DIGITALISATION AS THE KEY TO SUCCESS WITH THE HYPERTURN 65 POWERMILL AT EVVA

Requirement:
New manufacturing system for flexible complete machining of serial parts as well as special parts in batch size 1.

Solution:
Hyperturn 65 Powermill turn-mill centre including the EMCONNECT control interface from Emco.

Benefits:
High precision and flexibility, dry machining, programming and simulation in real time, digitalization of production processes from the shop floor to ERP.

The new manufacturing system at EVVA consists of the Hyperturn 65 Powermill turn-mill centre including EMCO's EMCONNECT control interface and complete automation package including Emco's SL 1200 short bar loader.

EVVA, a Vienna-based, family-owned company, has been researching, developing and manufacturing security technology since 1919. The fact that it is now, some 100 years later, a networked manufacturing pioneer is thanks to a clear digitalization strategy. An important milestone EVVA´s new production philosophy is represented by the Hyperturn 65 Powermill turning-milling centre in combination with the EMCONNECT networked control interface. With the flexible production system from Emco, complete machining of brass components can be automated for batch sizes down to 1, as well as medium quantity series. By Robert Fraunberger, x-technikFor more than 100 years, EVVA Sicherheitstechnologie GmbH (EVVA) has highly successfully combined tradition with innovation and has now become one of the world's leading manufacturers of high-quality locking systems.
,,Since its foundation as the ‚Erfindungs-Versuchs-Verwertungs-Anstalt´ (Invention-Test-Application-Establishment), EVVA has always been marked by courageous and forward-looking entrepreneurship as well as constant striving for innovation,'' says Michael Kiel, Group Division Manager Operations at EVVA, outlining the company's philosophy.
Its first patent (it currently holds 246) dating back to 1937, was for a cylinder padlock. Today, EVVA is one of Europe's leading manufacturers of access solutions, both mechanical and electronic, and also offers integrated complete solutions for a wide range of protection needs.

Sustainable production

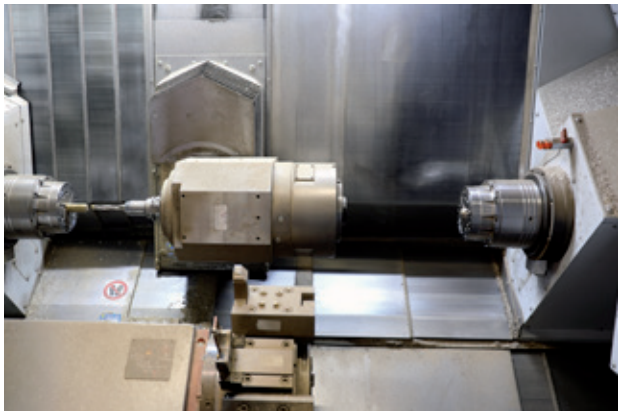
The family-owned company employs around 460 people at its headquarters in Vienna. In recent years, personnel has expanded, particularly in the field of electronics and software, along with to continuous investments in the machinery inventory.
The amount of oil and water consumed in the production of EVVA wide range of solutions is being successively reduced.
,,At the Vienna headquarters as well as in our other EVVA manufacturing sites, the clean production share is steadily increasing,'' adds Michael Kiel. The latest machines and digital solutions contribute to additional resource conservation gains in production.

Clear digitalization strategy

Clear digitalization strategy
For EVVA, digitalization is not just about software implementation, but it represents many opportunities for its own future development. ,,For our claim to excellence associated with Industry 4.0, we have defined four development priorities: 1. Digitalization, 2. Automation, 3. Positioning development, and 4. Collaboration. Our highest priority has always been, and will continue to be, to bring «the people» with us, through the relevant qualification measures and participation in projects», Kiel explained. A key pillar of EVVA´s corporate strategy is digitalization in the production and mechanical manufacturing areas. ,,Part of our production is highly automated, not least because of the space constraints of our location in the centre of Vienna. It is also necessary in order to generate further growth and to remain internationnally competitive,'' adds Dr Florian Pauker, Project Manager Operations for Digitalization at EVVA Sicherheitstechnologie GmbH.

Manufacturing special parts in batch sizes down to 1

Automation and digitalization is also the chosen strategy for the production of the wide variety of mechanical parts used in EVVA´s locking systems.
,,For example, since 2017, all newly purchased machine tools must be connectivity-enabled and have defined interfaces,'' says Florian Pauker, who worked for a long time in research at the Vienna University of Technology and the Austrian Centre for Digital Production (CDP) before joining EVVA, describing in practical terms the criteria for investment decisions.
Three years ago, the company was looking for a new manufacturing system that would offer a high degree of flexibility for productively efficient manufacturing of special parts as well as parts series. The primary goal was to significantly reduce the lead times of special locking systems or individual locking cylinders in typical batch sizes of 1 to 5. As Pauker explains: ,,We used to manufacture our special parts on conventional lathes and milling machines in multiple setups, with the consequence that we had three to four weeks of lead time. We wanted to reduce this to our standard delivery time of seven days.''



6-sided complete machining: The Hyperturn 65 Powermill is equipped with 5,000 rpm main and counter spindles, a 12,000 rpm BMT turret incl. Y-axis for a maximum of twelve driven tools, and an 18,000 rpm milling spindle with B-axis, enabling the complete machining of various parts made of brass with dry machining in batch sizes down to 1.

Solution: 6-sided complete machining

It quickly became clear to the team at EVVA that only a turning and milling centre with main and counter spindles, including the corresponding automation and digitalization options, would be suitable for this challenging task. After a rigorous selection process, it was determined that the Austrian machine tool manufacturer Emco, with a Hyperturn 65 Powermill including the EMCONNECT control interface as well as complete automation package, best matched the required criteria.
Emco and EVVA have long enjoyed a relationship of trust when it comes to equipping the shop floor. Added to this: Emco's new generation of machines is ideally suited to the tasks EVVA needs to address, particularly thanks to the flexibility of the EMCONNECT software platform. In addition, their already good relationship has been strengthened by collaboration in a research project: The Austrian Centre for Digital Production (CDP) is a competence centre for companies and scientists who work together on solutions in the field of automation and cyber-physical production systems. EVVA and Emco are involved in this project as companies and benefit from the knowledge gained there.

Optimal support from Emco

Of course, EVVA also looked around internationally for other suppliers and was in contact with them: ,,Overall, however, the support from Emco for our project was clearly the best. Emco took all our wishes and concerns into account and supported the entire project with its own team,'' says Florian Pauker, full of praise.
In addition to the requirements described above, the new system had also to be capable of dry machining components made primarily of non-ferrous metals (brass, nickel silver, etc.), which was important for EVVA to be able to implement their previously-mentioned clean production strategy in a consistent manner. ,,Dry machining means that coolants and lubricants can be completely omitted so there is no need for parts cleaning,'' says Pauker, explaining the decision.

Hyperturn 65 Powermill

The Hyperturn 65 Powermill is equipped with 5,000 rpm main and counter spindles, an 18,000 rpm milling spindle with B-axis, and an 80-station chain magazine. An additional BMT tool turret (12,000 rpm) including Y-axis and holding a maximum of twelve driven tools offers maximum flexibility by allowing both tool systems to be used in parallel on the main and counter spindles. Integrated glass scales in all axes ensure high precision and an Emco short bar loader optimizes time and costs during loading as well as unloading with parts catcher and conveyor belt.
Due to the requirement for dry machining, high speeds are required, especially for the bores that are often very small (ø 1.8), which also have to be produced as burr-free as possible. ,,The Hyperturn offers the necessary rigidity, and at 18,000 rpm the milling spindle also has sufficient speed for this purpose. In addition, the efficient removal of the extremely small chips ensures high process reliability,'' says Florian Pauker with satisfaction.
Another special feature is the use of a cobot from Universal Robots. This cooperative robot can work together with human colleagues and was added as an extension with a custom-designed interface (the overall plant uses the OPC UA protocol for data exchange). It ensures efficient processing of both special orders and series parts by removing components in a safe and orderly manner.

Digitalization with EMCONNECT

A key added value for EVVA is the ability to fully integrate the new manufacturing system into the company network. This enables the digitalization of production processes from the shop floor to ERP.
Emco's EMCONNECT is a control interface for connectivity and networking in the manufacturing environment and a digital process assistant for comprehensively integrating customer and system-specific applications related to machine control and production flow. ,,Through EMCONNECT, machine operators also benefit, because access to all important information, data, systems as well as the visualization of the cell takes place directly and centrally at the control panel of the machine,'' says Günter Pumberger, Product Coordinator Digitalization at Emco, pointing out an important advantage and adds: ,,As the system is based on Windows and EMCONNECT has a modular structure, project-specific and customer-specific applications can also be implemented very flexibly.''
This allowed EVVA to implement what they needed on their own, without requiring any modifications from EMCO.
,,As well as having access to workpiece drawings and setup documents, especially having access to the digital twin directly from the control panel makes the setup process easier. The integration of the robot's control system into EMCONNECT enables the complete cell to be operated centrally at the machine,'' elaborates Pumberger.
Florian Pauker sees a lot of potential for Emco to embed various digitalization solutions associated with the actual manufacturing process: ,,For me, the open architecture of EMCONNECT is a very successful approach, with the Siemens control system integrated in it as well'' One example is production data acquisition and as well as capabilities for remote diagnostics and predictive maintenance of the

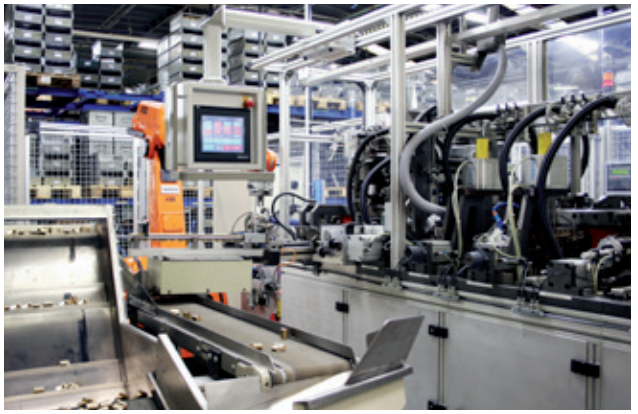
Emco's EMCONNECT control interface is a digital process assistant for comprehensively integrating customer and system-specific applications for machine control and production flow. The machine operator has centralized access to all important information, data, systems as well as the visualization of the cell at the control panel of the machine.

machine tool, while another example is tool service life optimization. ,,With the EMCONNECT Data Service, all related work areas and users have the machine's status, diagnostic and operating data at their fingertips, anytime and anywhere. With automatic notifications in case of malfunctions, when limit values are exceeded as well as pre-defined events, the responsible people can react immediately,'' adds Günter Pumberger.

Summary and outlook

As a first milestone of the new production philosophy at EVVA, the Hyperturn 65 Powermill in combination with EMCONNECT has created a flexible production system that enables the automated complete processing of components down to batch size 1, as well as medium-quantity series.
,,Our final goal is to use the new Hyperturn 65 Powermill to produce around 40% special parts and 60% series parts (up to 1,000 pieces) as flexibly and with as little manpower as possible,'' states Pauker.
Currently, the company is still working on the final integration of the ESPRIT TNG CAM system from DP Technology, supported by Pimpel GmbH. With CHECKitB4, Pimpel GmbH is supplying the digital twin for the complete virtual setup and simulation of the machining process. ,,With this project, we have more or less created a blueprint for the most complex manufacturing case that can occur at our company,'' concludes Florian Pauker, pleased with EVVA and Emco´s joint success.

The large 80-station chain magazine ensures highly flexible production and process reliability.



EVVA's production is highly automated, not least because of the limited space available at its location in the centre of Vienna.

Group Division Manager Operations at EVVA Sicherheitstechnologie GmbH

Since its foundation in 1919, EVVA has always been marked by courageous and forward-looking entrepreneurship as well as constant striving for innovation This is also reflected in our digitalization strategy.

Dr Florian Pauker, Project Manager Operations for Digitalization at EVVA Sicherheitstechnologie GmbH

Emco won our full confidence with a complete offer consisting of the high-quality Hyperturn 65 Powermill turn-mill centre including the EMCONNECT control interface, full automation package as well as competent advice and project support.

Günter Pumberger, Product Coordinator Digitalization at Emco

We are pleased to be able to accompany EVVA in this important step in the development of their production after years of excellent cooperation. Our digitalization expertise was of great help in providing the most convincing design concept to this customer.

EVVA
access to security

EVVA, a Vienna-based, family-owned company, has been researching, developing and manufacturing security technology since 1919. Today, EVVA is one of Europe's leading manufacturers of access solutions, both mechanical and electronic, and also offers integrated complete solutions for a wide range of protection needs.

- **Employees:** approx. 750 throughout Europe, including more than 460 in Austria
- **Turnover:** approx. 84 million euros (2019)
- **European subsidiaries:** Austria, Germany, Switzerland, Denmark, Italy, Spain, Netherlands, Belgium, Czechia, Slovakia, Poland, Sweden.

EVVA Sicherheitstechnologie GmbH
Wienerbergstraße 59-65 / A- 1120 Wien
Phone: +43 1-81165-0 / **www.evva.com**

TECHNICAL DATA HT65 Powermill

Work area

Swing over bed	500 mm
Distance between spindle noses	1300 mm
Maximum turning diameter	500 mm
Max. part length	1040 mm
Max. bar-stock diameter	65 (76/95) mm

Travel

Travel X1 / X2	405 / 210 mm
Traverse path Z1 / Z2	1040 / 1050 mm
Traverse path Y1 / Y2	220 / 100 mm
Traverse path counter spindle Z3	1045 mm

Main spindle

Speed range (infinitely variable)	0 – 5000 (4000/3500) rpm
Maximum torque	250 (360) Nm
Spindle nose DIN 55026	A2-6 (A2-8)
Spindle bearing (inside diameter)	105 (130/140) mm
Spindle bore (excluding draw-back rod)	Ø 73 (86/106) mm

Counter spindle

Speed range (infinitely variable)	0 – 5000 (4000/3500) rpm
Maximum torque	250 (280) Nm
Spindle nose DIN 55026	A2-6 (A2-8)
Spindle bearing (inside diameter)	Ø 105 (130/140) mm

C-axis

Resolution	0,001°
Rapid traverse	1000 rpm

Drive power

Main spindle (AC integrated-spindle motor)	29 (37) kW
Counter spindle (AC integrated-spindle motor)	29 kW

Milling spindle – Powermill

Speed range	0 – 12000 rpm
Maximum torque	60 Nm
Maximum drive power	22 kW
Type of tool shank	HSK-T63

B-axis

Travel range	220°
Holding torque of clamp	4000 Nm
Interpolating drive torque	332 Nm

Tool magazine

Tool storage capacity	20 / 40 / 80 mm
Max. tool diameter	Ø 80 (Ø 120) mm
Max. tool length	250 mm
Max. tool weight	5 kg

Tool turret with BMT interface and direct drive

Number of tool positions	12
Precision interface	BMT-55P
Tool cross-section for square-shank tools	20 x 20 (25 x 25) mm
Shank diameter for boring bars	40 mm
Tool indexing time	0,5 sec.
Speed range of driven tools	0 – 12000 rpm
Torque of driven tools	30 Nm
Drive power of driven tools	10 kW

Feed drives

Rapid speed X1 / X2	30 m/min
Rapid speed Z1 / Z2 / Z3	30 m/min
Rapid speed Y1 / Y2	12 m/min
Feed force X1 / X2	5000 N
Feed force Z1 / Z2	8000 N
Feed force Y1 / Y2	7000 N

Coolant system

Tank capacity	450 (300) l
Coolant pumps for the tool systems	2 x 14 bar
Scavenge pumps for the work area	2 x 3,7 bar

Power consumption

Connected load	50 kVA
Compressed air	6 bar

Dimensions/weight

Height of center above floor	1316 mm
Overall height	2490 mm
Required space L x D (without chip conveyor)	5300 x 3340 mm
Total weight	12250 kg

Safety devices CE compliant

beyond standard

EMCO GmbH / Salzburger Str. 80 / 5400 Hallein-Taxach / Austria / T +43 6245 891-0 / F +43 6245 86965 / info@emco.at

www.emco-world.com