hall to enable access to both long sides.

"We need the front area of the MLS for the logistics, such as loading stations, material stations, etc., so there is only room for one MCH 250 on this side. The second machine is at the back of the stacking system", Franz Eichinger says. That is also a novelty within the overall system at Pöttinger, since the machine pallet can only be transferred into one machine, due to the asymmetrical design of its underside.

That deviates from the equipment with the zero-point clamping system, where the machine pallet stays on the machine and only the jig plate is transferred and turned into the machine. The correct alignment of the jig / workpiece is restored by the automatic rotation of the machine pallet with the jig plate by 180° in the working space and the pallet can be machined accordingly. Before it is discharged out of the working space, another rotation is carried out to restore the required alignment of the jig plate in the system.

When the system was designed, several system expansion stages were taken into account. The 2nd expansion stage includes the integration of two more Heller MCH250 machining centers, which are also positioned at the back of the system and are to replace the Hitachi Seiki machines. The expansion of the existing system is planned for the final expansion stage, which will almost double the number of storage places. The integration of two additional machines is also planned. "We will thus achieve a high degree of automation and increase our productivity while making the best use of our available space at the same time", Franz Eichinger concludes.

## Tampere Manufacturing Summit

[www.tamperemanufacturingsummit.fi](http://www.tamperemanufacturingsummit.fi)

8 – 10 June 2009,  
Tampere, Finland  
Tampere Hall

Tampere Manufacturing Summit 2009 is an international benchmarking and networking forum. It brings together front line industrial manufacturers and researchers to exchange opinions and ideas about different aspects of manufacturing and keys to improved global competitiveness.

The summit programme is based on invited presentations by internationally recognized experts from industry and academia discussing industrial best practices and scientific and technological advances and breakthroughs in manufacturing.

### In association with:



Published by FASTEMS Oy Ab  
No. 1/2009

#### EDITOR-IN-CHIEF

Helena Reilin, Fastems Oy Ab  
[helena.reilin@fastems.com](mailto:helena.reilin@fastems.com)

#### LAYOUT:

Leila Ainasoja,  
Fastems Oy Ab

#### PRINTED BY:

Hämeen Kirjapaino Oy,  
Tampere, Finland 2009

#### EDITORIAL ADDRESS:

System Integrator  
Fastems Oy Ab  
Tuotekatu 4,  
33840 Tampere, Finland  
Tel. +358 (0)3 268 5111  
Fax. +358 (0)3 268 5000

8760  
Fastems