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English

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Achieving success together with
innovation and sustainability

MAPLAN technology promises higher competitiveness,
simplifies processes and conserves resources.



RUBBER & SILICONE
MAPLAN

INJECTION INTELLIGENCE

EDITORIAL



Dear reader,

We currently operate in a challenging economic environment. The trade war between the USA and China as well as the automotive industry's failure to restructure after the diesel scandal are causing deep uncertainty. While the USA and China are intervening in their markets to provide support, Europe lacks an effective common industrial policy. Instead of markets being supported in a targeted manner, their competitiveness is being weakened and structural reform is being postponed in many countries. Economic activity is weakening and investment is being withheld. Psychology dominates the economy, and uncertainty reigns at the moment. We can all stick our heads in the sand or we can react to this situation purposefully.

We have decided for the latter!

MAPLAN has developed new machinery and control technology with numerous features in order to increase our customers' competitiveness and flexibility with even greater energy efficiency, effective automation systems and the opportunity to upgrade existing machines.

We would be delighted to discuss this with you from 16 to 23 October at the K-2019 Show in Düsseldorf.

The economy thrives on optimism and good business relations thrive on exchange.

Philippe SOULIER, Owner
Wolfgang MEYER, CEO

IMPRESSUM

OWNER
MAPLAN GmbH, MAPLAN-Strasse 1
AT-2542 Kottlingbrunn
office@maplan.at, FN: 63369s, UID: ATU19665306

EDITOR
Martina Kruber, Wolfgang Meyer, Gerald Kemper
LAYOUT
Mathias Schwarz

INDIVIDUALISED & FUTURE-ORIENTED

INJECTION INTELLIGENCE

Achieving **SUCCESS** together with **INNOVATION** and **SUSTAINABILITY**

Societal and industrial change, new customer requests and new technology: everything is interconnected. No one can get past the need for digitalisation any longer. The world is becoming digital, but is also supposed to become more sustainable at the same time. This would appear to be paradoxical and no easy task. However, Industry 4.0 represents both a challenge and an opportunity for companies. This is because digitalisation also facilitates innovation for economic activity that is ecological and social if the considerable potential here is made use of.

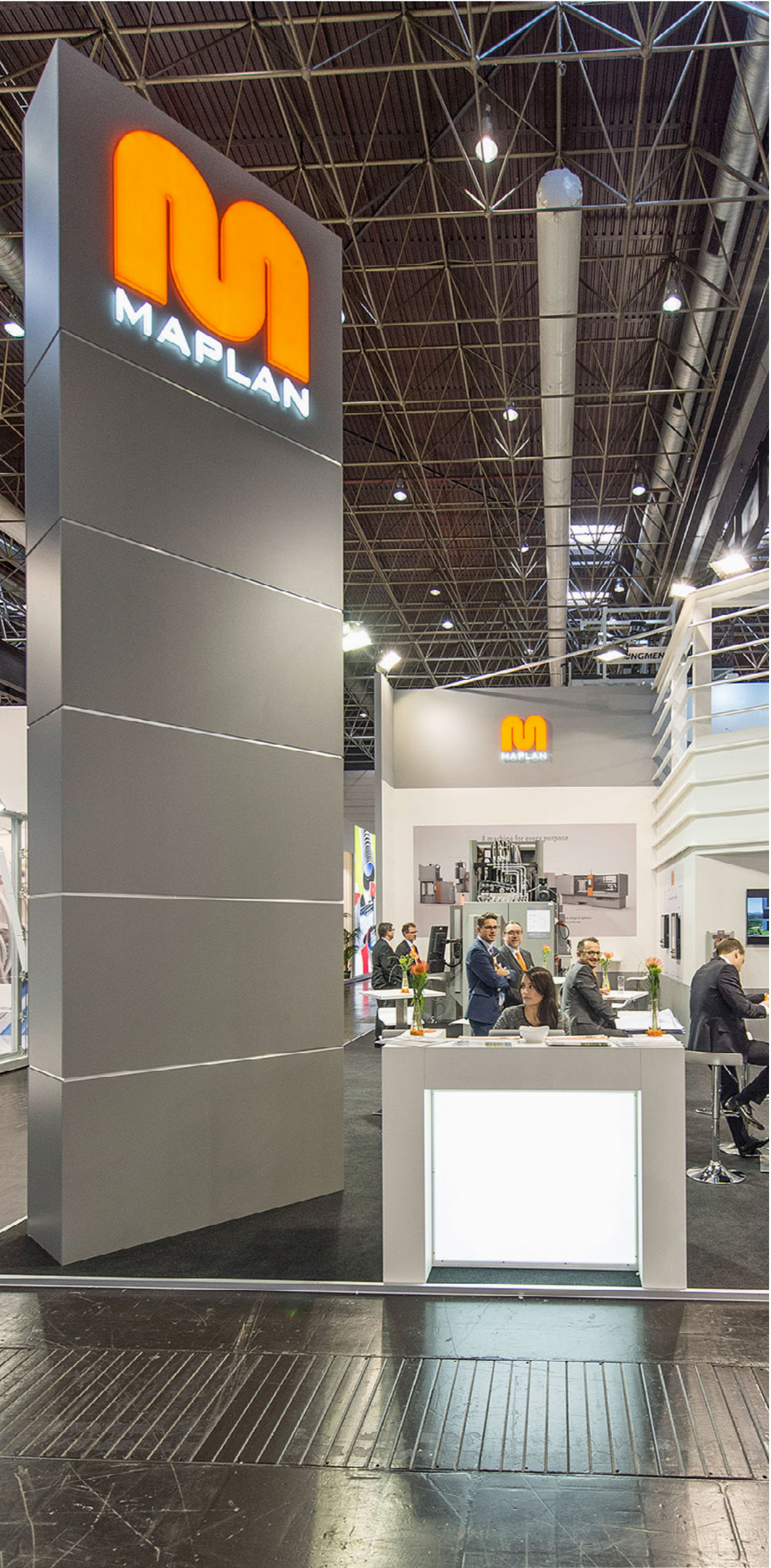
How are we facing this challenge here at MAPLAN? Our answer reads: MAPLAN INJECTION INTELLIGENCE. This holistic message takes into account MAPLAN's new philosophy. Innovative, smart and energy-efficient technology which is easy to use, promises sustainable production of the highest quality. And the individualised customer experience is the key to success. For us, sustainability is an all-encompassing issue since it cannot simply be reduced to individual aspects. For this reason, we at MAPLAN take economic, ecological and social factors into account when creating the conditions for effective cooperation. Sustainability also has the added benefit of increasing efficiency. At MAPLAN, our entire process



chain is continually enhanced for optimum efficiency - from the supplier through production to the customer. Using resources efficiently and sustainably is part of our corporate culture. For us, this is not just an empty promise, but a corporate responsibility which we live and breathe to the benefit of all. And this ideology is reflected in our technology in turn.

OUR TECHNOLOGY IS LONG LASTING.

MAPLAN can offer the right type of machine for every application or bespoke system solutions. In this way, we ensure that the size of the machine is correct in relation to the quantities that should be produced, that predefined budgets are held to and that as few resources



“

INJECTION INTELLIGENCE constitutes innovative, smart and energy efficient product and service solutions which are simple for users and which facilitate sustainable production of the highest quality.

Wolfgang Meyer, CEO

”

as possible are used in production. MAPLAN machines consist of durable, high-quality components and are equipped with every option available today for the optimisation of energy efficiency.

OUR TECHNOLOGY IS UNDERSTANDABLE.

MAPLAN offers machinery that captivates through the simplicity of its operation and the straightforward construction of its components. This has been clearly evident on the original MAP.fifo injection unit for many years. Consisting of few individual components, optimal basic construction and simple operation options, this concept continues to offer unparalleled performance. Very low pressure-losses owing to the short nozzle, hardly any waste when changing materials and a high level of precision make for perfect article quality with the highest possible conservation of resources. All MAPLAN systems use the MAP.commander C6 as a central control unit. This technological heart of INJECTION INTELLIGENCE distinguishes itself through exceptionally high user friendliness, simple logic and comprehensive assistance systems which make the user's life simpler. The control unit warns employees the moment processes get out of tolerance and not only later on when products of inferior quality are being manufactured.

OUR TECHNOLOGY IS FORWARD LOOKING.

MAPLAN guarantees efficient processes because we know that time is money. We believe that innovation in injection moulding technology means pursuing all possible avenues in order to optimise production processes that are in line with the latest technological standards. For this reason, the MAP.commander C6 serves as a basis for the networking of machinery in the sense of Industry 4.0. Real-time data, monitoring and remote access to machines offer completely new opportunities. Good examples of this include remote maintenance or diagnosis from distance by way of online camera support and energy monitoring.



INDIVIDUAL CARE AS ADDED VALUE.

In an era of unending digitalisation, we value personal relationships and empathy. We look to foster long-term partnerships with our customers and suppliers: we know how you operate, the specific problems you face and how to solve them. Our employees play a crucial role in the holistic message of INJECTION INTELLIGENCE. Long-standing and competent specialists who maintain a close dialogue with the customer and who contribute to MAPLAN technologies guaranteeing our customers' success are a good of which we are very proud.

Our competent team looks forward to working together with you to find new and efficient solutions that lead to greater competitiveness, savings and, ultimately, greater satisfaction.

HIGH-LIGHTS THAT INSPIRE

MAPLAN comes up trumps with new **HIGH-TECH** machinery range

Our mission is to produce stable, durable and low-consumption machines which deliver components of consistent quality with minimal tolerances. From our experience, our customers are generally counting with a machine runtime up to 15-20 years. At MAPLAN, durability becomes sustainability. We have completed our machinery range and now cover the entire segment. This is particularly essential in economically challenging times since our customers require a machine in exact accordance with their needs in-time.

A completely restructured machinery range

MAP.cell: Using robots and automation for higher productivity and flexibility

Ergonomics across the board: The new ERGO⁺ 6000/460 including the MAP.fifo ergo injection unit

Sustainability through optimisation: Energy monitoring allows the entire energy consumption of a machine to be broken down into individual, connected consumers

More INJECTION INTELLIGENCE with the MAP.commander X6 control unit upgrade

Curious? Then visit us at the K-2019 in hall 16, stand D40.

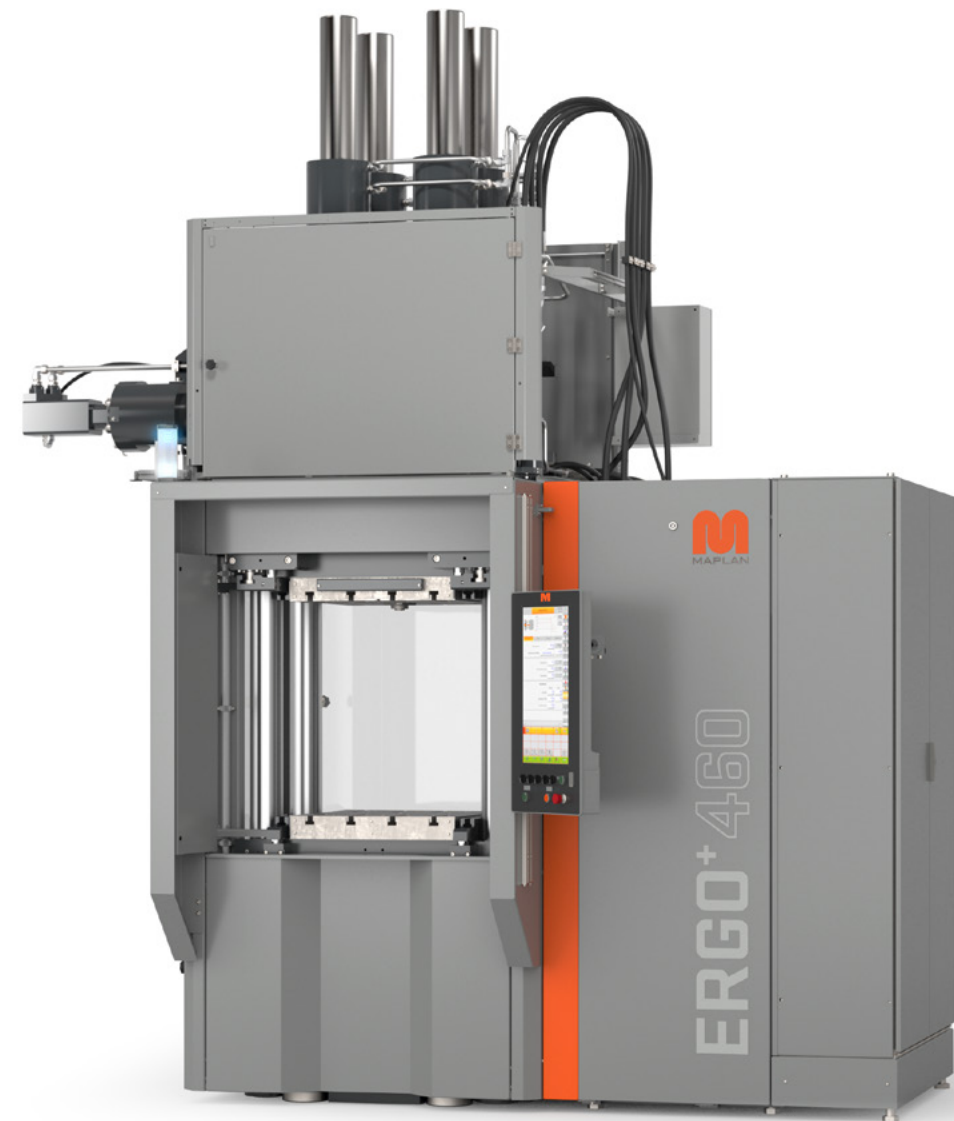
THE RESTRUCTURED SERIES WITH MAPLAN[®]: COMPLETED, OPTIMISED AND DURABLE

The new MAPLAN[®] machinery range was launched just in time for the K-2019, a range that is right at home in the large machinery segment thanks to up to 900 tonnes of clamping force.

Our highlights, your customer benefit:

- The gradation of the machine program is now significantly improved: The large machine segment starts at 460 tonnes closing force and is available in other sizes: from 570 and 720 up to 900 tonnes.
- Higher productivity with reduced resource

HALL 16
STAND D40



The new ERGO⁺ 4000/460 with reduced working height (~200 mm) and ergonomic strip intake

expenditure – from power and water to air pressure.

- Improved ergonomics thanks to a modernised ERGO⁺ series with MAP.fifo ergo injection unit. The operating height has been reduced and the injection unit is now more easily accessible.
- The result is machinery that is stable in the long term with lower energy consumption, exceptionally low downtime and service costs, high ease of maintenance and optimal ergonomics and accessibility.
- Thanks to shorter delivery times, we can offer maximum flexibility.
- The low energy consumption and long-term stability of our machines strengthen our customers' competitiveness!

MACHINES WITH THE EXTRA PLUS⁺

Horizontal RAPID⁺ 200-800 t
Vertical ERGO⁺ 90-460 t
Vertical ERGOMAX⁺ 460-900 t
Vertical CLEVER⁺ 160-400 t
Vertical MULTI⁺
Vertical BOTTOM⁺
C-Frame EASY⁺ 20-100 t
Presses FORCE⁺

MAP.AUTOCCELL: WE'RE BRINGING AUTOMATION TO LIFE AT THE K-2019

360° Turnkey systems - tailor-made under one roof and very close to the customer: MAPLAN combines high-quality system components to form an effective production cell. At the exhibition, we would like to demonstrate to you the results of successful automation in the form of the MAP.autocell. The customised MAP.autocell takes over the entire production pro-

cess - ranging from component feed-in and production to further processing. All components are operated centrally via a control system. Two examples will be presented at the K-2019:

HORIZONTAL: MODULAR RAPID⁺ 700D/300

A 300-tonne machine which impressively demonstrates our modular concept. Elastic "crown cork" bottle caps made of HTV silicone are produced using a 16-cavity mould and a valve gated cold runner block. The 16 valve gates are individually controllable, meaning their filling properties can be adapted individually or in clusters as necessary. In this case, the de-moulding function in the mould is performed by a stripper plate. As an option, a servo-electric double brushing system with two vertical units will be shown.

RAPID⁺ 700D/300



NEW VERTICAL: ERGONOMIC ERGO⁺ 6000/460 WITH MAP.FIFO ERGO INJECTION UNIT

Smartphone multifunction brackets are produced on the new, fully hydraulic and ergonomic 460-tonne ma-



MAP.autocell

chine. The machine functions as a MAP.autocell when combined with an industrial robot that takes on the task of manipulating the cavity plates between the machine and a de-moulding and reworking station. The articles made of EPDM that are manufactured with an 8-cavity mould in conjunction with a hydraulically operated valve gate cold runner are marked with a laser after de-moulding.

NEW MAP.ENERGYWATCHER: ROOT OUT RESOURCE KILLERS AND SAVE OPERATING MATERIALS IN A TARGETED MANNER

The MAP.energywatcher allows the entire energy consumption of a machine to be broken down into individual, connected consumers and illustrated – from total power through water and air pressure to the overall process. On this basis, it is not only possible to calculate overall resource consumption but also optimise it on the basis of real data and break it down into each machine part. Consequently, massive cost savings are guaranteed!

Water measurement: MAP.waterwatcher

Compressed air measurement: MAP.airwatcher

Current measurement: MAP.powerwatcher

X6 UPGRADE: WITH MAP.COMMANDER C6 CONTROL FOR INJECTION INTELLIGENCE

All machines with a Generation 4 control unit (built from year 1995) can be upgraded to the new MAP.commander C6 control unit. This guarantees the full range of functions – equal to new machines. This uncomplicated upgrade including sensors can be completed in only a few working days. With that, the basis for an INTELLIGENT INJECTION moulding process is created:

- Comprehensive assistance systems guarantee smooth processes
- Uncomplicated and rapid cycle configuration
- A high level of user-friendliness thanks to remote maintenance opportunities provided by MAP.remote including MAP.eyec
- Freely programmable additional movements thanks to MAP.logicmoves.
- X6 - makes every machine network-ready for Industry 4.0
- Spare parts available long-term

MAP.commander C 6000

MAP.CARE: SERVICE WITH INTELLECT AND UNDERSTANDING

We at MAPLAN are known for our remarkable customer service. What sets us apart in this regard? A high level of technical know-how, many years of experience and quick reaction times. We are there for our customers, we understand their problems and we find solutions! We won't let you down with our delivered systems and have put together various packages and developed upgrades and maintenance contracts. Three service packages are available as of now:

- MAP.firstaid – the most important small parts always available
- MAP.care – Preventative package for in-house maintenance
- MAP.care⁺ - Preventative package for the long-term assurance of parts' quality

NETWORKED WITH MAPLAN

- Every C6 MAPLAN machine is ready to be hooked up to the network
- Authorised users can access the machine at any time and from any location
- Real-time control of production progress - or through log files and reports
- MAP.mes: the MAPLAN interface for MES systems based on OPC-UA
- Integration into higher-level ERP systems, e.g. via T.I.G
- Central documentation of processes and formulas
- Secured data due to VPN connection
- MAP.remote: Optional remote maintenance with MAP.eyec camera guarantees immediate support from customers service or the process engineering team

BE CONNECTED!

System networking and status transparency through Industry 4.0. features

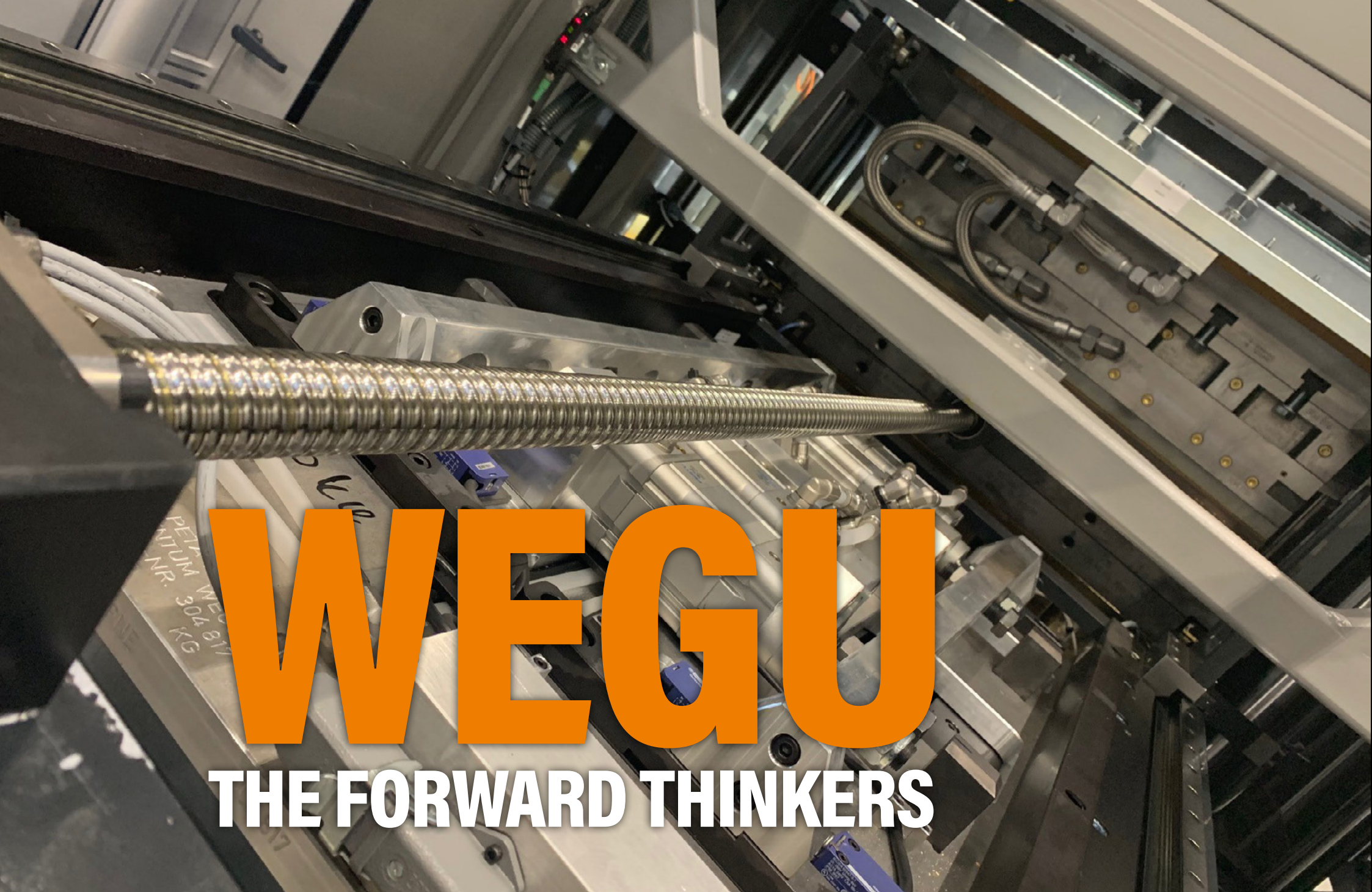
MAP.mes77 – the EUROMAP77 standard interface for connecting to MES systems

The advantages of networking and digitalisation speak for themselves. Industry 4.0, which is sadly often only used as a buzzword, promises real advantages when it comes to production, planning, control and maintenance. In order to take full advantage of these benefits, MAPLAN production cells and machines can be connected with server systems to deliver production data to MES systems.

The relatively young EUROMAP77 interface (preceded by the EURO-MAP63) establishes the first ever standard for the connection of injection moulding machines produced by different manufacturers to production control systems. Until now, machines from different manufacturers had to be implemented separately so that their data could be delivered into ERP and MES systems. The connection of all machines can now take place via the same, standardised protocol. The data exchange is based on the OPC-UA interface protocol and facilitates the recording of:

- Machine statuses
- The process data of all manufactured parts, for quality control among other things
- Material data & batches
- Production data – when will which product be produced on which machine
- Formula management
- Long-term data archiving

Integration can serve to simplify and optimise many different issues which primarily concern productivity and planning: production optimisation, the increase of cycle times, the utilisation of machinery, maintenance planning, the simple transfer of formulas etc. As one of the first manufacturers in rubber injection moulding, MAPLAN is now offering this interface as MAP.mes77 for the management of MAP.commander C6 on an optional basis.



Only the **FLEXIBLE** win!

70 years and counting: WEGU is an important automotive industry supplier with 280 employees at its Kassel location and will celebrate the 70th year of its founding this year. Nevertheless, it is still important after so many years for a successful firm such as WEGU, to be agile in order to remain competitive.

GERMANY IS AN EXPENSIVE LOCATION

Irrespective of which machine or where it is situated, it will cost almost exactly the same everywhere. Personnel costs in Germany and other high-income countries are disproportionately high. If only salary costs are taken into account, the decision to relocate production to low-income countries is not a difficult one to make.

Qualitative figures make clear this fact: a machinist's worth per hour is estimated at around 35 Euro in Germany, 6-7 Euro in Slovakia and even less in China.

WEGU in Kassel is facing this challenge by continuously improving existing processes. The goal is to reduce personnel costs with ever more efficient systems. This can be achieved in the first instance with cleverly designed machinery and facilities with which it is also possible to earn money in Germany. A healthy level of patriotism paired with staff who are superbly trained in process development, process engineering and maintenance are the basis for the continuous endeavour that has become part of everyday working life at WEGU.

WEGU's success is based on continuous further development and



The new MAPLAN ERGO+ 490

challenging the status quo. In order to meet with this requirement, the highest possible level of flexibility is asked of suppliers and partners. Creative ideas and innovative process technologies are the basis for sustainable success. Individual developments by various project partners become a process-optimised overall concept.

“Automation with process reliability is the key to securing Germany as a production location. This is a genuine concern of ours. And to do that, we need partners with superb specialist knowledge

Ralf Krause, Project Leader & Head of Technology Centre

TOGETHER TOWARDS SUCCESS

MAPLAN is one of WEGU's established long-standing partners for the further development of existing processes and technologies. Together with WEGU and other partners such as Hahn Automation, PETA Formenbau and WEAsystec, systems have been created where it would be fair to speak of a pioneering spirit in the rubber industry. An outstanding project that was delivered this year is a production cell for a MAPLAN ERGOMAX* 460 tonne machine with a super-fast 2-station shuttle and a fully machine-linked, automated loading device produced by Hahn Automation. Servo-hydraulic plate shifting devices with a speed of up to 800 mm/sec are very impressive in practice and anything but standard in the rubber industry.

Some highlights include:

- A plate movement speed that has been almost doubled
- An extremely high level of flexibility owing to alternative article printing concepts
- Rapid insertion of plastic or metal parts through the use of servo-technology
- Efficient integration of the external processes in the MAP.commander C6000 machine control
- No need for parallel hydraulics because of superfast motion sequences
- Auxiliary processing times have been reduced by 25 %!
- Longer oil change intervals through the reduction of fully hydraulic aggregates

SUSTAINABILITY AS A GENUINE CONCERN

Last but not least, sustainability is an issue of paramount importance to WEGU and MAPLAN. As an environmentally certified company, the energy balance of the machinery is very important.

For this reason, absolutely comparable MAPLAN machines with conventional drive units and standard temperature control units were compared with those with MAP.cooldrive and MAP.dci technology a few years ago at WEGU. The energy saving potential was and is impressive.

ENERGY-SAVING MAPLAN TECHNOLOGY

Savings per year:

MAP.cooldrive savings, 17,520 kWh or 2.803,- €/year, basis 0,16 €/kWh

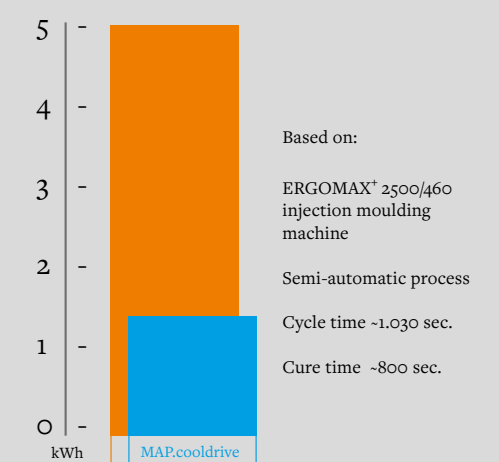
Elimination of the oil cooling:
Reduced water consumption & cooling requirements
16.800 kWh or 1.116,- €/ year, Basis 0,6 €/kWh

Four MAP.dci temperature units:
Intelligent demand control
10.800 kWh or 1.728,- €/ year, basis 0,16 €/kWh

Overall cost savings per year:

2.803,- € + 1.116,- € + 1.728,- € = 5.647,- €

Energy consumption per cycle:



ABOUT WEGU

WEGU is divided into the business areas of lightweight construction systems and vibration technology. The company's portfolio includes rubber absorbers of every kind, silicone and composite moulded parts made of these materials with metal and/or plastic. These precision parts have been very successfully produced on MAPLAN machines for over 15 years.

WEGU has been a part of the Zhongding Group since 2015, a globally active company with more than 30 domestic subsidiaries in China as well as 10 further subsidiaries abroad. Zhongding is the number one rubber company in China among manufacturers that do not produce tyres and is thirteenth globally.



Ralf Krause, Head of Technology Centre, and Peter Mörk, Head of Production

WEGU & MAPLAN WHAT WE HAVE ACHIEVED TOGETHER

1. A plate movement speed that has been almost doubled
2. The saving of parallel hydraulics through super-fast motion sequences
3. Auxiliary processing times have been reduced by 25 %!

"SUPERFAST"

FKM LTE



THE MAP. FEATURES: THE KEY TO SUCCESS

Many functions of the MAP.commander C6 control facilitate the daily work and lead to higher productivity:

MORE FLEXIBLE THROUGH INDIVIDUALISATION

- MAP.varioswitch: Best ergonomics and operating safety through intelligent combination of freely configurable software and hardware buttons
- MAP.logicmoves: freely programmable control of external equipment (electric, hydraulic or pneumatic)

PRODUCTION MADE EASY

- MAP.motion: Self-optimising movements of the clamping unit and ejectors
- MAP.sloMo: Smooth and precise opening of the clamping unit for the demoulding of sensitive products
- MAP.multidosing: Multi-dosing increases the injection capacity
- MAP.autofeed: Automatic strip intake for interruption-free production
- MAP.energywatcher for energy monitoring
- MAP.advanced: This package visualizes the injection process with process/injection graph, MAP.limit envelope curves, plasticising graph and trend graph

FOR SAFETY

- MAP.smartlight: For visualising the state of the machine - ideal for multi-machine operation
- MAP.currentcontrol: Current monitoring
- MAP.moldsafe: No damaging with digital mould protection

BE CONNECTED

- MAP.mes77: Standardised EUROMAP 77 interface
- MAP.mes: Comprehensive MAPLAN interface based on OPC-UA
- MAP.mesdigi: Hardware-related digital interface for recording machine status

MAPLAN MACHINE TECHNOLOGY

provides the conditions required for the use of "superfast" fluorocarbon rubber compounds

Advances in compound chemistry have resulted in a reduction in injection and networking times on the one hand, but have also highlighted machine technology's limitations on the other. To be able to offer the right machinery for this, MAPLAN has been cooperating with manufacturers of high-performance rubber compounds for a long time now. One example is the Italian LTE srl. in Cologne near Brescia. They have been developing fast-curing compounds since 1993 with a strong focus on fluoroelastomers.

The first type from the new LTE fast-curing fluororubber family is the V6370V00 type, a green 70ShA-FKM compound for gas applications that was developed in accordance with the EN549 E1-H3 specification. Its cross-linking on the basis of bisphenol proceeds about 50 percent faster than conventional compounds without the need to compromise on quality properties. The formula doesn't only speed up cross-linking but also improves de-moulding through easier injection and reduced adherence to the mould. The efficiency potential of the rubber compound was demonstrated on the horizontal MAPLAN RAPID* 300 in the LTE pilot plant with the high-precision MAP.fifo injection unit and a 102-cavity injection mould for 14 x 2.6 mm O-rings, with which

the cycle time could be more than halved from 70 seconds to just 29.

The production quantity rose correspondingly by 140 percent from 5,245 to 12,662 items per hour.

The injection moulding machine's remarkably low injection time of less than five seconds and the LTE rubber compound's cure-time of just eleven seconds played a fundamental role in the reduction of the cycle time. Despite the reduced cure-time, the part quality is equal to conventional compounds. This was proven via compression set tests. The MAP.fifo's material-preserving and homogeneous material

Property	Unit	Test Method	Required	FKM FastCuring
Original properties after post-curing: 24h @ 230°C				
Hardness	Shore A	ISO 48	70±5	75
Density	gr/cm ³ (20°C)			2.12
M-100	Mpa	ISO 37		10.7
Tensile strength	Mpa	ISO 37	≥7	18.7
Elongation at Break	%	ISO 37	≥125	169
C-set 168h@175°C def.25%	%	ISO 815-B	≤40	26
C-set 70h @ 0°C def. 25%	%	ISO 815-B	≤40	35
Value change after treatment in Air: 70h @ 255°C				
Δ Hardness	Pts	ISO 48		3
Δ Tensile strength	%	ISO 37		-19
Δ Elongation at Break	%	ISO 37		-14
Value change after treatment in Air: 168h @ 175°C				
Δ Hardness	Pts	ISO 48	±10	2
Δ Tensile strength	%	ISO 37	>-40	-5
Δ Elongation at Break	%	ISO 37	>-40	-18
Δ Weight	%			-0.1
Δ Volume	%			-0.2
Value change after treatment in Pentane: 72h @ 23°C				
Δ Weight	%		-5 to +10	+0.1
Value change after treatment in Pentane: 72h @ 23°C + drying 168h @ 40°C				
Δ Weight	%		-8 to +5	+0.0

Property	Unit	Test Method	Required	FKM FastCuring
after post-curing: 24h @ 230°C				
C-set 24h@200°C def.25%	%	ISO 815-1A type B	≤25	16
C-set 24h@200°C def.25%	%	O-ring	≤25	18

Detailed information about the test series

processing and the reduced residence time of the material in the injection chamber were advantageous here. An additional benefit is that nearly all of the material is injected with every shot with the MAP.fifo.

LTE has successfully introduced its new technology to several customers and will now extend this result to a comprehensive range of compounds of different hardnesses and colours and will continue to test these on the MAPLAN RAPID* until the production stage.

EVENTS

Save the Dates

21. - 24. 04. 2020
CHINAPLAS
Shanghai/CHINA

→ APRIL

21. - 24. 04. 2020
Tires & Rubber
Moscow/RUSSIA

12. - 15. 05. 2020
Elmia Svets
Jönköping/SWEDEN

→ MAY

May
IRJ
Queretaro/MEXICO

→ JUNE

16. - 19.06.2020
FIP
Lyon/France

23. - 25. 06. 2020
Expobor
São Paulo/Brazil

25. - 26.06.2020
MAPLAN Days of Technology
Kottlingbrunn/AUSTRIA

→ OCTOBER

20. - 22.10.2020
Int. Elastomer Conference
Knoxville/TENNESSEE, USA