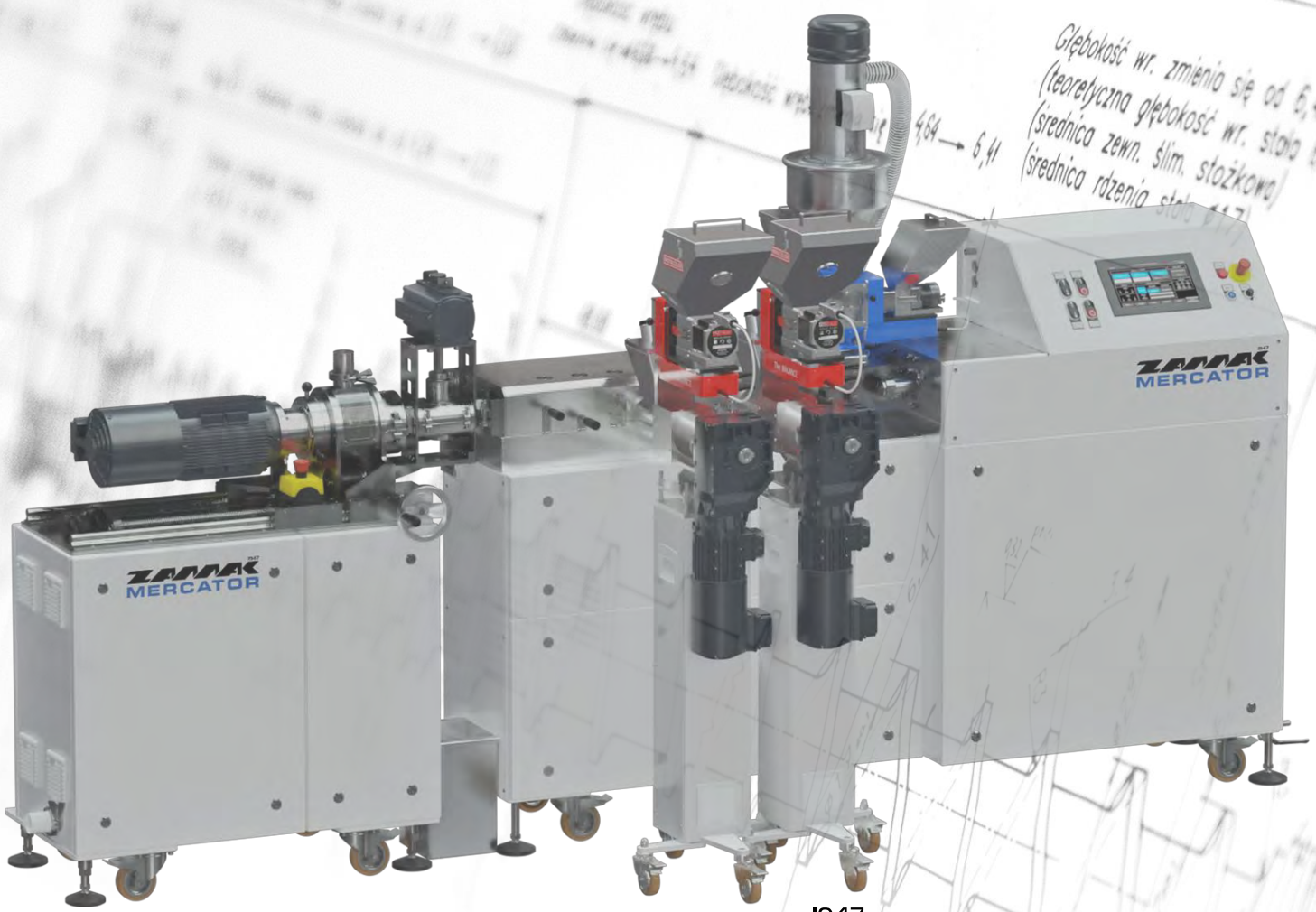


1947

ZAMAK
MERCATOR

Year 2020/2021
Laboratory extruders for special tasks

17.02.2021

WHY CHOOSE OUR PRODUCTS AND SERVICES?

ZAMAK MERCATOR began its activities within the structure of the Kraków Cable Factory (KFK), which in the 1970s was the largest cable manufacturer in Poland, and enjoyed international popularity. Today ZAMAK MERCATOR is the only Polish manufacturer, with it over 70 years of experience, specializing in the installation of complete industrial and laboratory lines for the processing of plastics, rubber and silicone. Our range also includes fully equipped lines for recycling, for the production of filament for 3D printers, for the coating of cables and optical fibers, and for the production of components used in medicine and pharmacy in their broadest sense. We have a very-wide range of single-screw extruders, with diameters from Ø12 to Ø15O mm, and twin-screw extruders from 2xØ12 to 2xØ120, but we also supply state-of-the-art injection-moulding machines, rolling mills, and a comprehensive tooling selection.

SERVING SCIENCE

ZAMAK MERCATOR is the only company on the Polish market which addresses its resource to all scientific and research units, offering a full spectrum of state-of-the-art extruders, laboratory injection-moulding machines, and complete laboratory lines, adapted to the specialist guidelines of scientific centers. All our machines stand out from the international competition with innovative design solutions and high torque, which facilitates the processing of unusual and problematic plastic materials.

ENERGY-SAVING AND ENVIRONMENTALLY FRIENDY

Our priority is to manufacture machines which are eco-friendly and do not pollute the environment. State-of-the-art ZAMAK MERCATOR equipment is also a big saving as it facilitates the efficient production of even very-small quantities of plastics, and, most importantly, it uses the minimum amount of electricity. Taking care of our planet and the energy efficiency of the machines we design are very-important issues for our company. The innovative solutions developed by the ZAMAK MERCATOR Research&Development Institute applied in all our machines were recognized with the title of Symbol Innowacji (Symbol of Innovation) 2015. Reliability and versatility enable production and a wide range of tests to be undertaken with any raw material.

CEASELESS STRIVING FOR PERFECTION

The core of ZAMAK MERCATOR's activities is a continuous increase in the quality of the supplied services and manufactured equipment, which guarantees the reliability of their use for our Customers. This fact is confirmed by the implementation of the international standard for the functioning of the Quality-Management System, which is compliant with the requirements of ISO 9001:2008.

100% SATISFACTION

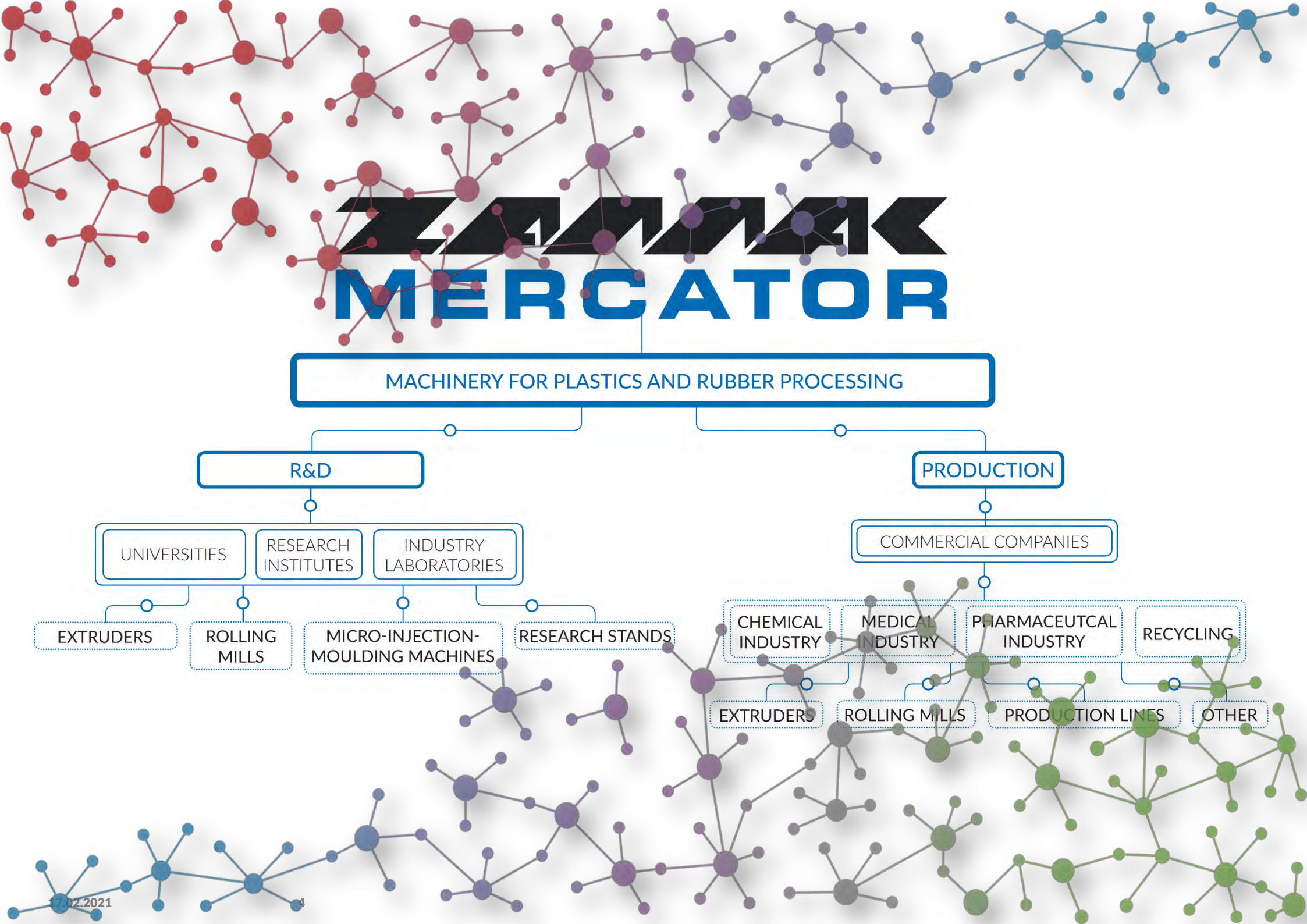
Our machines are 100% MADE IN POLAND. From the very beginning, we have been designing, constructing and building equipment in Poland in our factory in Skawina. In our activity, we combine skill and tradition with state-of-the-art solutions and the latest trends in the industry, and our long-standing experience is a guarantee of meeting even the most-demanding requirements, which is confirmed by the numerous recommendations granted to our company.

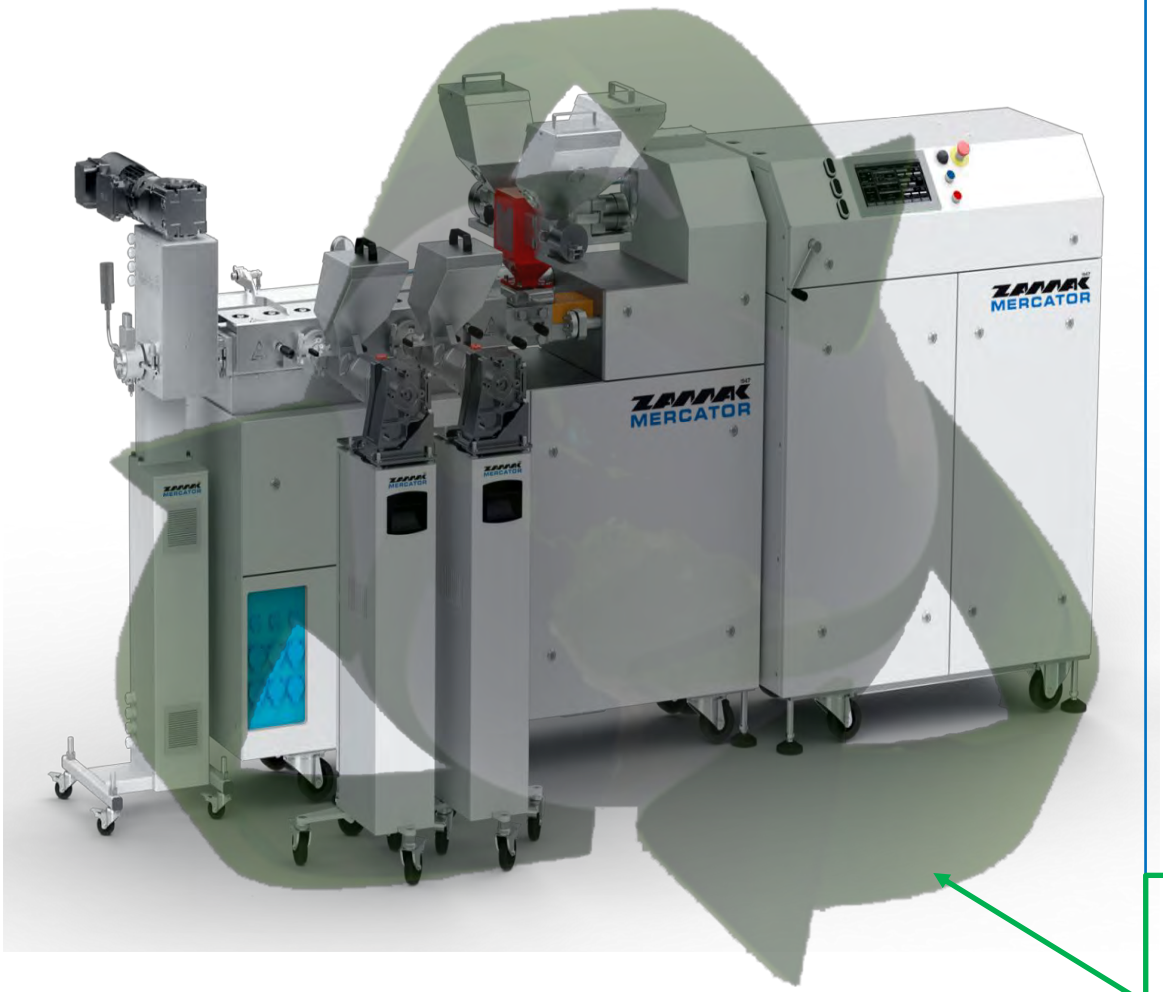
INTERNATIONAL PROJECTS

ZAMAK MERCATOR participates in a prestigious EU project called NEWEX, which is based on close cooperation with partners from industry and university research institutions from different countries of the European Union. The results of the work in this joint venture are innovative technical solutions, and also extremely important contacts and acquaintances established between all participants in this project.

WORKING WELL TOGETHER

We win awards and distinctions not only in the professional field, but on the football field! Every year the ZAMAK MERCATOR team stands on the podium of the Business League, an élite association organising matches for teams representing Kraków companies and institutions. Thanks to such activities, a strong friendly relationship is created between our employees, which can be seen not only on the pitch, but also on a daily basis, with the common aspiration to the success of ZAMAK MERCATOR.


MERCATOR
MACHINERY FOR PLASTICS AND RUBBER PROCESSING
R&D
UNIVERSITIES
RESEARCH INSTITUTES
INDUSTRY LABORATORIES
EXTRUDERS
ROLLING MILLS
MICRO-INJECTION-MOULDING MACHINES
RESEARCH STANDS
PRODUCTION
COMMERCIAL COMPANIES
CHEMICAL INDUSTRY
MEDICAL INDUSTRY
PHARMACEUTCAL INDUSTRY
RECYCLING
EXTRUDERS
ROLLING MILLS
PRODUCTION LINES
OTHER



Laboratory modular twin screw extruder
Series - RES-2P 2 x 24 mm L / D 40 160 Nm. on the snail [Vertex II]

Professional laboratory twin-screw and single-screw extruders you can rely on.

ZAMAK MERCATOR is a manufacturer of twin-screw and single-screw research extruders.

The screw diameters of the co-rotating and counter-rotating extruders are:
2 x 12/2 x 16/2 x 20/2 x 24mm with L / D range up to 48.
The diameters of the screws of single-screw extruders are:
12/16/20/25/32/45 mm with the L / D range up to 36.
We also divide them into modular and non-modular ones.

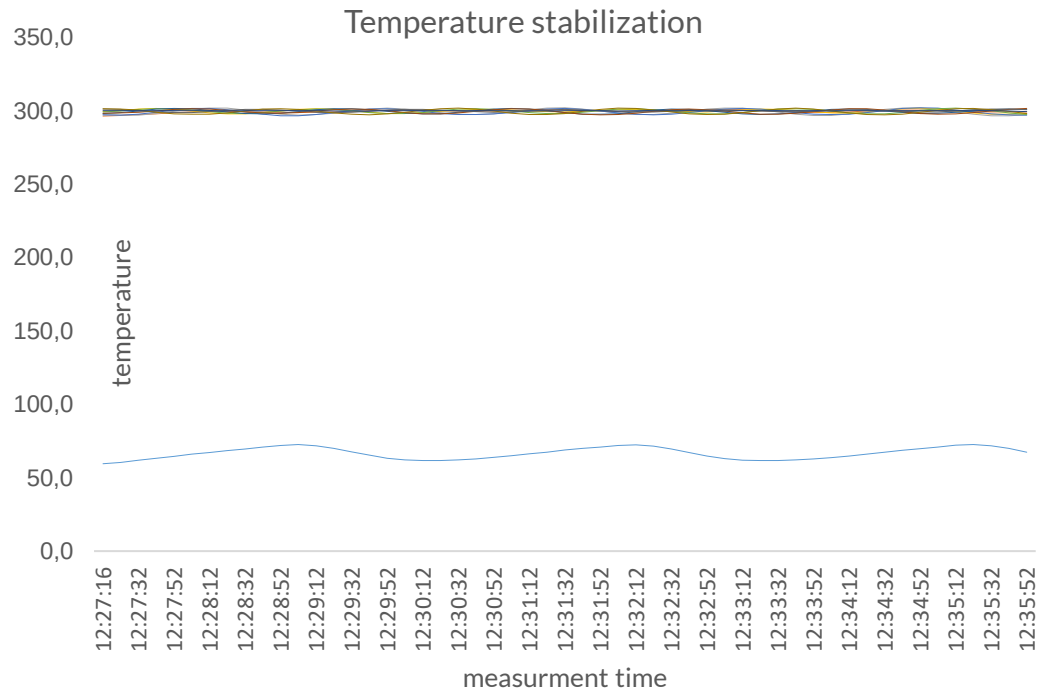
The design of extruders is based on innovative design assumptions, modern components and is based on many years of experience gathered in the plastics processing industry.

ZAMAK MERCATOR research extruders provide scientists with a high ability to reproduce and design industrial processes in a laboratory.
Due to the high complexity of the extrusion process, the research extruder should have all the capabilities of industrial extruders and even exceed them.

Our research extruders enable reliable and repeatable research processes.
The preparation time for subsequent examinations is short.
In the practice of a research laboratory, meeting such an assumption means that the extruder must achieve and stabilize the operating parameters set by the scientist in a short time. Multiple changes of set operating parameters should be reliable, repeatable and fast.

The technologies and materials used allow our devices to work with virtually all plastics, composites and **biodegradable** materials that can be extruded. It is possible thanks to:

- High torque and power
- Working with co-rotating and counter-rotating augers
- Replaceable cylinder liners that can be easily adapted to the material being extruded
- Precise and reliable temperature control
- Accurate measurements of other physical values



The first key factor determining the quality and reliability of research on the extrusion process is the precise control and reliable temperature measurement in each of the extruder zones.

Ensuring reliable measurement and ensuring stable and consistent with the set temperature values of the alloy inside the extruder barrel is not an easy and inexpensive task.

The following requirements must be met:

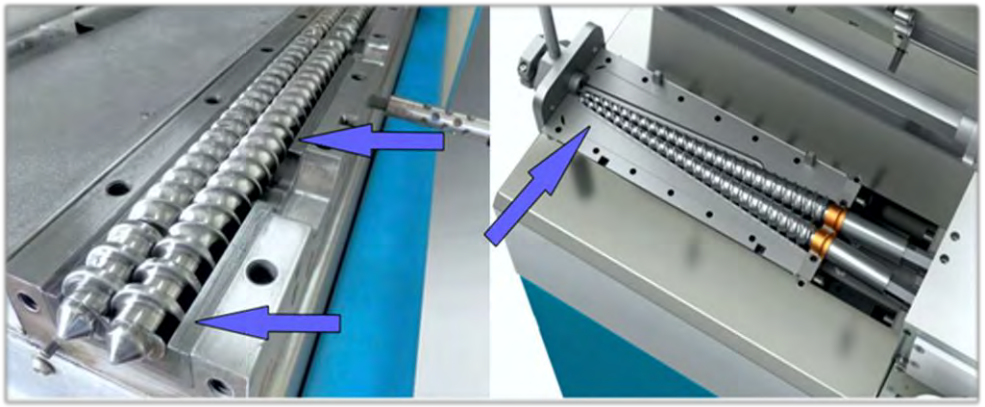
The research extruder barrel is divided along the longitudinal axis, often it has many ports for side feeders and ports at the top of the barrel, e.g. for dispensing liquids or gases.

The heaters are arranged in such a way that the heat is distributed evenly in each heating and cooling zone of the barrel.

Temperature sensors are arranged in such a way as to provide reliable measurement and reduce thermal interference from heaters operating at a higher temperature than the plasticizing system.

To avoid uncontrolled temperature increases, each cylinder zone is equipped with an efficient and fast cooling system that works with the heating system.

The whole is controlled by a precise multi-zone PID temperature controller. The control system has the ability to calibrate and shape the heating and cooling characteristics of the plasticizing system by the researcher.



The working surface of the extruder barrel in the form of replaceable inserts

Corotating and counterrotating screws in one extruder with Vertex II gearbox

The second important factor is the technical parameters and the possibilities of adapting the device to research on various materials.

The basic technical parameters are: maximum torque per screw, maximum rotation speed, power of the drive motor and maximum working temperature.

For example research extruder ZAMAK MERCATOR RES - 2P/24A Vertex II 2 x 24mm L/D =40-48 has a maximum torque of 160 Nm per screw, rotation speed of 700 rev/min, drive power of 22/26,4 kW and can work with temperatures of 400/450 °C.

Such parameters allow to work with practically all available materials, provided that the material from which the screw and cylinder are made allow it.

To enable work with a variety of materials we have designed cylinders with replaceable inserts forming working surface of the cylinder. In practice, this means that we can adapt the extruder to work with other materials within a short time. Exchangeable inserts allow for quick and relatively cheap regeneration of the plasticizing system. The inserts can be made of any material and in technology that is suitable for this.

In practice, research can be conducted on all materials covering the medical, pharmaceutical and food industries.

Extruders with Vertex II gearbox replace two extruders, expanding the possibilities of testing.

Our extruders are equipped with torque distribution gearboxes that can work as **corotating or counterrotating**. Changing the revolution direction is done automatically from the operator panel. **This unique feature means that we can test materials using the properties of a corotating or counterrotating system.**

ZAMAK MERCATOR research extruders can be equipped with a precise strain gauge measuring the force acting on the screws along the longitudinal axis. This mechanism further extends the possibilities of conducting research.

Zamak Mercator laboratory single and twin screw extruders – performance and qualities

- The barrel heating and cooling system ensures accurate and reliable process temperature control thanks to:
  - *Precise multi-zone PID controllers that simultaneously control barrel heating and cooling, eliminating the possibility of uncontrolled overheating of extruded material*
  - *Individual calibration of the barrel thermal characteristics [adaptation to the task and material]*
  - *Efficient barrel cooling system*

- The machine drive provides high torque and power density. The high drive power enables working with materials that put high resistance to extrusion [composites with natural or synthetic fibers]. In addition:
  - *High drive power and power density [N/cm^3] facilitate process scaling and transfer of laboratory test results to industrial production*
  - *The drive is equipped with digital angular position measurement*
  - *Protection against damage is realized by means of three overload couplings and an inverter equipped with electronic protections*

- Torque distribution gears enable work with corotating and counterrotating screws, thanks to which we obtain the following benefits:
  - *During the tests, corotating and counterrotating systems can be used in one device, which significantly expands the possibilities and reduces the costs of tests*
  - *Changing the screws configuration does not require a lot of work because the direction of their rotation is switched automatically from the operator panel*

- The barrel design allows easy replacement of barrel liners that are part of the barrel's working surface, giving benefits as follows:
  - *Low cost and ease of barrel repair in case of damage to the working surface [allows testing of materials with high abrasion, damaging the barrel]*
  - *Allows you to choose barrel surface technology, e.g. nitrided steel/ hardened steel stainless steel [440/390/360/ HIP/ PVD/ and others]*
  - *Allows you to use inserts made in different technologies at the same time*
  - *It enables testing of the degree of wear of materials that are part of the barrel's working surface*

- The upper, raised part of the barrel is divided into two parts, and the lower one is lowered. Also:
  - *Thanks to the divided upper part of the barrel, it is not necessary to disassemble the dispensers installed in the charging area when the barrel is open to clean it, change the screws or check the plasticization process of the polymer*
  - *To facilitate access to the screws, the bottom of the barrel is tilted down*
  - *The opening and closing of the top and bottom of the barrel is supported by gas springs, so that it is not necessary to use a lot of force*

- The unique system of precise measurement of the force acting on the screws along their axis gives additional benefits:
  - *Research can be extended to include rheological properties of extruded materials without the need for additional equipment*
  - *The axial force measurement system provides additional protection for the device against exceeding the permissible operating parameters*

- The control system of research extruders is based on PLC controllers, which ensure:
  - *Precise and real-time measurements of all operating parameters and accurate temperature control*
  - *Recording of all operating parameters on a data carrier or in the plant network/ saving of parameters [recipes] in the PLC processor memory*
  - *Remote supervision and control via wired and wireless networks [e.g. from tablet]*
  - *The possibility of adapting the device's control and control system to the procedures required by the pharmaceutical industry*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Pd
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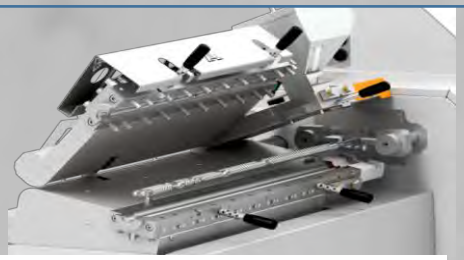
Hg

TWIN-SCREW EXTRUDERS
for plastics

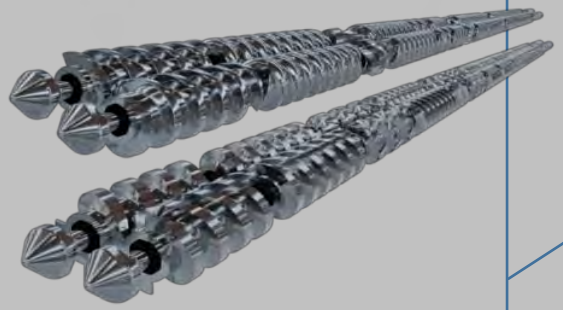
Zamak Mercator laboratory single and twin screw extruders – performance and qualities

The temperature and melt pressure can be measured in each zone

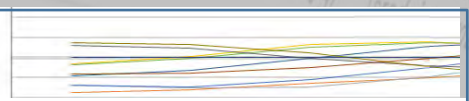
Barrel thermal calibration option



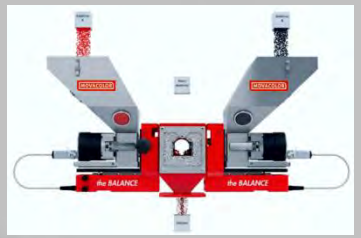
Barrel opening system facilitating research



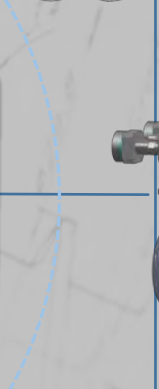
The possibility of using corotating and counterrotating screws with segmental construction

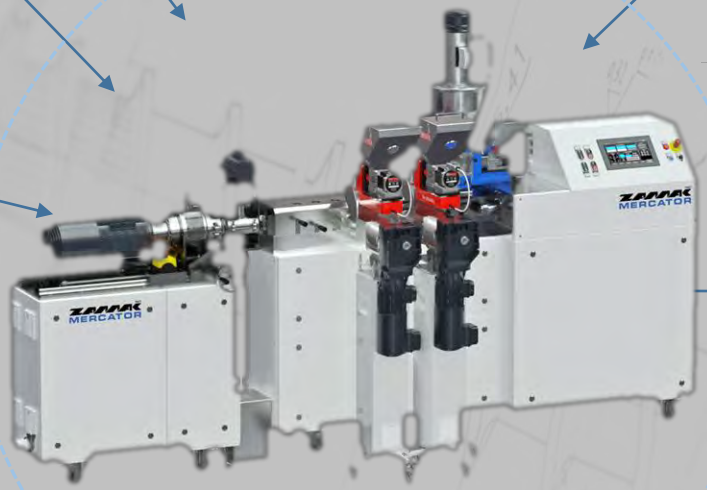


The cylinder heating and cooling system ensures accurate and reliable temperature regulation of each zone



Integration of gravimetric and volumetric dispensers for powders, liquids and gases

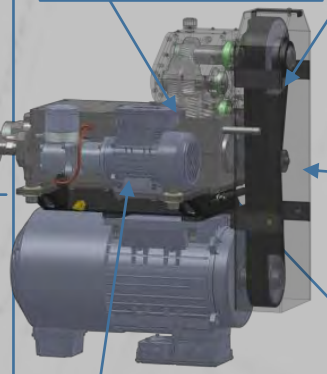




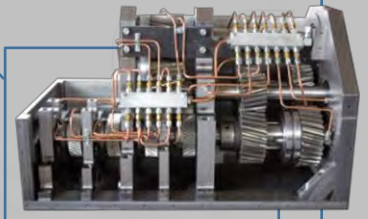
Three overload clutches

Digital angular position measurement

Torque measurement

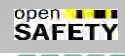


Oil pump



A unique drive ensuring high torques and power density, adapted to corotating and counterrotating operation

Modular side feeder system



Digital control and communication system

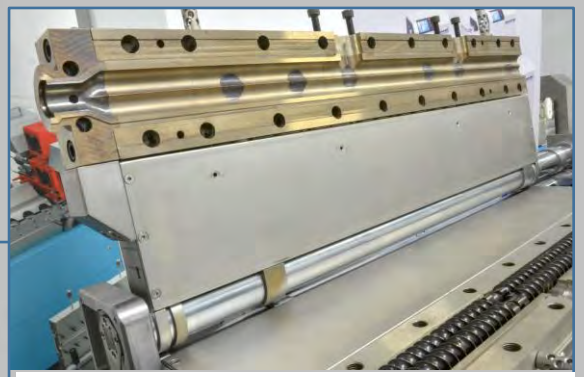
Laboratory twin-screw extruders Zamak Mercator
important performance features

Models with a modular design Series - RES-2P Vertex
2x16 / 2x20 / 2x24 mm

Models with a non-modular design
Series - RES-2P Vertex
2x12 / 2x16 / 2x20 / 2x24 mm

Many models and equipment options
available

No need to disassemble the dispensers to open the cylinder and see the process progress

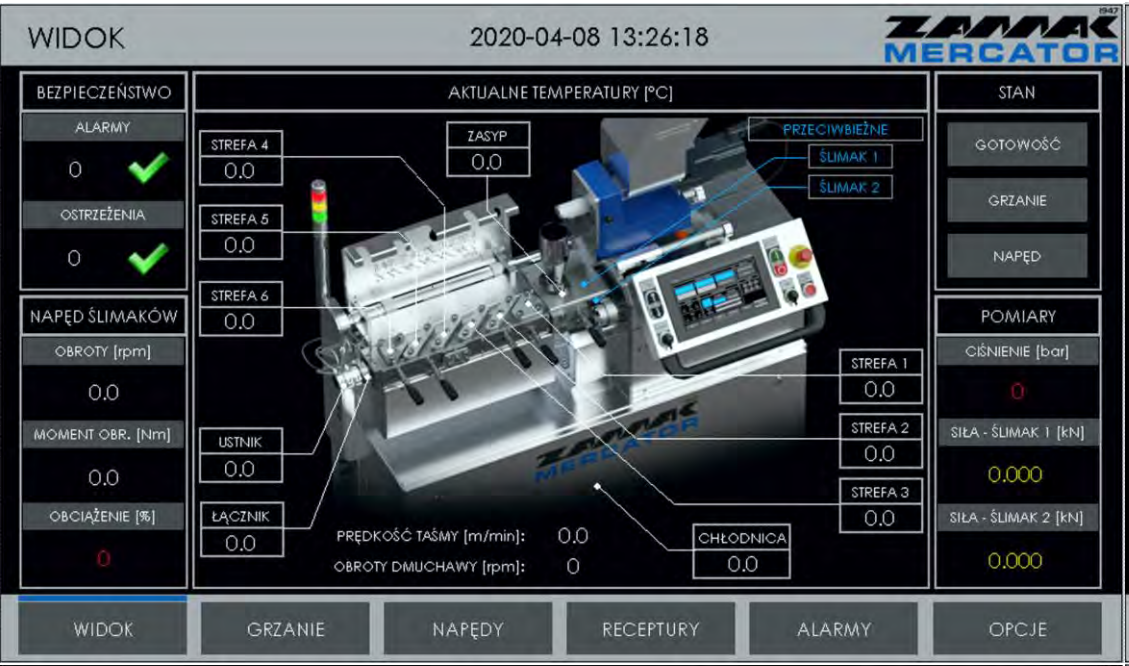


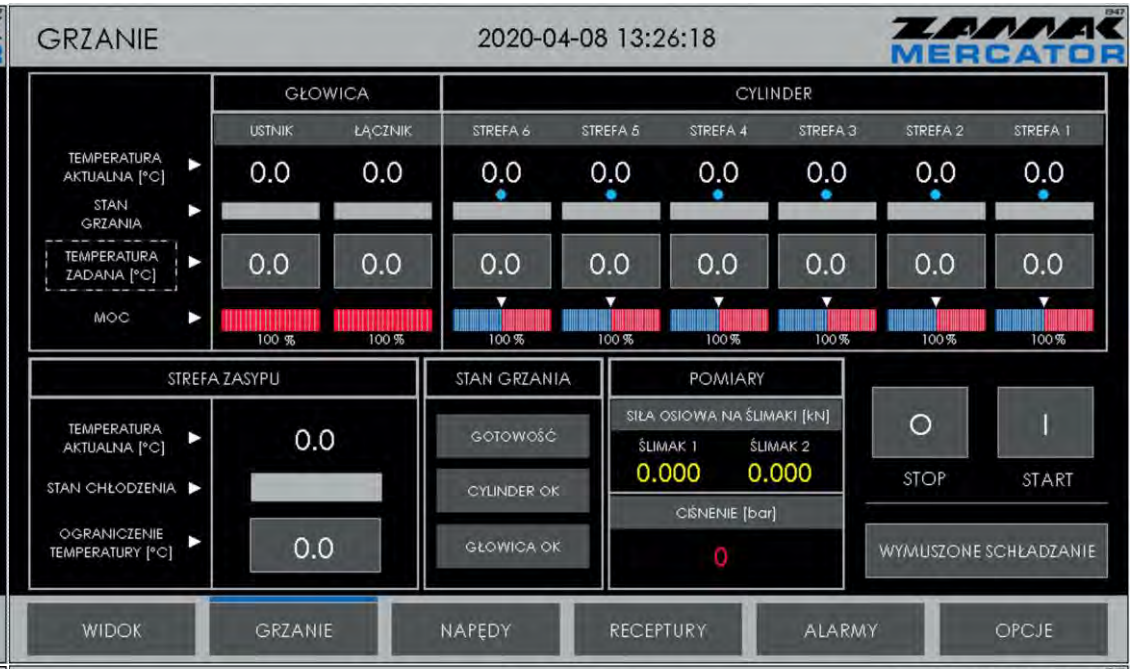
Replaceable inserts forming the working surface of the cylinder

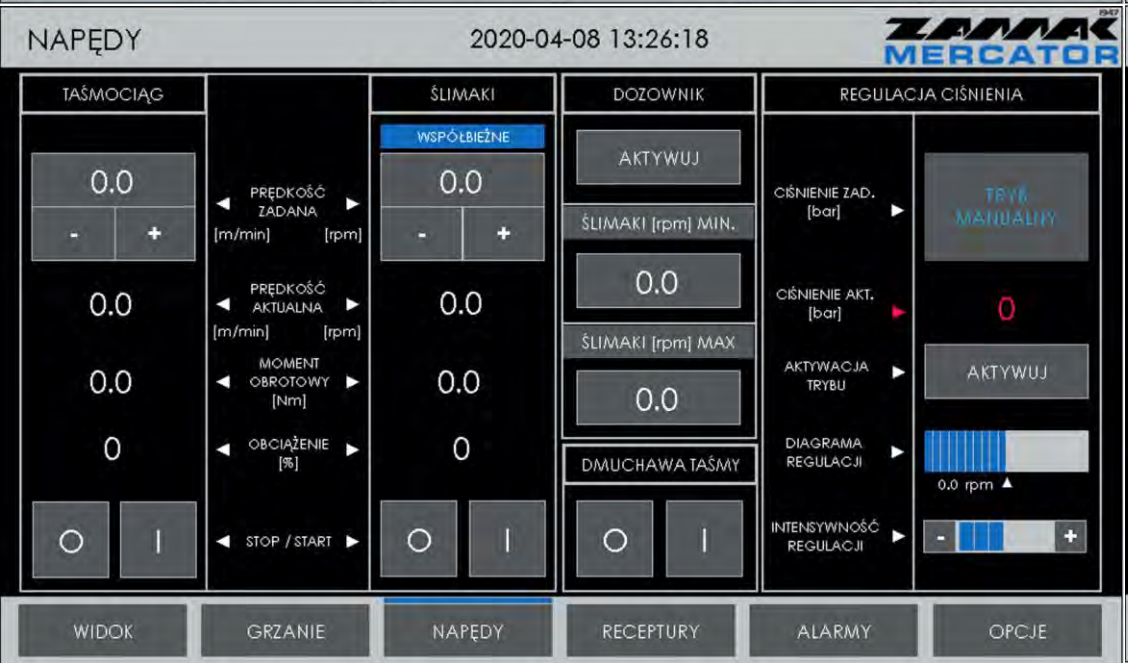
Precise measurement of the axial force acting on the screws

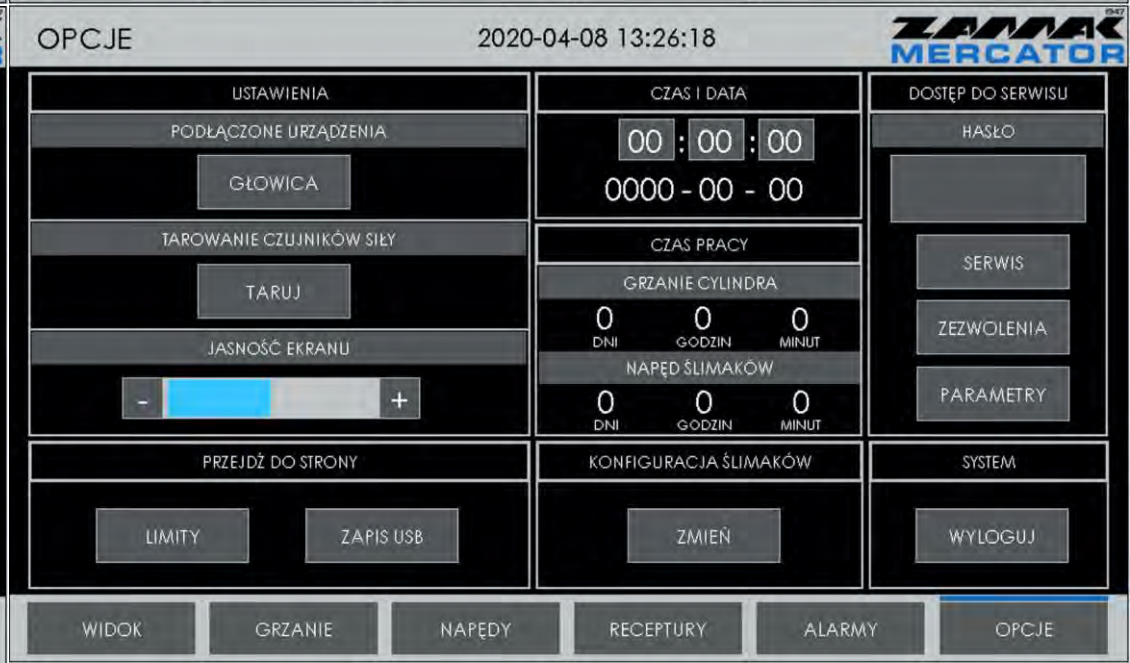
Sample laboratory device user interface - important functional features

- User-friendly high-resolution touch screens - You can control the devices wirelessly using a tablet
- A clear and convenient interface enables full process control
- It enables the device parameters to be adjusted to a specific task
- It allows you to save all parameters on the medium, even every 1 s



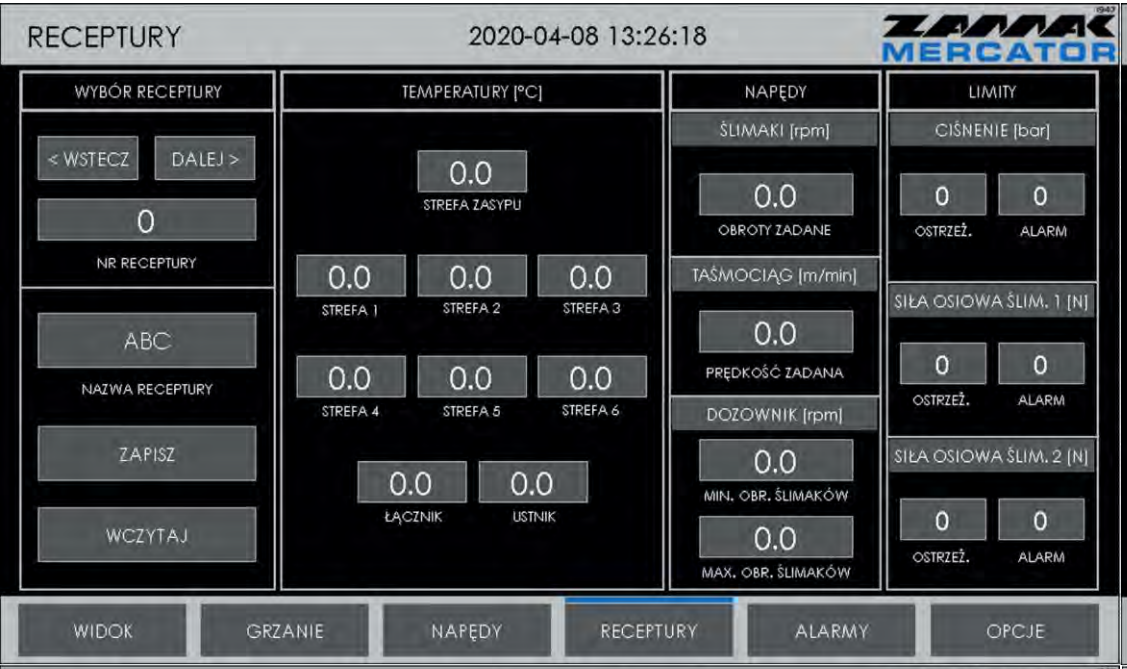


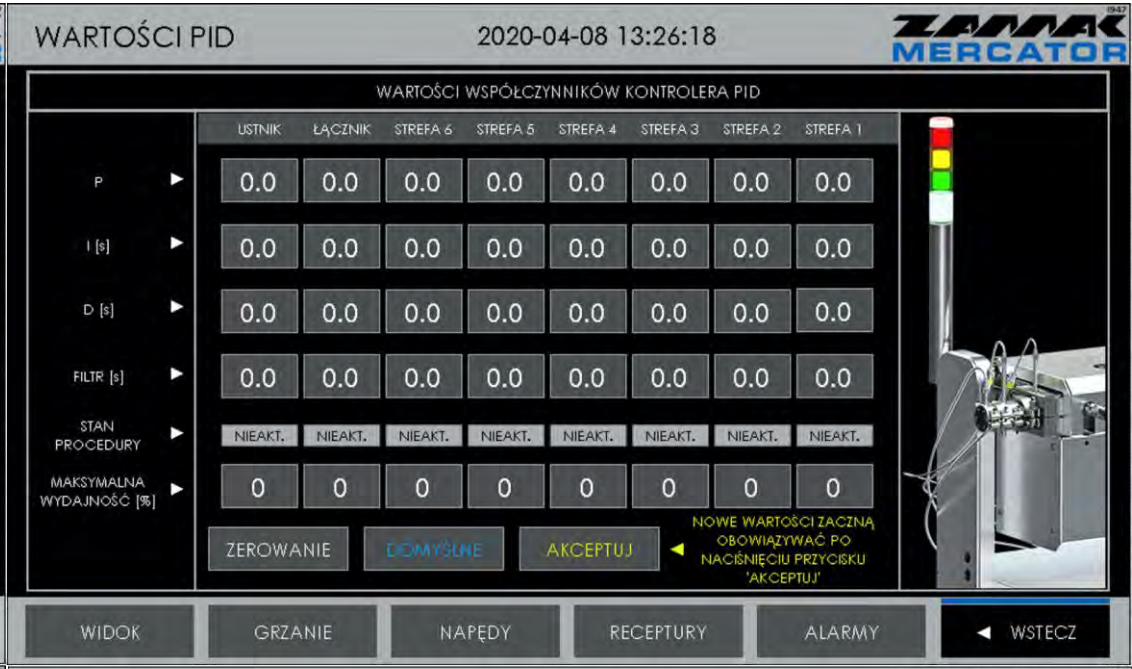


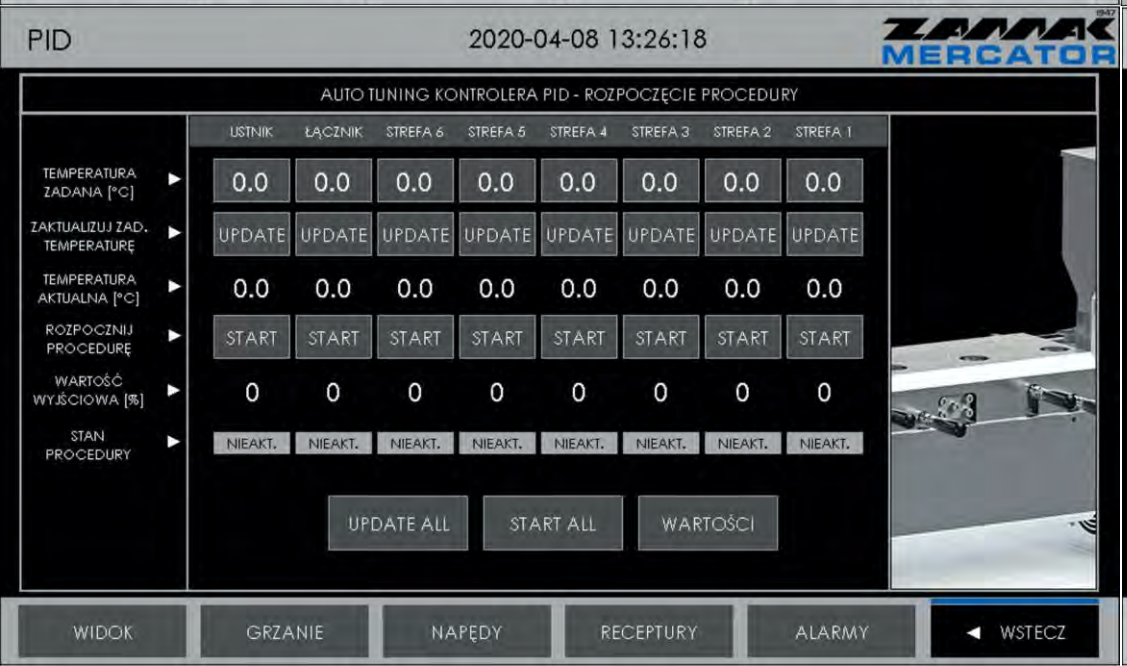


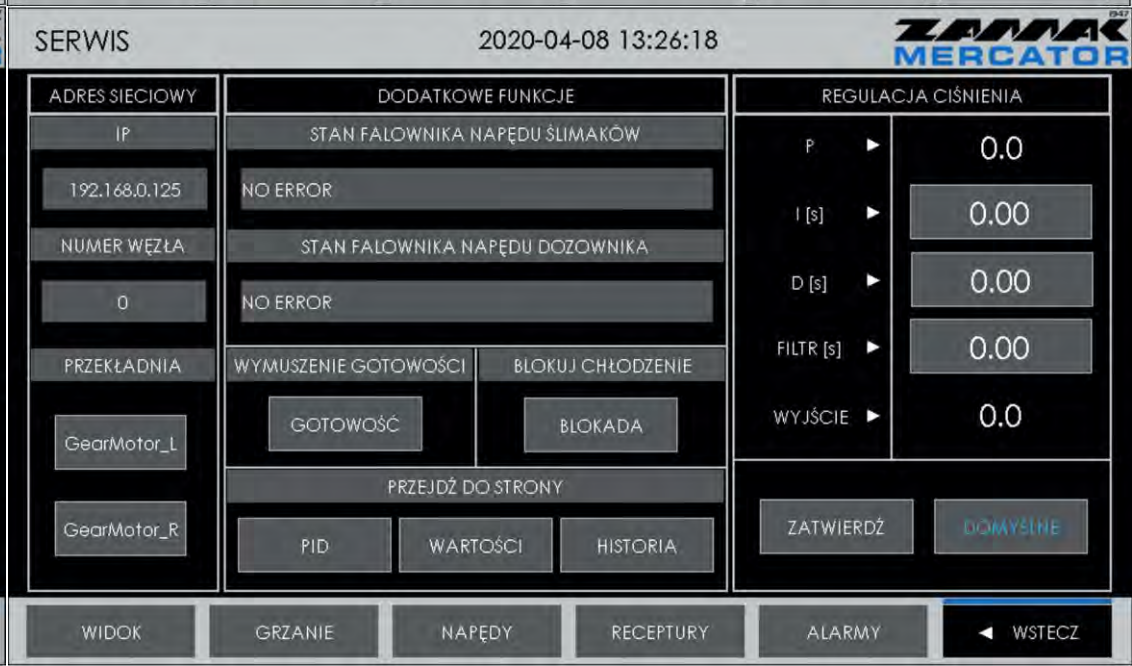
Sample laboratory device user interface - important functional features

- Access to advanced device settings - additional second level of access protected by a password
- Access to service settings - additional third level of access protected by a password
- Possibility to integrate the control system with other laboratory devices and Zamak Mercator lines and optionally devices from other manufacturers
- Possibility to control and service via WWW

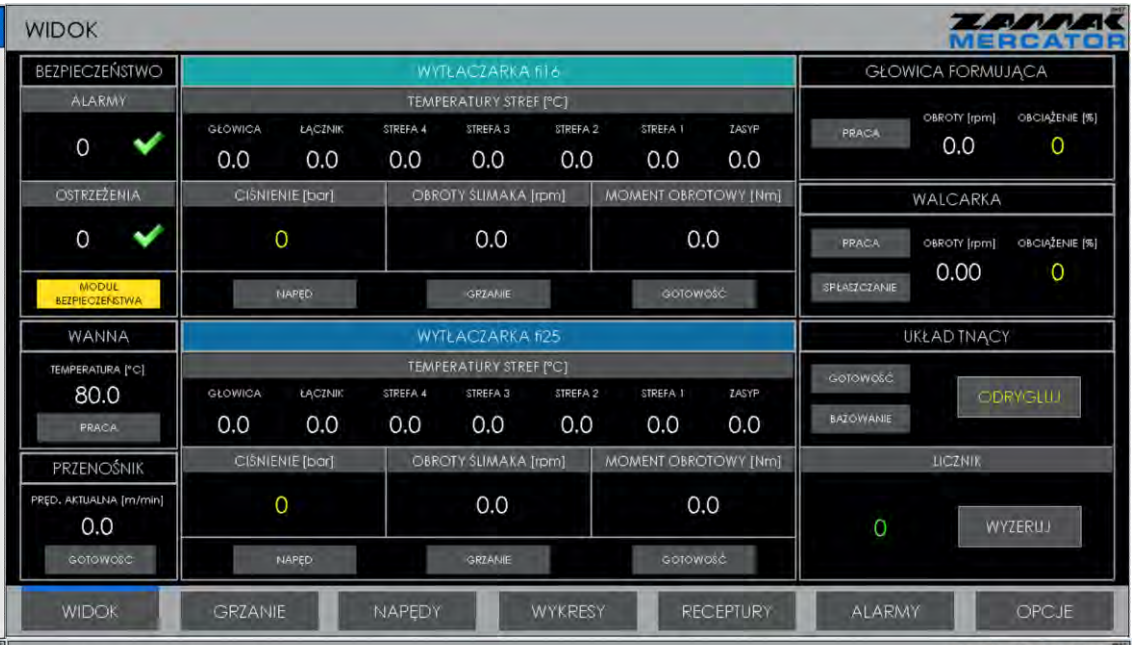


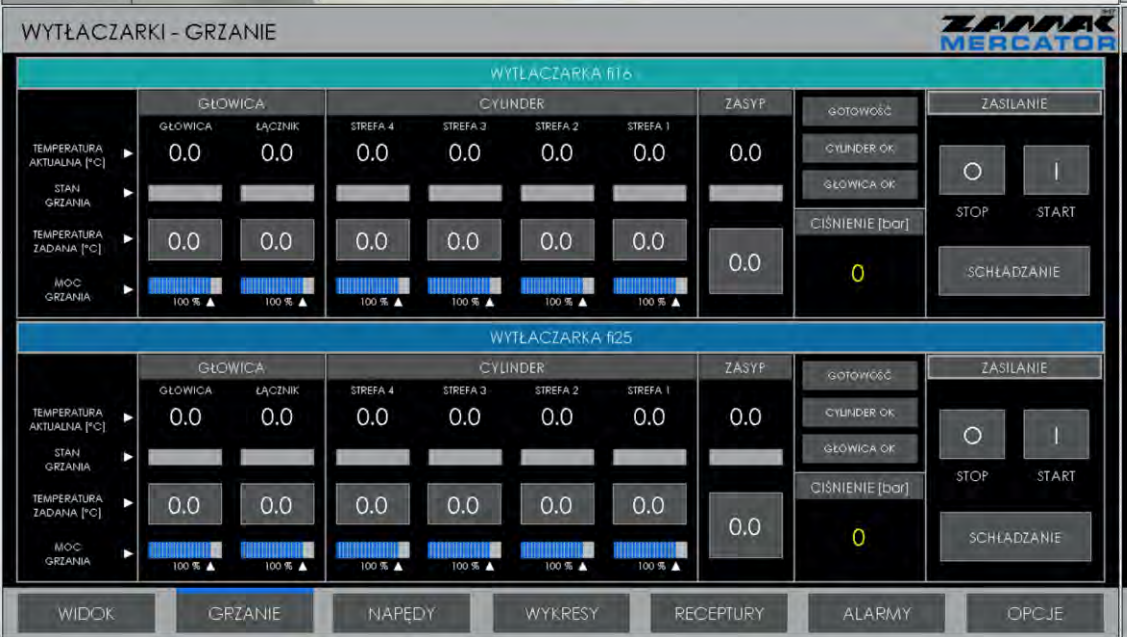




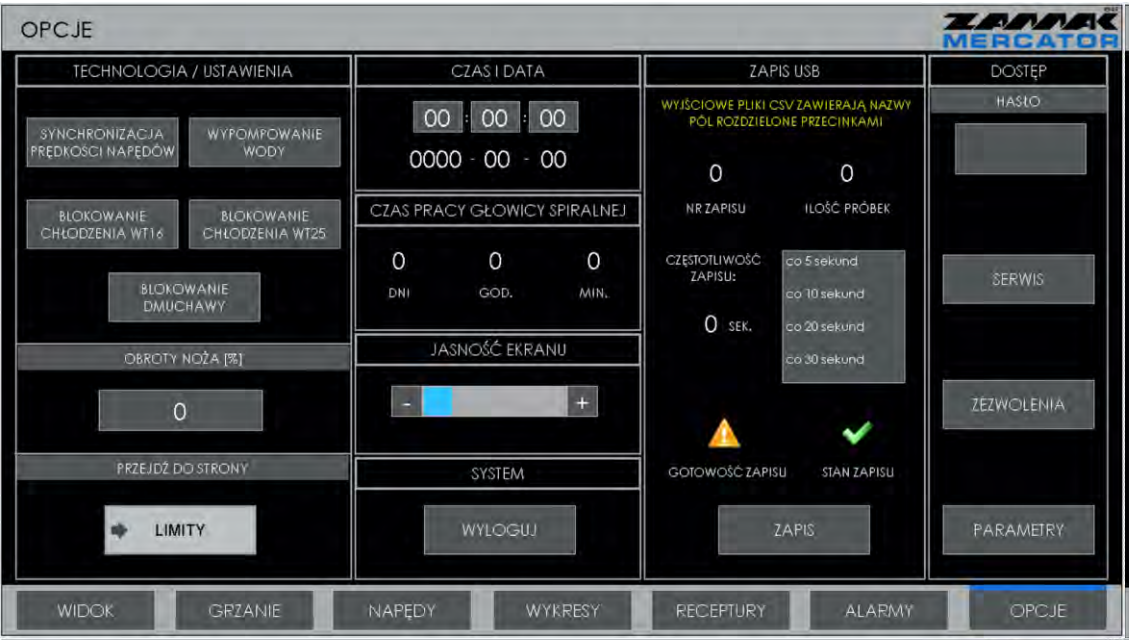


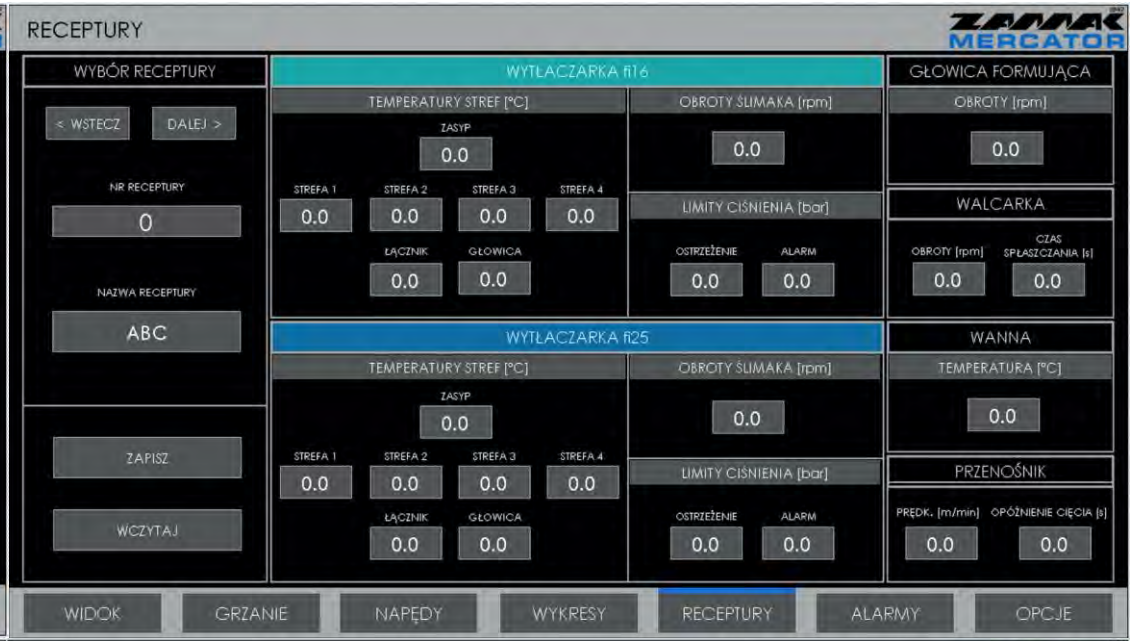
Exemplary user interface of the extrusion line - important functional features



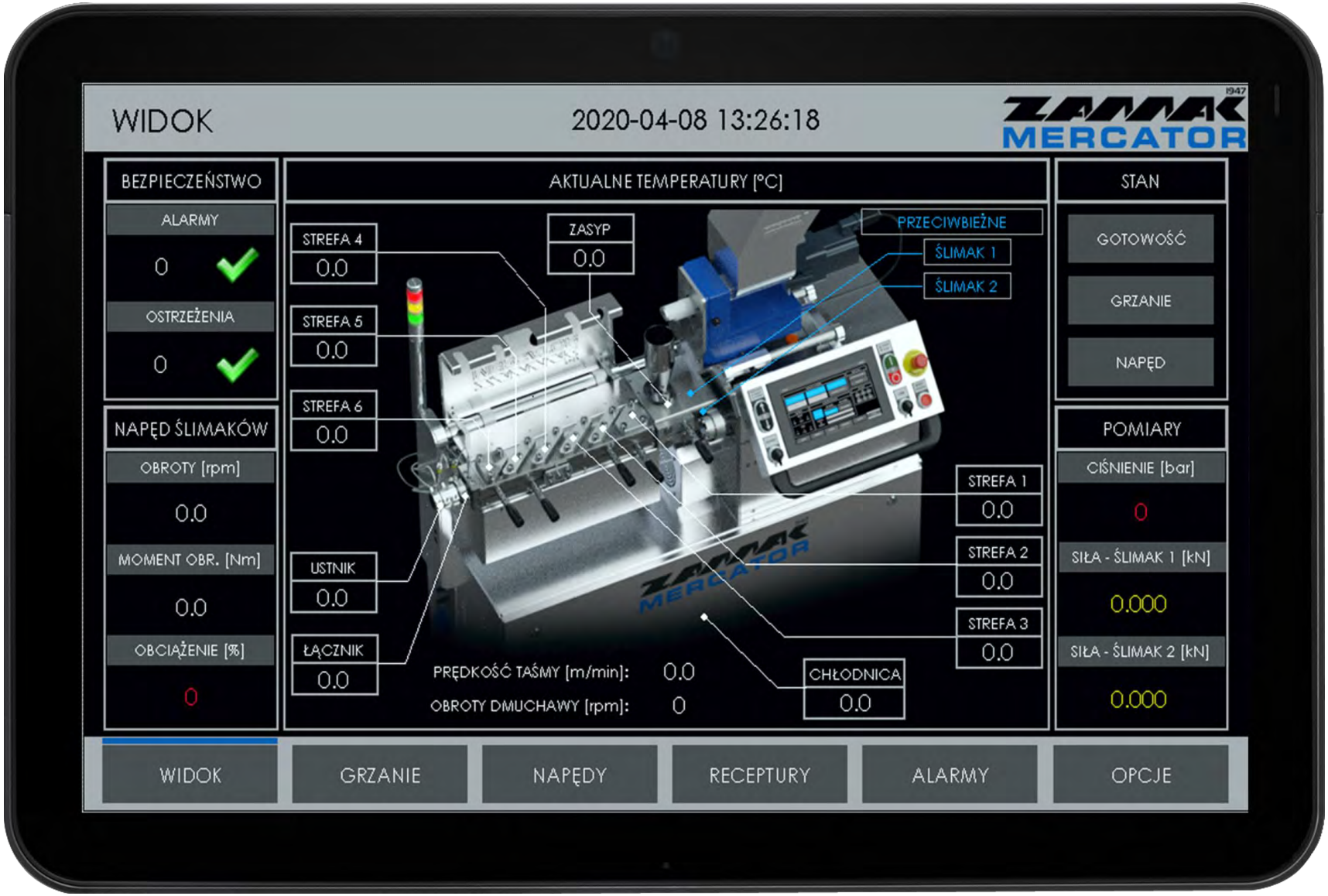


Exemplary user interface of the extrusion line - important functional features





An exemplary user interface of a laboratory extruder visible on the tablet screen



Optional equipment of extruders and laboratory lines - requires the installation of a WiFi gate

Laboratory twin-screw modular extruders
Series - RES-2P Vertex

Professional laboratory twin-screw extruder
Series - RES-2P 2 x 24 mm L/D 40 160 Nm per screw [Vertex II]

Technical data of the Vertex II series twin-screw modular extruders

• Screws diameter	[mm]	2 x 24 /2x20 /2x16
• Screws length	[L/D]	36-40-48
• Corotating work of screws		Yes
• Counterrotating work of screws		Yes
• Maximum torque per screw		
• RES-2P 2x24 mm	[Nm]	140/160
• RES-2P 2x20 mm	[Nm]	65/80
• RES-2P 2x16 mm	[Nm]	20/24
• Maximum screws revolution speed	[rev/min]	600 - 1200
• Maximum power of the drive module	[kW]	22/26,4
• Maximum power density		
• RES-2P 2x24 mm	[Nm/cm3]	16,8/21,57
• RES-2P 2x20 mm	[Nm/cm3]	15,14/18,64
• RES-2P 2x16 mm	[Nm/cm3]	10,92
• Maximum working temperature	[°C]	400/450

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

- Interchangeable cylinder working surfaces
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Automatic configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet

• Degassing system	[option]
• Side ports for dispensers	[option]
• Counterrotating screws	[option]
• WIFI and tablet control	[option]
• Remote monitoring and service diagnosis	[option]

Laboratory non-modular twin-screw extruders
Series - RES-2P Vertex

Laboratory twin screw extruder
Series - RES-2P 2 x 24 mm L / D 40 160 Nm. for snail [Vertex II]

Technical data of the Vertex II series twin-screw non-modular extruders

• Screws diameter	[mm]	2 x 24 /2x20 /2x16/2x12
• Screws length	[L/D]	36-40-48
• Corotating work of screws		Yes
• Counterrotating work of screws		Yes
• Maximum torque per screw		
• RES-2P 2x24 mm	[Nm]	140/160
• RES-2P 2x20 mm	[Nm]	65/80
• RES-2P 2x16 mm	[Nm]	20/24
• Maximum screws revolution speed	[rev/min]	600 - 1200
• Maximum power of the drive module	[kW]	22/26,4
• Maximum power density		
• RES-2P 2x24 mm	[Nm/cm3]	16,8/21,57
• RES-2P 2x20 mm	[Nm/cm3]	15,14/18,64
• RES-2P 2x16 mm	[Nm/cm3]	10,92
• RES-2P 2x12 mm	[Nm./cm3]	9
• Maximum working temperature nitrided steel	[°C]	400/450
• Maximum working temperature acid-resistant steel	[°C]	300

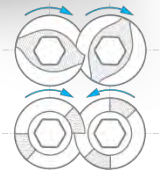
Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

- Interchangeable cylinder working surfaces
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Automatic configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet
- Degassing system [option]
- Side ports for dispensers [option]
- Counterrotating screws [option]
- WIFI and tablet control [option]
- Remote monitoring and service diagnosis [option]

Laboratory conical twin-screw modular extruders
Series - REM-2CA Vertex



Technical data of the Vertex series conical modular extruders

• Plasticization unit capacity	[ml]	5-20 [5/10/15/20]
• Corotating work of screws		Yes
• Counterrotating work of screws		Yes
• Maximum torque per screw	[Nm]	60
• Maximum screws revolution speed	[rev/min]	400
• Maximum power of the drive module	[kW]	22/26,4
• Maximum working temperature	[°C]	400/450

Precise measurements

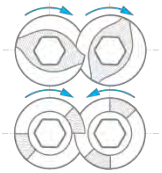
• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

• Interchangeable cylinder working surfaces	
• Cylinder horizontally split	
• Top dosing and measuring ports	
• Volumetric and gravimetric dosing systems	
• Zonal cylinder cooling system	
• Water cooled feeding zone in a closed circuit with its own cooler	
• Manual configuration change from corotating to counterrotating	
• Corotating screws	
• Real time PLC	
• Ethernet	
• Degassing system	[option]
• Side ports for dispensers	[option]
• Counterrotating screws	[option]
• WIFI and tablet control	[option]
• Remote monitoring and service diagnosis	[option]

Laboratory conical twin-screw modular extruders
Series - REM-2CA Vertex, with variable cylinder capacity

Laboratory twin-screw, non-modular, conical extruders Series - REM-2CA Vertex II



Laboratory twin-screw extruder, non-modular, conical Series - REM-2CA Vertex, with a variable cylinder volume and with an attached adapter for cooperation with a micro injection molding machine

Technical data

• The volume of the plasticizing system	[ml]	5-20 [5/10/15/20]
• REM-2CA 5 ml		
• REM-2CA 10 ml		
• REM-2CA 15 ml		
• REM-2CA 20 ml		
• Concurrent work of screws		Yes
• Counter-rotating work of the screws		Yes
• Maximum torque per screw	[Nm.]	60
• Maximum screw speed	[rpm]	400
• Maximum drive power	[kW]	3
• Maximum working temperature	[oC]	400/450

Precise measurements

• Temperature measurement and control	Yes
• for each cylinder and head zone	
• PID controller	
• Screw torque measurement	Yes
• Measurement of the axial force acting on the screws	Yes
• Melt pressure and temperature measurement	Yes
• Drive load measurement	Yes
• Recording and archiving of measurement data	Yes
• and recipes	

Equipment

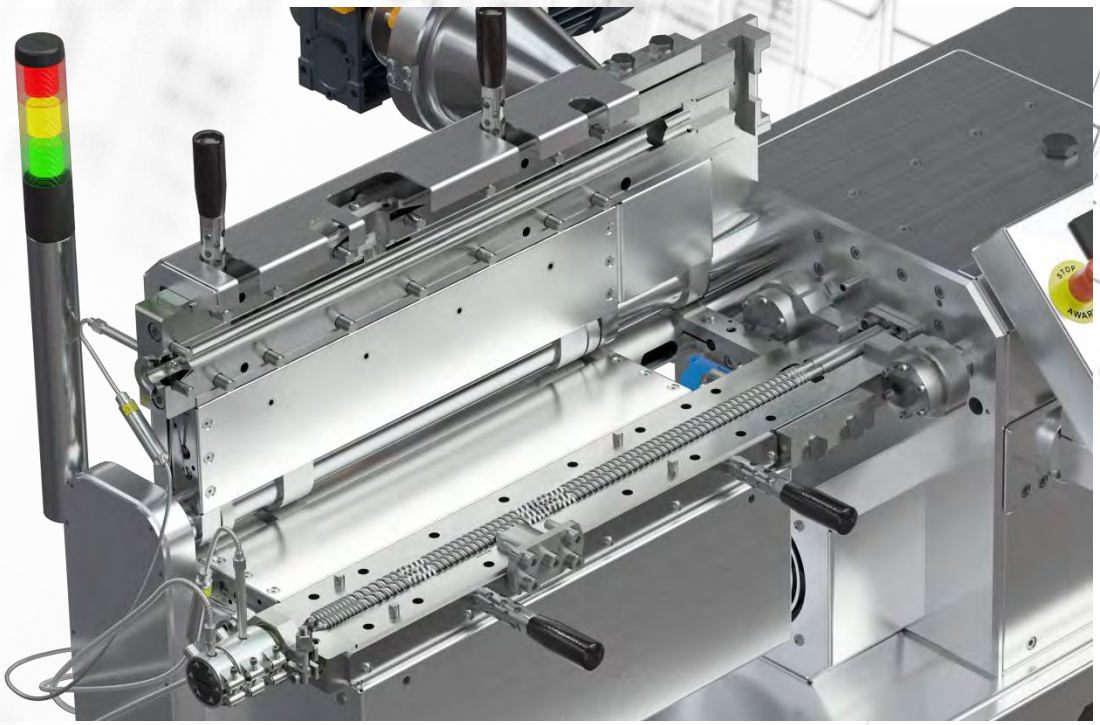
- Replaceable cylinder working surfaces

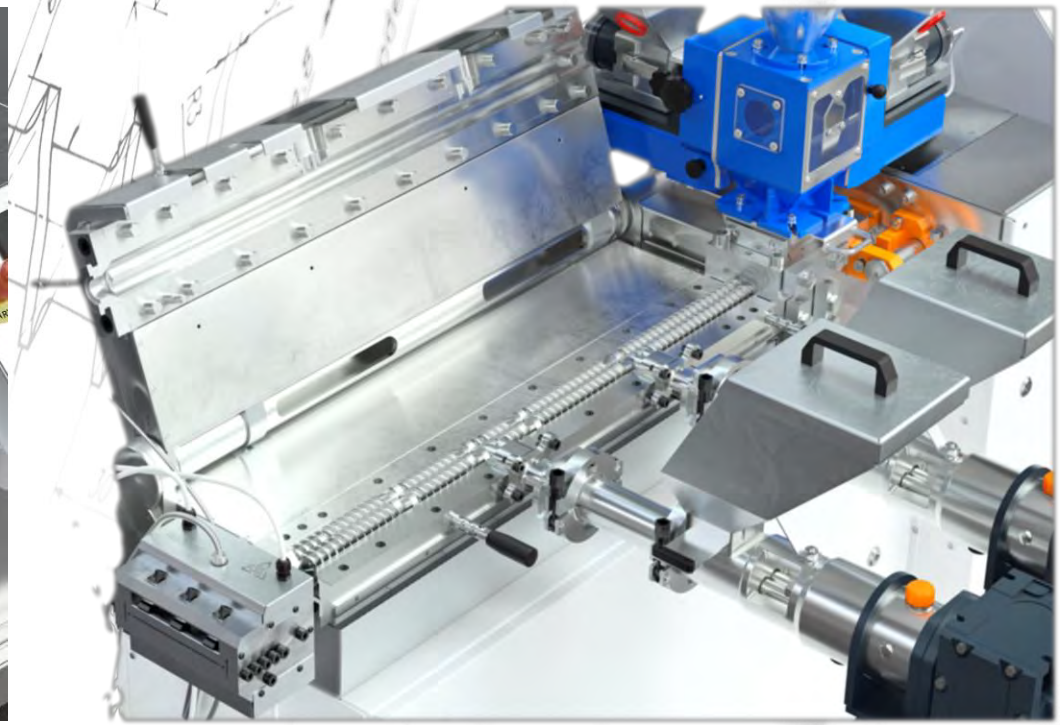
- Replaceable cylinder liners with capacities:
- REM-2CA 5 ml REM-2CA 10 ml REM-2CA 15 ml REM-2CA 20 ml

- Horizontally split cylinder
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zoned cylinder cooling system
- Water-cooled charging zone with its own closed-circuit cooler
- Manually change the configuration from concurrent to counter-rotating
- Concurrent screws
- Real-time PLC
- Ethernet

• Degassing system	[option]
• Side ports for dispensers	[option]
• Contra-rotating screws	[option]
• Wifi and tablet control	[option]
• Remote supervision and service diagnosis	[option]

Laboratory twin screw extruders - horizontal split cylinder configuration



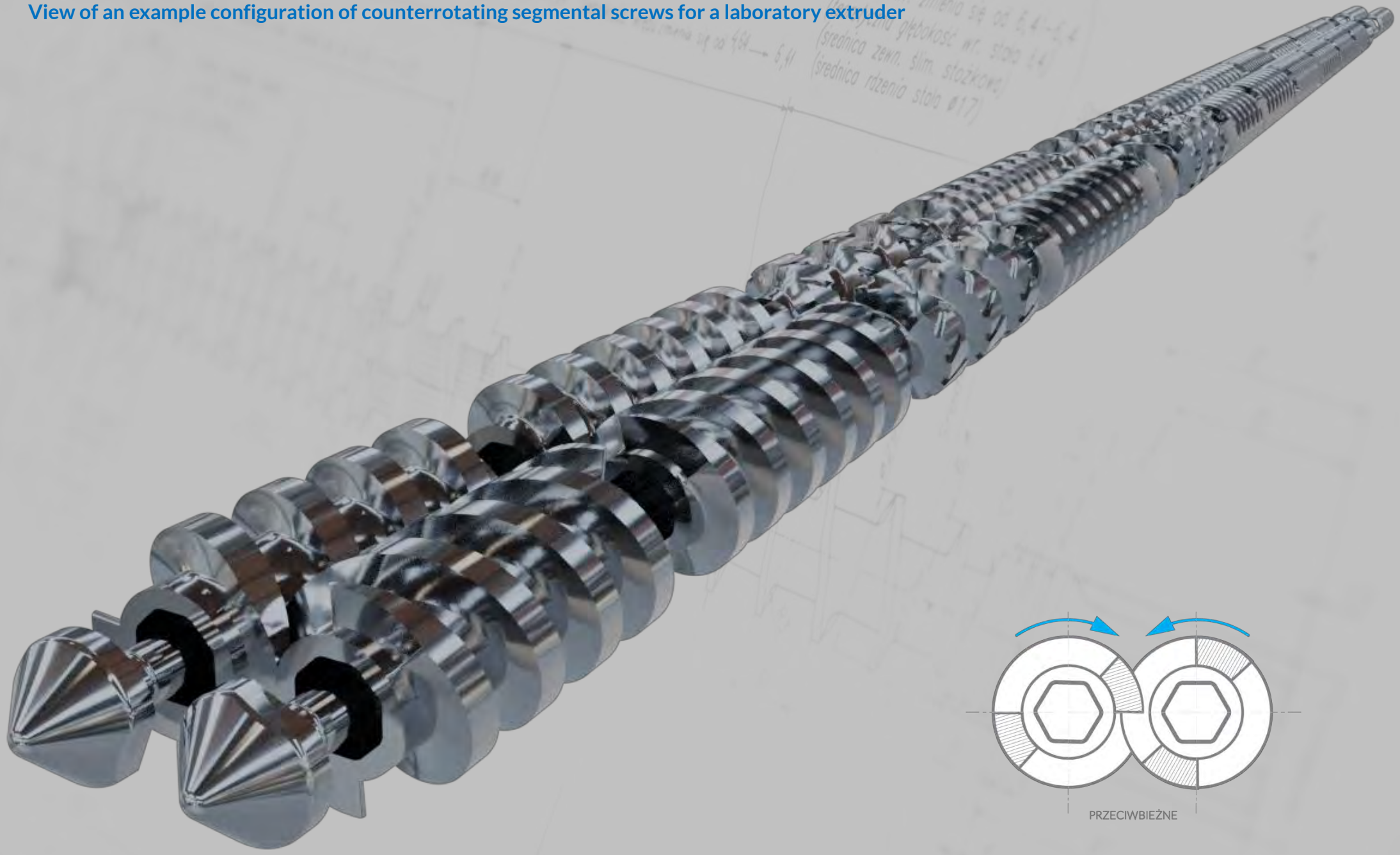


Easy access to the screws, replaceable barrel inserts as the working surface and the way of mounting the head for foil extrusion and two side feeders. Opening the cylinder is possible without removing the gravimetric dosing devices.

View of an example configuration of corotating segmental screws for a laboratory extruder

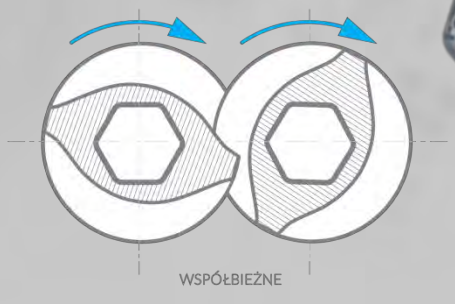
We offer many different segments for corotating screw configuration

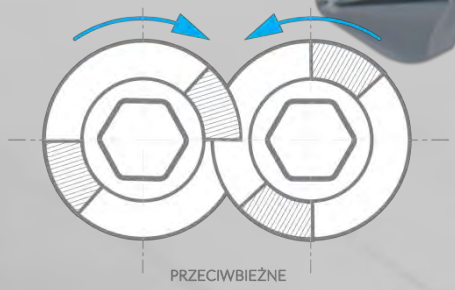
View of an example configuration of counterrotating segmental screws for a laboratory extruder



We offer many different segments for counter-rotating screw configuration

Twin-screw laboratory extruders series
RES-2P Vertex II and RES-2P Vertex II Pharma
with screw diameters 2x12 / 2x16 / 2 x20 /2 x24
as the only ones on the market they can work with corotating and counterrotating screws



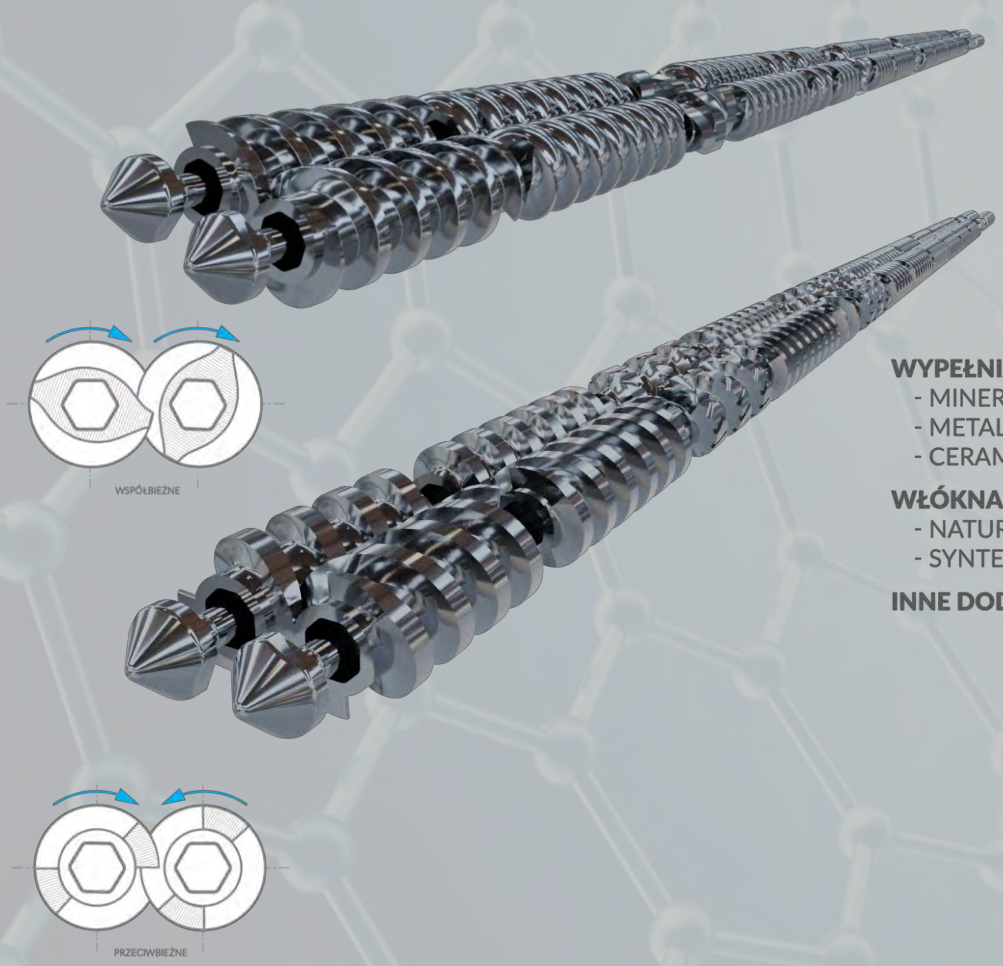


The possibility of using corotating and counter-rotating screws in one device greatly extends the possibilities of conducting research, while maintaining a reasonable cost of the research tool.

The laboratory test stands are equipped with extruders of the RES series with Vertex II torque dividing gears, which can work with co-rotating and counter-rotating screws. Vertex II gears provide high torque and power density.

The possibility of using co-rotating or counter-rotating screws in one extruder in the research process allows to test practically all thermoplastic and plastic materials.

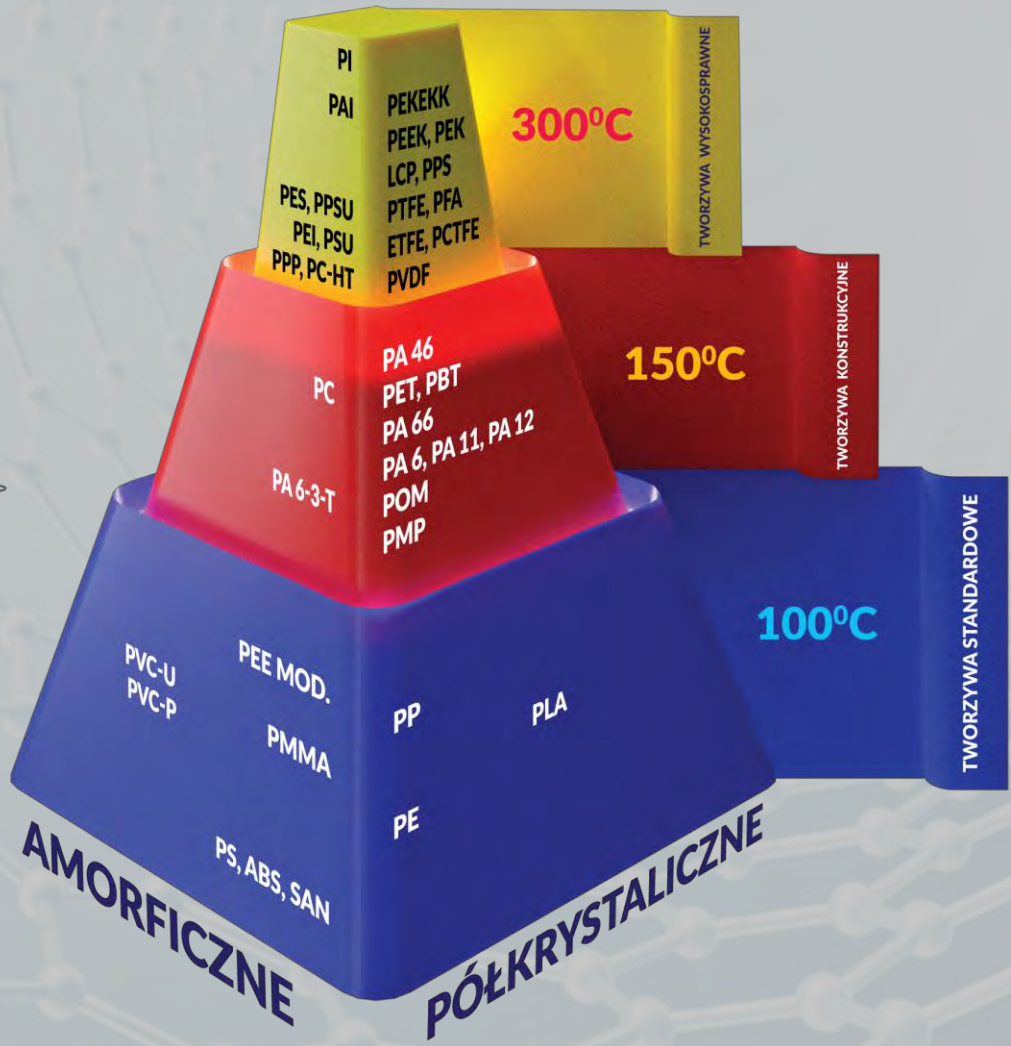
The combination of work with co-rotating and counter-rotating screws, the possibility of equipping extruders with side feeders and precise gravimetric dosing systems allows to conduct research on thermoplastic and plastic materials, blends, composites



WYPEŁNIACZE
- MINERALNE
- METALICZNE
- CERAMICZNE

WŁÓKNA CIĘTE:
- NATURALNE
- SYNTETYCZNE

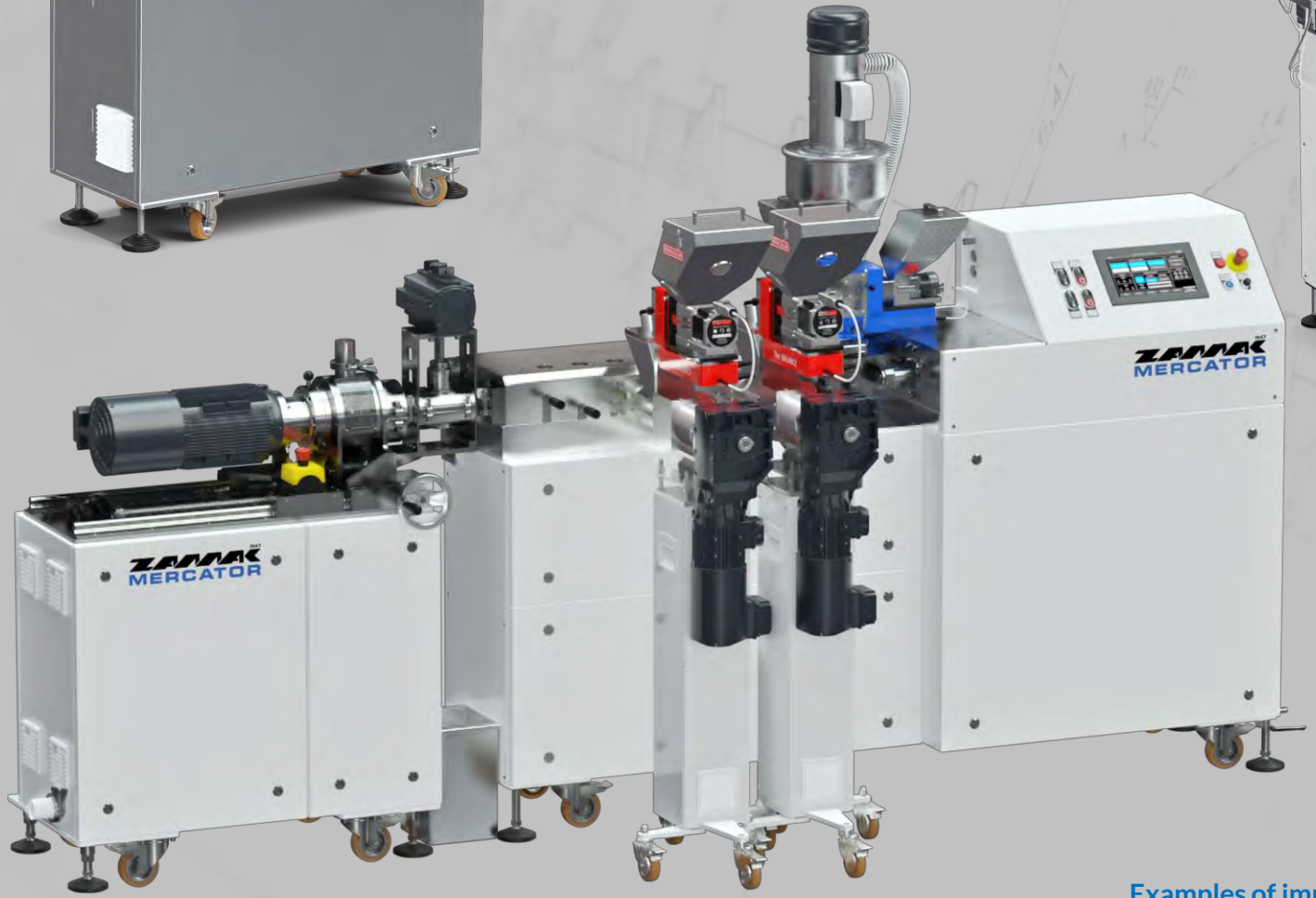
INNE DODATKI



Laboratory twin-screw extruders of the RES-2P Vertex II series with screw diameters of 2x12 / 2x16 / 2 x20 /2 x24

Examples of implementations tailored to a specific scope of research

Laboratory twin-screw extruders of the RES-2P Vertex II series with screw diameters of 2x12 / 2x16 / 2 x20 /2 x24



Examples of implementations tailored to a specific scope of research

Side feeders for twin screw extruders

Side feeder

The twin screw extruder side feeder allows the side feeding of fillers and additives in the form of powder, granules or chopped fibers to the processing section of the twin screw extruder.
It is characterized by a self-cleaning profile of double screws and the feeding of the product to the screws of the extruder without stagnation zones.
Due to its compact design, the bypass tray takes up very little space.
It can be mounted anywhere in the extruder process section. The design allows for quick disassembly from the process section, and the twin screws are very easy to replace.

The side feeder can be used as horizontal or vertical degassing

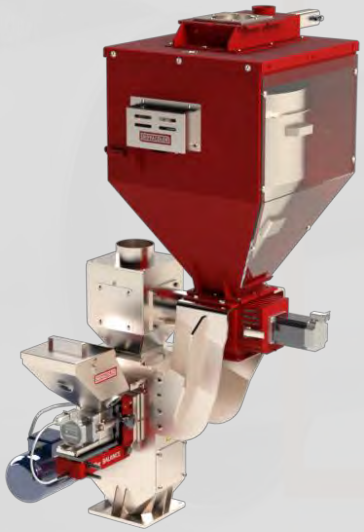
It is a safe and simple alternative to conventional vacuum degassing. Two screws, which rotate in the same direction, are built into the degassing unit, pushing any floating melt back into the process chamber, but allow all gases to escape. This prevents blockages or deposits. The large free volume in the screw channel creates optimal conditions for degassing the polymer melt.

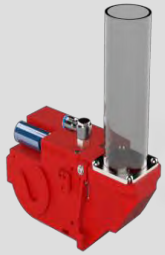
benefits:
Increased operational reliability: The degassing hole does not clog even under changing process conditions.
Better product quality: self-cleaning screws prevent material from settling and hardening in the vacuum dome.
Less maintenance: Due to significantly lower cleaning requirements, downtime is minimized and costs are reduced.

DOSING SYSTEMS

Gravimetric and volumetric

Professional laboratory gravimetric and volumetric dosing systems by Movacolor - for granules, powders and liquids

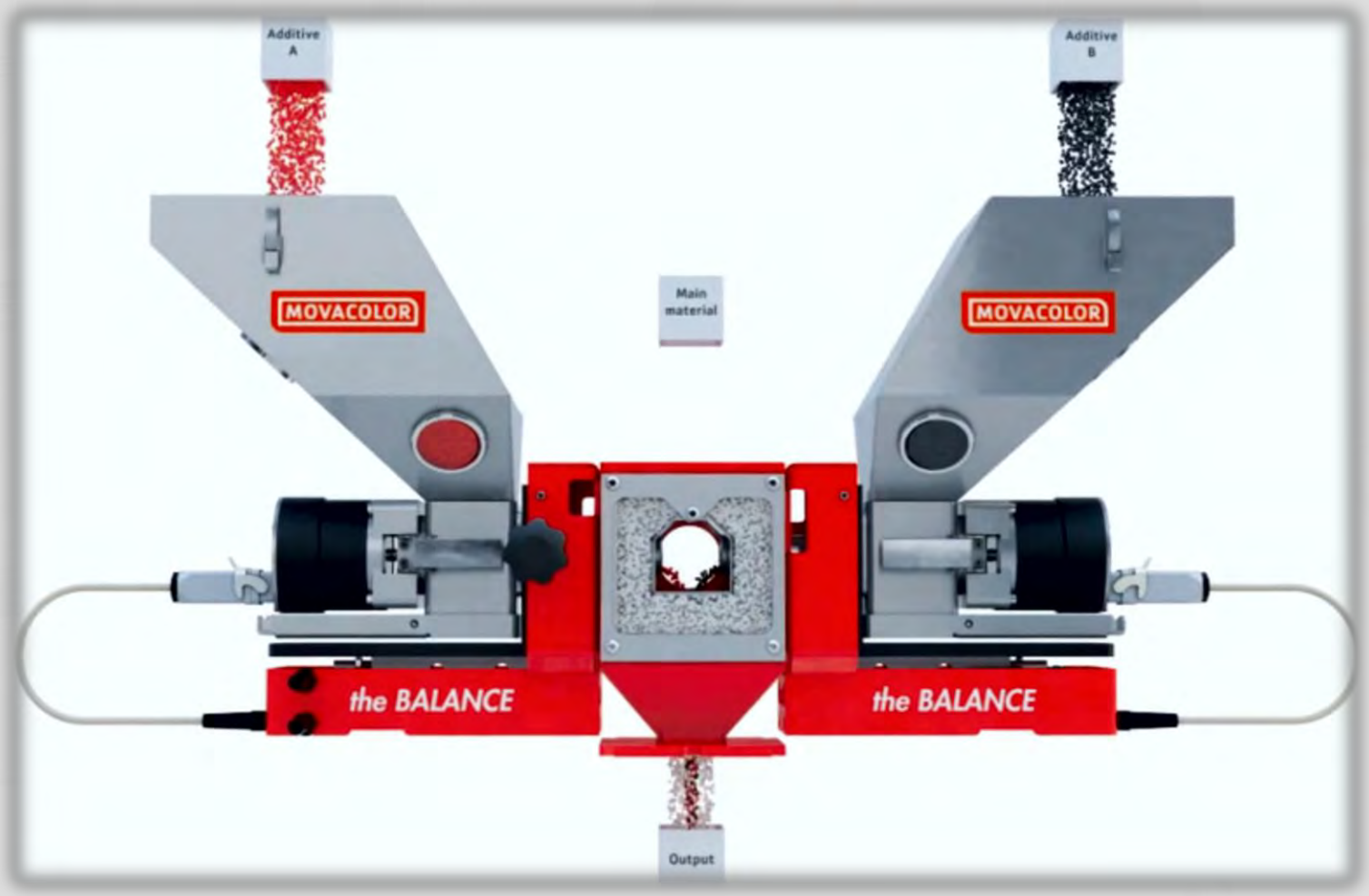




ZAMAK MERCATOR designs and supplies liquid dispensing systems based on peristaltic pumps.
We also offer high pressure systems based on gear pumps and adapted to research for industry.
We also offer acid-resistant systems for the pharmaceutical industry.

ZAMAK MERCATOR designs and supplies gas dosing systems under high pressure, e.g. supercritical CO 2.

Professional laboratory gravimetric and volumetric dosing systems by Movacolor - for granules, powders and liquids



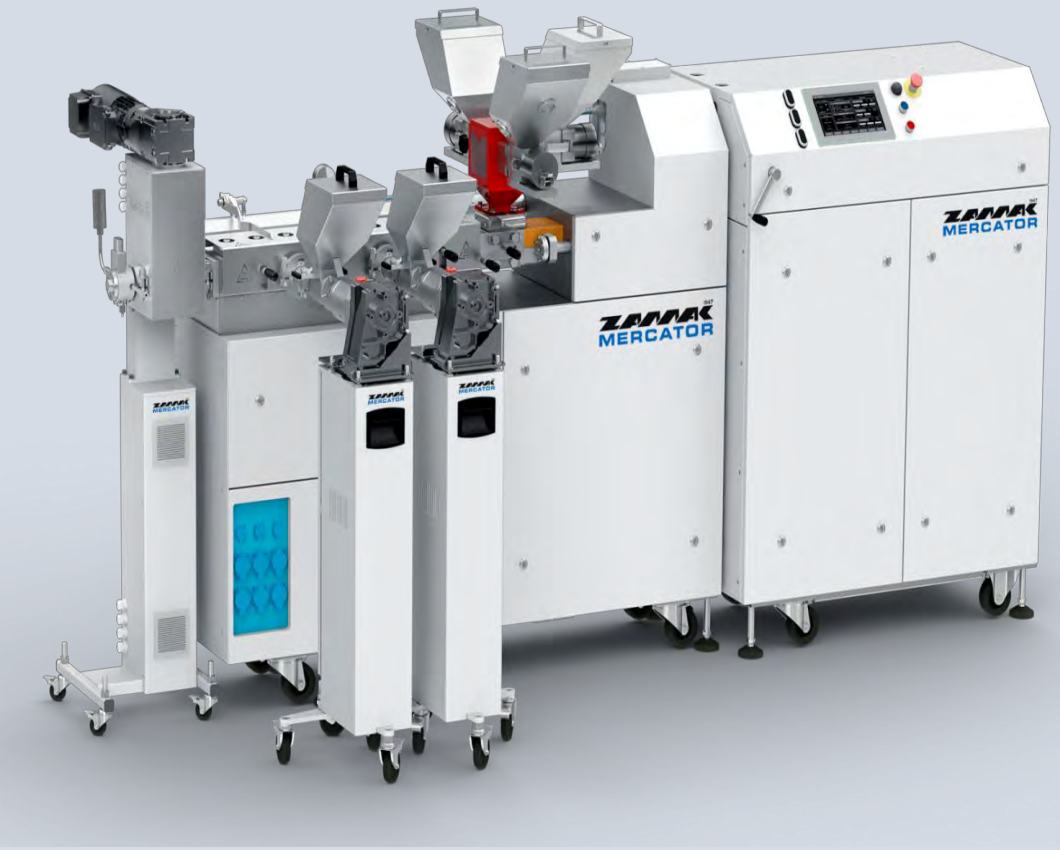
TWIN-SCREW EXTRUDER

for pharmacy and medicine

Pharmacy

Medicine

Laboratory twin-screw modular extruders
Series - RES-2P Vertex Pharma



Technical data of Pharma modular twin-screw extruders

• Screws diameter	[mm]	2 x 24 /2x20 /2x16
• Screws length	[L/D]	36-40-48
• Corotating work of screws		Yes
• Counterrotating work of screws		Yes
• Maximum torque per screw		
• 2x24 mm	[Nm]	140/160
• 2x20 mm	[Nm]	65/80
• 2x16 mm	[Nm]	20/24
• Maximum screws revolution speed	[rev/min]	600 - 1200
• Maximum power of the drive module	[kW]	22/26,4
• Maximum power density		
• 2x24 mm	[Nm/cm3]	16,8/21,57
• 2x20 mm	[Nm/cm3]	15,14/18,64
• 2x16 mm	[Nm/cm3]	10,92
• Maximum working temperature nitrided steel	[°C]	400/450
• Maximum working temperature acid-resistant steel	[°C]	300

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

- **Design for pharmacy [stainless steel 440C]**
- Interchangeable cylinder working surfaces
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Automatic configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet

• **Control and supervision system in accordance with the requirements of the pharmaceutical industry**	**[option]**
• Degassing system	[option]
• Side ports for dispensers	[option]
• Counterrotating screws	[option]
• WIFI and tablet control	[option]
• Remote monitoring and service diagnosis	[option]

Professional Laboratory twin-screw modular extruder
Series - RES-2P 2 x 24 mm L/D 40 160 Nm per screw [Vertex II] Pharma

Laboratory twin-screw not-modular extruders
Series - RES-2P Vertex Pharma

Professional Laboratory twin-screw extruder
Series - RES-2P 2 x 24 mm L/D 40 160 Nm per screw [Vertex II] Pharma

Technical data of Pharma not-modular twin-screw extruders

• Screws diameter	[mm]	2 x 24 /2x20 /2x16/2x12	
• Screws length	[L/D]	36-40-48	
• Corotating work of screws		Yes	
• Counterrotating work of screws		Yes	
• Maximum torque per screw			
• 2x24 mm	[Nm]	140/160	
• 2x20 mm	[Nm]	65/80	
• 2x16 mm	[Nm]	20/24	
• Maximum screws revolution speed	[rev/min]	600 - 1200	
• Maximum power of the drive module	[kW]	22/26,4	
• Maximum power density			
• 2x24 mm	[Nm/cm3]	16,8/21,57	
• 2x20 mm	[Nm/cm3]	15,14/18,64	
• 2x16 mm	[Nm/cm3]	10,92	
• 2x12 mm	[Nm./cm3]	9	
• Maximum working temperature nitrided steel		[°C]	400/450
• Maximum working temperature acid-resistant steel		[°C]	300

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

- **Design for pharmacy [stainless steel 440C]**
- Interchangeable cylinder working surfaces
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Automatic configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet

• **Control and supervision system in accordance with the requirements of the pharmaceutical industry**	**[option]**
• Degassing system	[option]
• Side ports for dispensers	[option]
• Counterrotating screws	[option]
• WIFI and tablet control	[option]
• Remote monitoring and service diagnosis	[option]

Laboratory conical twin-screw modular extruders Series - REM-2CA Vertex Pharma

Laboratory modular conical twin-screw extruder Series - REM-2CA Vertex Pharma, with variable cylinder volume and with attached adapter to work with a micro injection molding machine designed for testing small amounts of expensive materials

Technical data of Pharma conical modular extruders

• Plasticization unit capacity	[ml]	5-20 [5/10/15/20]	
• Corotating work of screws		Yes	
• Counterrotating work of screws		Yes	
• Maximum torque per screw	[Nm]	60	
• Maximum screws revolution speed	[rev/min]	400	
• Maximum power of the drive module	[kW]	22/26,4	
• Maximum working temperature nitrided steel		[°C]	400/450
• Maximum working temperature acid-resistant steel		[°C]	300

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

- **Design for pharmacy [stainless steel 440C]**
- Interchangeable cylinder working surfaces
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Manual configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet

• **Control and supervision system in accordance with the requirements of the pharmaceutical industry**	**[option]**
• Degassing system	[option]
• Side ports for dispensers	[option]
• Counterrotating screws	[option]
• WIFI and tablet control	[option]
• Remote monitoring and service diagnosis	[option]

Laboratory twin-screw not-modular extruders
Series - RES-2P Vertex Pharma

Professional laboratory twin-screw extruder not-modular
Series - RES-2P 2 x 12 mm L / D 40 9 Nm per screw [Vertex II] Pharma
for testing small amounts of expensive materials

Technical data

• Screws diameter	[mm]	2x24 /2x20 /2x16 /2x12	
• Screws length	[L/D]	36-40-48	
• Corotating work of screws		Yes	
• Counterrotating work of screws		Yes	
• Maximum torque per screw			
• 2x12 mm	[Nm./cm3]	9	
• Maximum screws revolution speed	[rev/min]	600 - 1200	
• Maximum power of the drive	[kW]	22/26,4	
• Maximum power density			
• 2x12 mm	[Nm./cm3]	9	
• Maximum working temperature nitrided steel		[°C]	400/450
• Maximum working temperature acid-resistant steel		[°C]	300

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator		Yes
• Screw torque measurement		Yes
• Measurement of axial force acting on the screws		Yes
• Measurement of material pressure and temperature		Yes
• Measurement of drive load		Yes
• Recording and archiving of measurement data and recipes		Yes

Equipment

- **Design for pharmacy [stainless steel 440C]**
- Interchangeable cylinder working surfaces
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Automatic configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet
- **Control and supervision system in accordance with the requirements of the pharmaceutical industry** **[option]**
- Degassing system [option]
- Side ports for dispensers [option]
- Counterrotating screws [option]
- WIFI and tablet control [option]
- Remote monitoring and service diagnosis [option]

Laboratory twin-screw conical not modular extruders Series - REM-2CA Vertex Pharma

Technical data

• Plasticization unit capacity	[ml]	5-20 [5/10/15/20]
• **REM-2CA 5 ml**		
• **REM-2CA 10 ml**		
• **REM-2CA 15 ml**		
• **REM-2CA 20 ml**		
• Corotating work of screws		Yes
• Counterrotating work of screws		Yes
• Maximum torque per screw	[Nm]	60
• Maximum screws revolution speed	[rev/min]	400
• Maximum power of the module	[kW]	3
• Maximum working temperature	[°C]	400

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of axial force acting on the screws	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

- **Design for pharmacy [stainless steel 440C]**
- Interchangeable cylinder working surfaces
- Replaceable barrel inserts with capacities REM-2CA **5 ml** REM-2CA **10 ml** REM-2CA **15 ml** REM-2CA **20 ml**
- Cylinder horizontally split
- Top dosing and measuring ports
- Volumetric and gravimetric dosing systems
- Zonal cylinder cooling system
- Water cooled feeding zone in a closed circuit with its own cooler
- Manual configuration change from corotating to counterrotating
- Corotating screws
- Real time PLC
- Ethernet
- **Control and supervision system in accordance with the requirements of the pharmaceutical industry** **[option]**
- Degassing system [option]
- Side ports for dispensers [option]
- Counterrotating screws [option]
- WIFI and tablet control [option]
- Remote monitoring and service diagnosis [option]

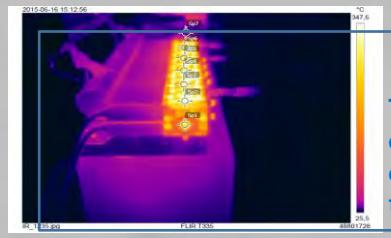
Laboratory twin-screw conical not modular extruder Series - REM-2CA Vertex Pharma, with variable cylinder volume and with an attached adapter for cooperation with a laboratory injection molding machine designed for testing small amounts of expensive materials

SINGLE-SCREW EXTRUDERS

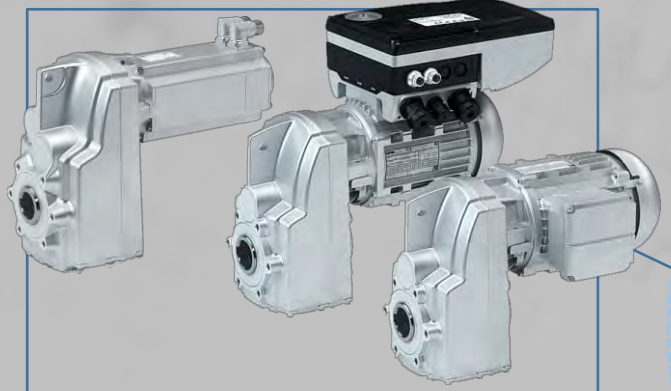
for plastics

Zamak Mercator single-screw extruders with screw diameters of 12 to 32 mm important performance characteristics

The ability to measure temperatures and stop pressures in each zone



The possibility of thermal calibration of the cylinder

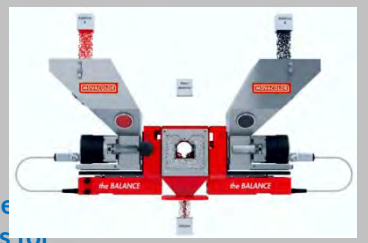


Drives in 120 Hz technology ensuring high torques and power density, high dynamics and low inertia

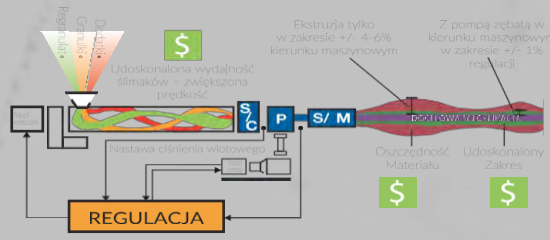
Possibility to use screws of various configurations designed for many types of materials

The cylinder heating and cooling system ensures accurate and reliable temperature control of each zone

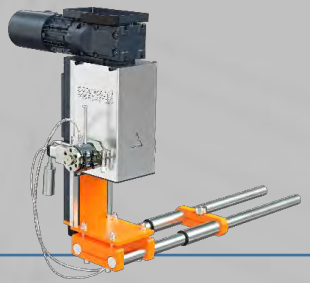
Configuration to work in left and right sides



Integration of gravime volumetric dispensers for granules, powders, liquids and gases



Precision molten plastic pumps equipped with:
Three independent heating zones
Two ports for stop pressure sensors
Precise drive



Digital control and communication system

Laboratory single-screw extruders
Red series

Technical data

• Screw diameter	[mm]	12/16/20/25
• Screw length	[L / D]	24-40
• Maximum torque per screw		
• 12 mm	[Nm.]	30
• 16 mm	[Nm.]	65
• 20 mm	[Nm.]	100
• 25 mm	[Nm.]	260
• 32 mm	[Nm.]	420
• Maximum screw speed	[rpm]	160-260
• Maximum drive power		
• 12 mm	[kW]	0.55-1.1
• 16 mm	[kW]	1.5-2.2
• 20 mm	[kW]	3- 4
• 25 mm	[kW]	5.5-7.5
• 32 mm	[kW]	7.5-11
• Maximum working temperaturę	[oC]	400

Precise measurements

• Temperature measurement and control	Yes
• for each cylinder and head zone	
• PID controller	
• Screw torque measurement	Yes
• Melt pressure and temperature measurement	Yes
• Drive load measurement	Yes
• Recording and archiving of measurement data	Yes
• and recipes	

Equipment

• Volumetric and gravimetric dosing systems	
• Zonal cylinder cooling system	
• The charging zone is cooled with running water	
• Real-time PLC	
• Ethernet	
• Top dosing and measuring ports	[option]
• Degassing system	[option]
• Wifi and tablet control	[option]
• Remote supervision and service diagnosis	[option]

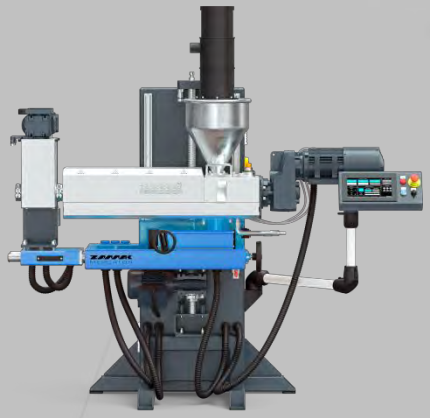
Single-screw laboratory extruders, RED and RED Pharma series, with screw diameters of 12/16/20/24/32 mm









Examples of implementation tailored to a specific scope of research

SINGLE-SCREW EXTRUDERS

for medicine and pharmacy

Pharmacy

Medicine

Laboratory single-screw extruders
Red Pharma Series

Professional laboratory single-screw extruders from the smallest with a 12 mm screw with a capacity <1000 g/h, to the largest with a 32 mm screw and with a capacity of up to 30 kg/h

Technical data

• Screws diameter	[mm]	12/16/20/25
• Screws length	[L/D]	24-40
• Maximum torque per screw		
• 12 mm	[Nm]	30
• 16 mm	[Nm]	65
• 20 mm	[Nm]	100
• 25 mm	[Nm]	260
• 32 mm	[Nm]	420
• Maximum screws revolution speed	[rev/min]	160-260
• Maximum power of the drive		
• 12 mm	[kW]	0,55-1,1
• 16 mm	[kW]	1,5-2,2
• 20 mm	[kW]	3- 4
• 25 mm	[kW]	5,5-7,5
• 32 mm	[kW]	7,5-11
• Maximum working temperature	[°C]	400

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of material pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

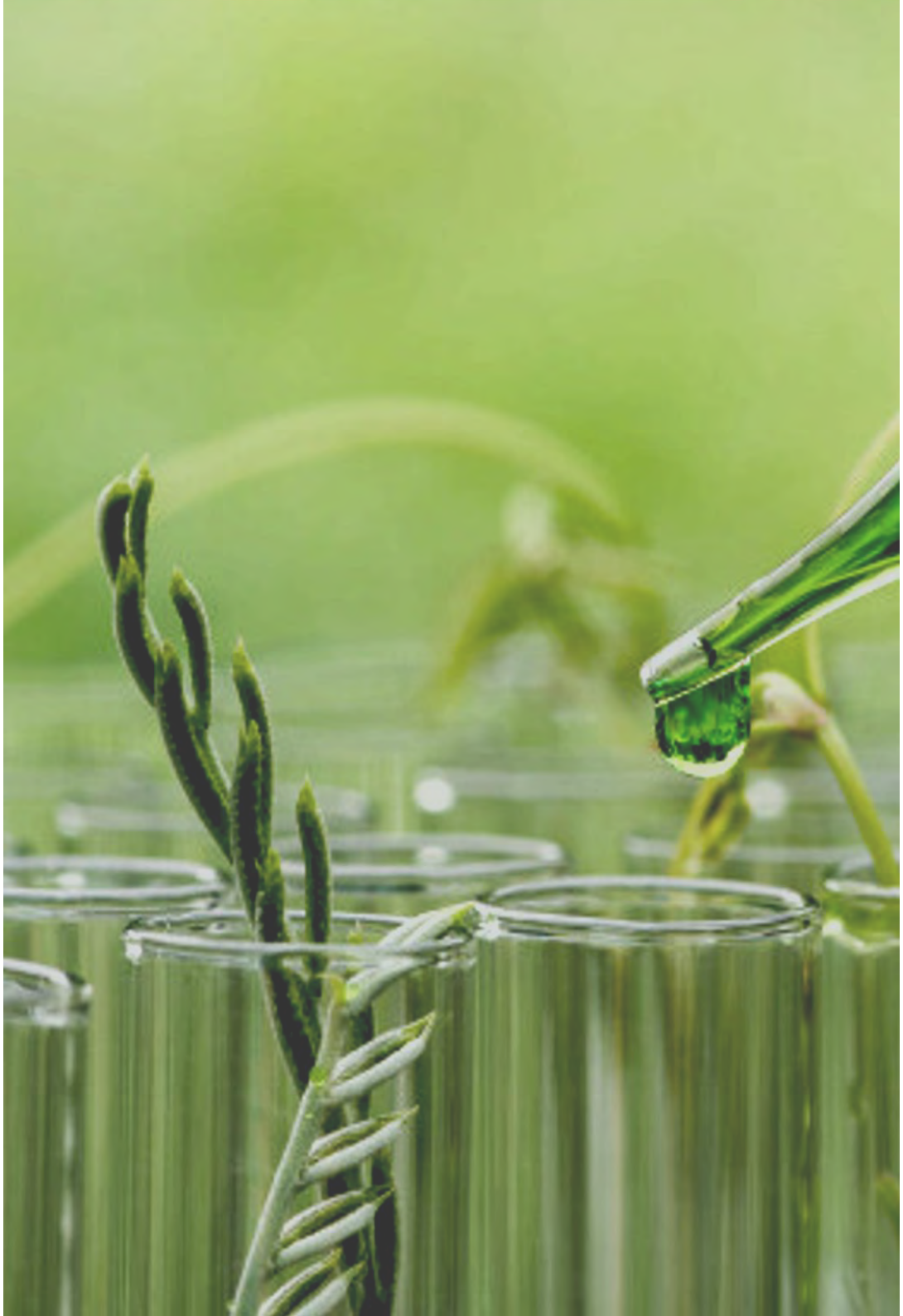
• **Design for pharmacy [stainless steel 440C]**	
• Volumetric and gravimetric dosing systems	
• Zonal cylinder cooling system	
• Running water cooled feeding zone	
• Real time PLC	
• Ethernet	
• **Control and supervision system in accordance with the requirements of the pharmaceutical industry**	**[option]**
• Top dosing and measuring ports	[option]
• Degassing system	[option]
• WIFI and tablet control	[option]
• Remote monitoring and service diagnosis	[option]

LINES FOR FILAMENTS RESEARCH

for medicine and pharmacy

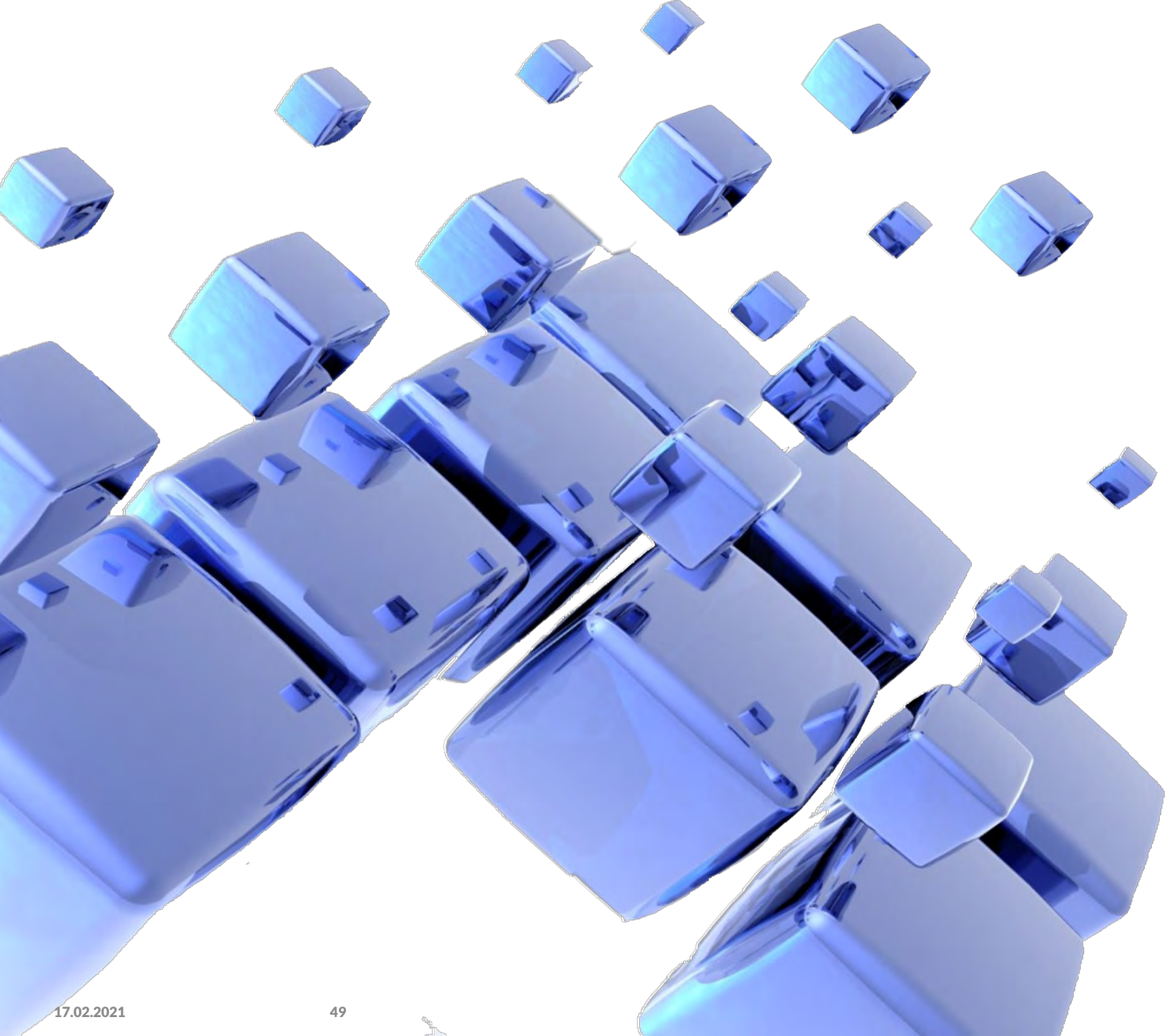
Pharmacy

Medicine



Laboratory lines for research on filaments for pharmacy for 3D printing - example configurations

EXTRUDERS FOR 3D PRINTERS



Extruders for 3d printers - a professional solution for 3D printing

- Drive system with high power and torque, low inertia and high dynamics.

- Thrust [axial] bearing allows the extruder to operate with pressures up to 400 bar.
- It guarantees high durability and reliability of the entire device.
- Additionally, they are equipped with strain gauge transducers of the force acting axially on the extruder screw.

- Pneumatic system for feeding the extruder with granules [works properly with large deviations of the extruder from the vertical position

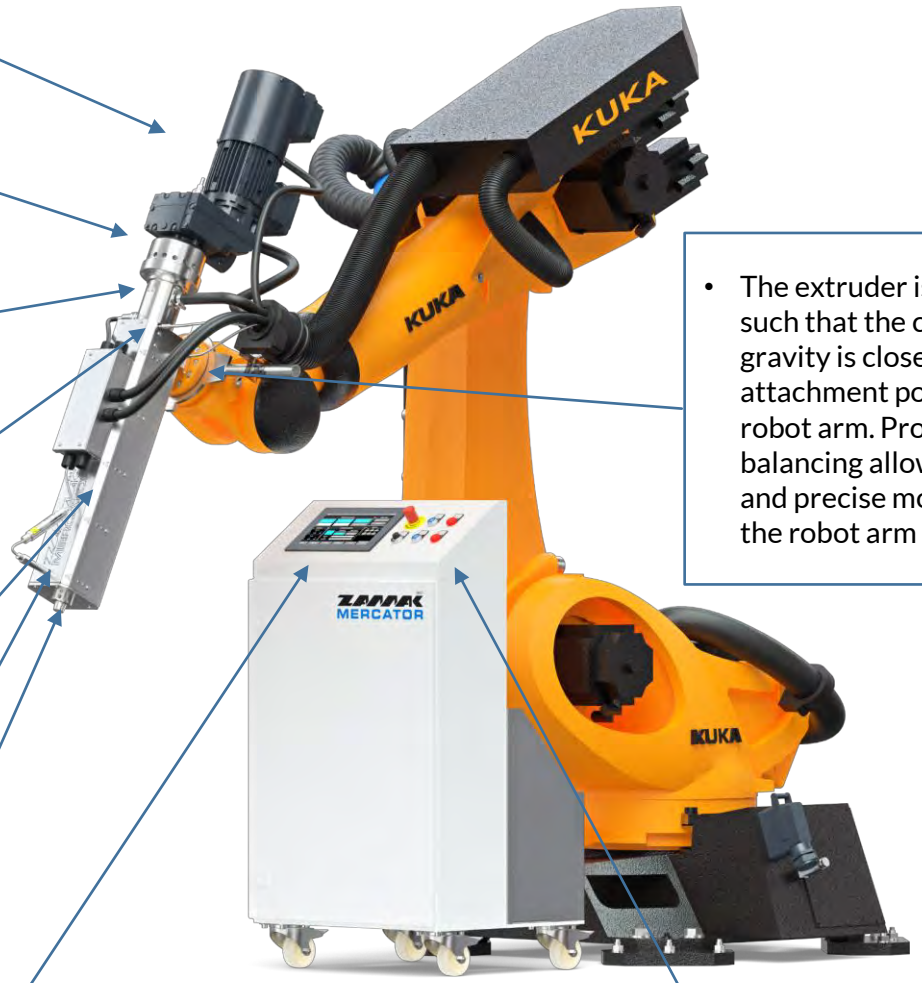
- Water cooling system of the extruder charge [enables work with materials that soften at low temperatures without the phenomenon of "sticking the charge"]
- The hopper cooling system is equipped with a precise temperature measurement and controller

- Professional plastic plasticization system equipped with:
- Five-zone heating system, which is equipped with precise temperature regulators [each zone is equipped with an independent temperature measurement]
- Thermal insulation with low thermal conductivity
- Light cover made of aluminum

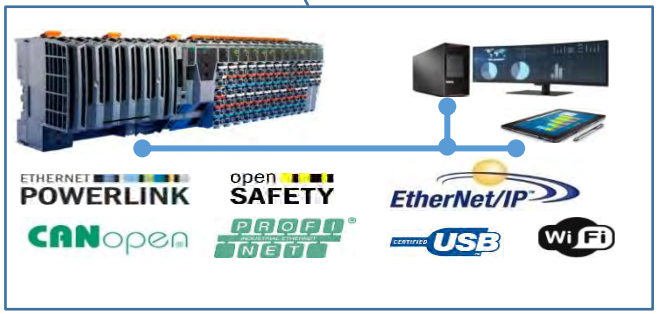
- Two UNF ½ ”ports are intended for the installation of a plastic pressure transmitter and a pressure fuse required by the safety standard

- Replaceable extrusion head, equipped with thermal insulation and an adjustable air cooling system for extruded material

- Digital control system based on a PLC controller - two-way communication with the robot
- Large touch screen / Tablet control
- Communication Main line PowerLink / Ethernet TCP / IP / other



- The extruder is balanced such that the center of gravity is close to the attachment point to the robot arm. Professional balancing allows for quick and precise movements of the robot arm



Extruders for 3d printers

Extruder for 3D printers fi 25 mm with a capacity of 8-10 kg / h

Extruder for 3d printers fi 25 mm with a capacity of 8-10 kg / h with reduced dimensions to work in hard-to-reach places

Extruders for 3d printers

Extruder models available for 3d printers

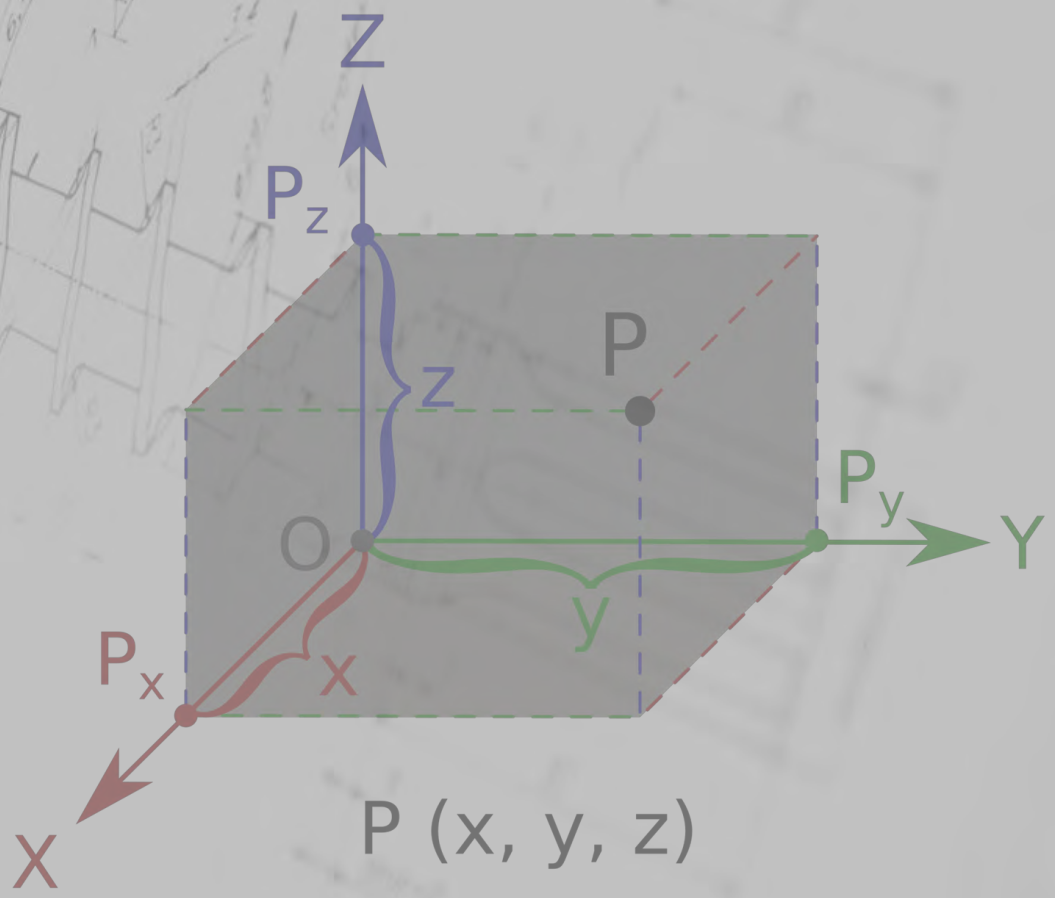
3d extruder - screw diameter 16 mm, capacity approx. 2 kg / h,	suitable for mounting on a multi-axis robot arm or in a Cartesian system
3d extruder - screw diameter 20 mm, capacity approx. 4 kg / h,	suitable for mounting on a multi-axis robot arm or in a Cartesian system
3d extruder - screw diameter 25 mm, capacity approx. 8-10 kg / h,	suitable for mounting on a multi-axis robot arm or in a Cartesian system
3d extruder - screw diameter 32mm, capacity approx. 20-30 kg / h,	suitable for mounting on a multi-axis robot arm, in a Cartesian system or an overhead crane
3d extruder - screw diameter 45 mm, capacity approx. 40-60 kg / h,	suitable for mounting on a multi-axis robot arm, in a Cartesian system or an overhead crane

Standard equipment

- Controlled by own PLC controller equipped with a touch screen
- Standard Communication Main line - Power Link [other buses available]
- Digital and analog inputs and outputs are available
- High-class measuring systems - temperature / pressure / force / torque / electrical values
- Integration with Kuka robot control systems
- Standard drive units - asynchronous motor with an encoder in servo mode
- Vacuum feeding of granules independent of the extruder position
- Extruded material cooling system with a concentric air stream

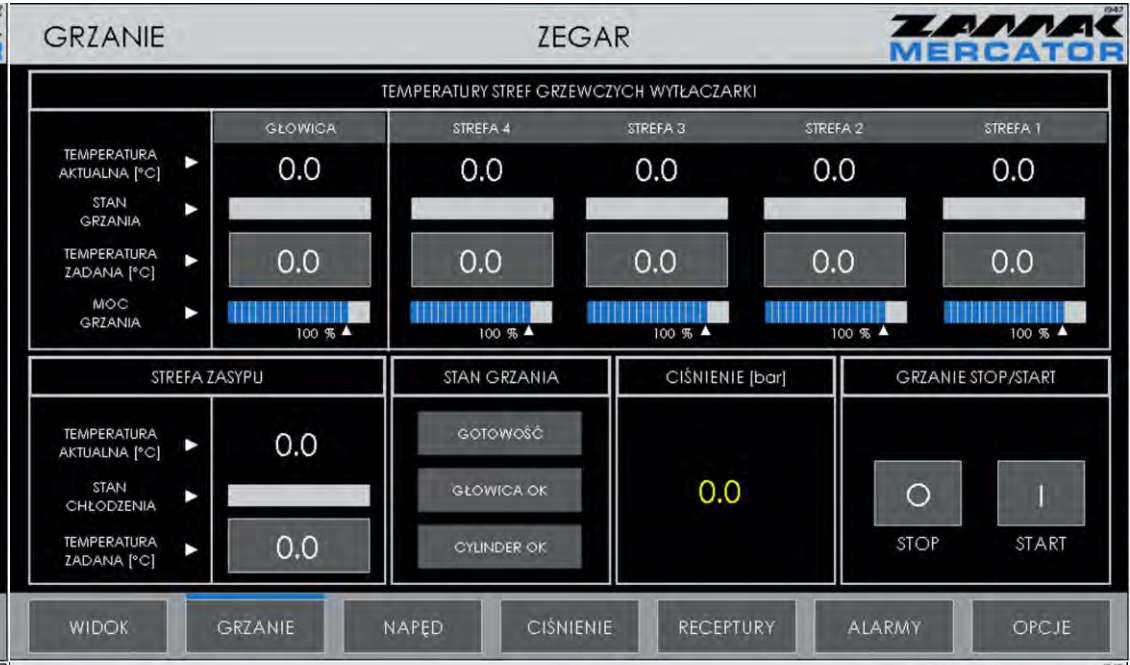
Optional equipment

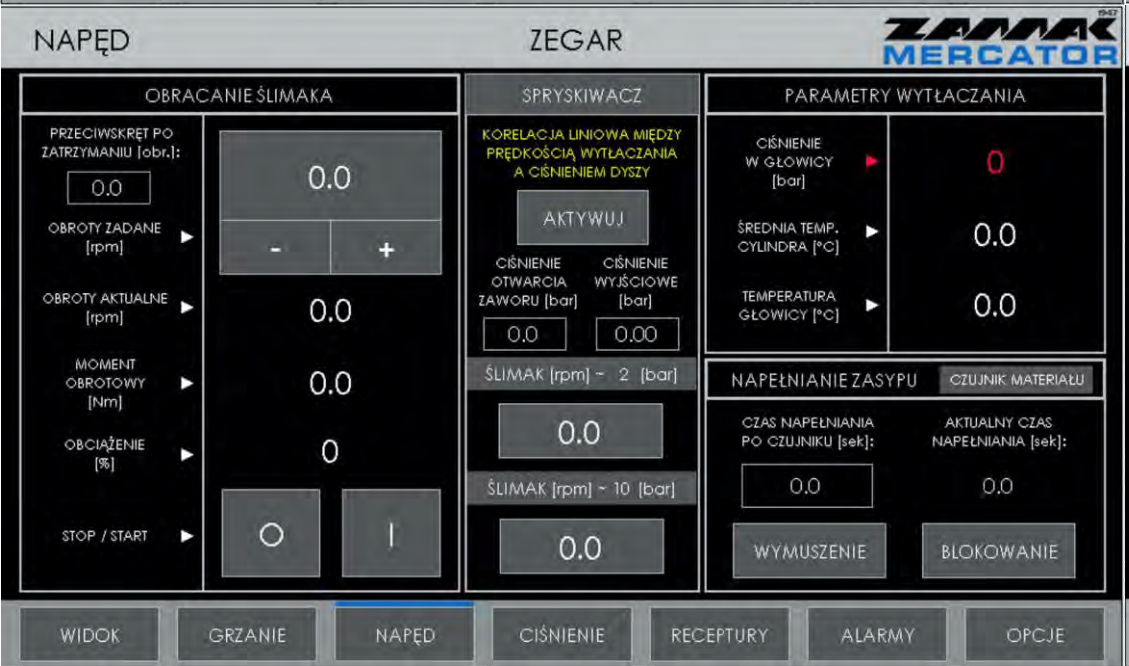
- Communication Main line other than Power Link
- Additional digital and analog inputs and outputs as agreed
- Integration with robot, crane and other control systems as agreed
- Optional drive units - servo synchronous motor
- Screws dedicated to specific plastics
- Extruded plastic cooling system with water mist
- Control of the extruder from the tablet
- Ethernet TCP / ip

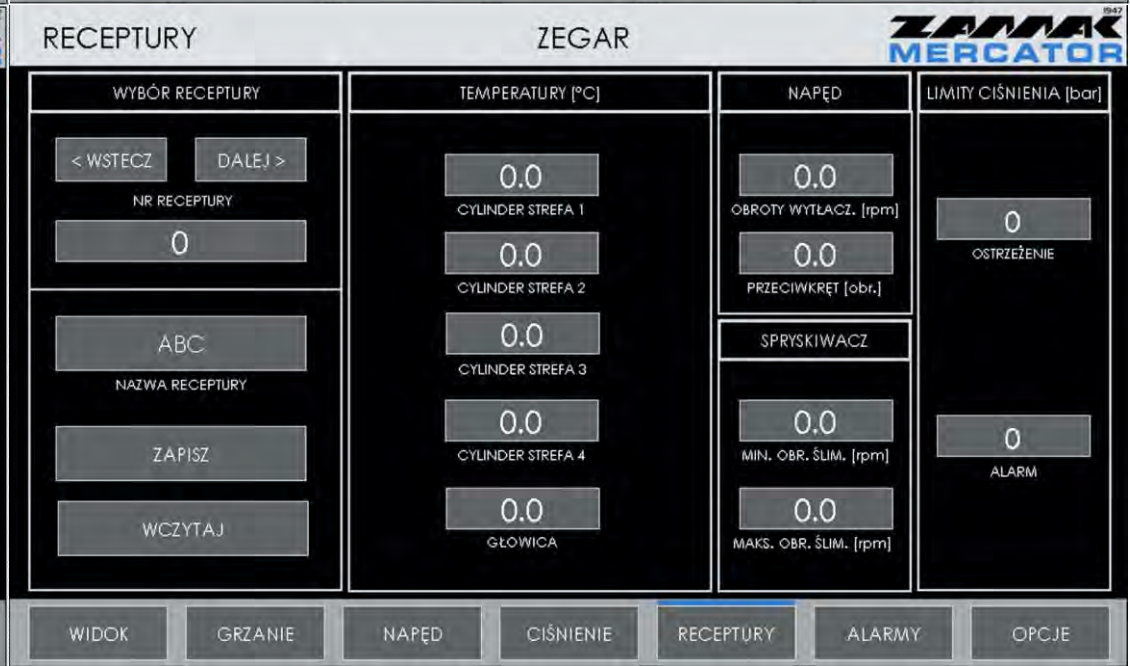


An exemplary user interface of an extruder for a 3d printer - important functional features

- User-friendly high-resolution touch screens - You can control the devices wirelessly using a tablet
- A clear and convenient interface enables full control of the process
- It enables the device parameters to be adjusted to a specific task
- It allows you to save all parameters on the medium, even every 1 s

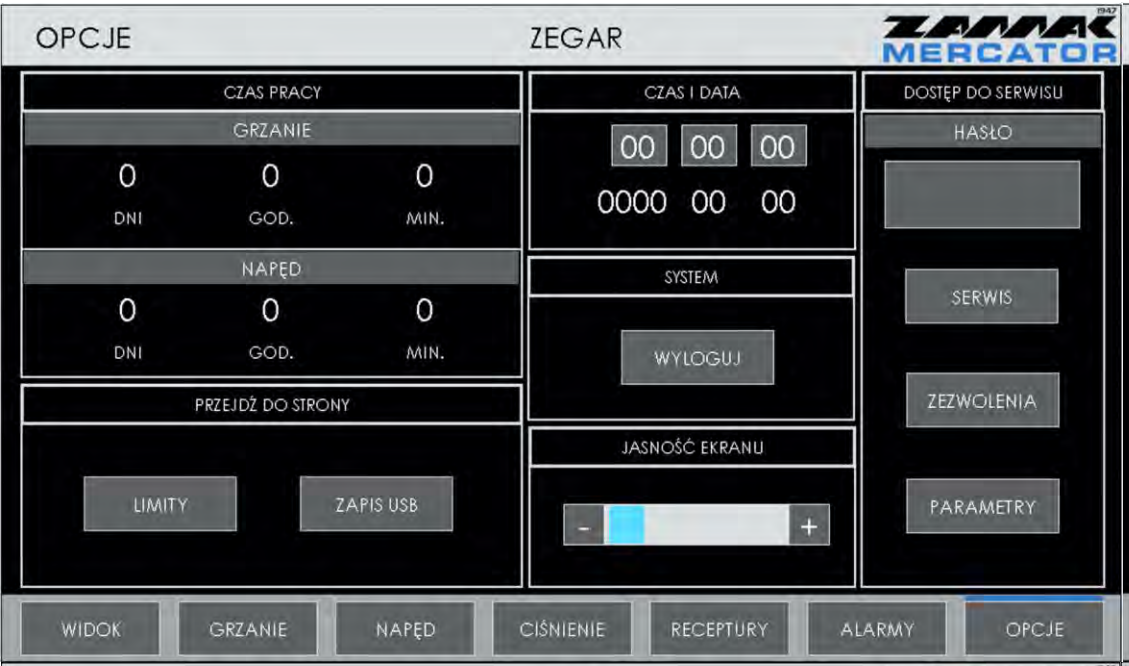


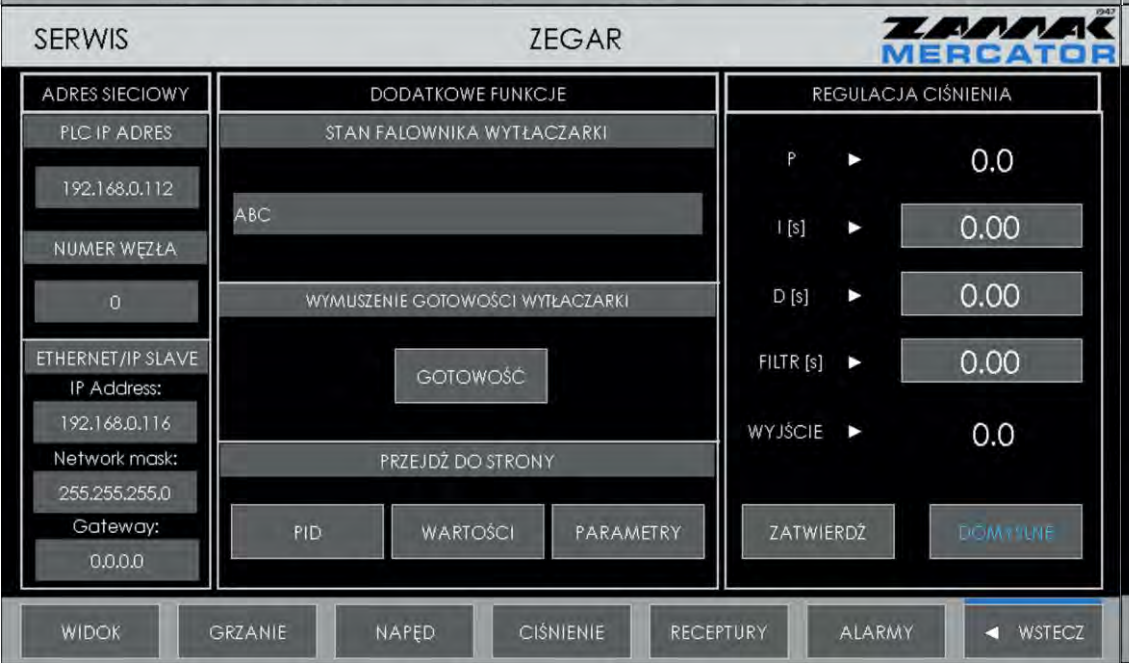




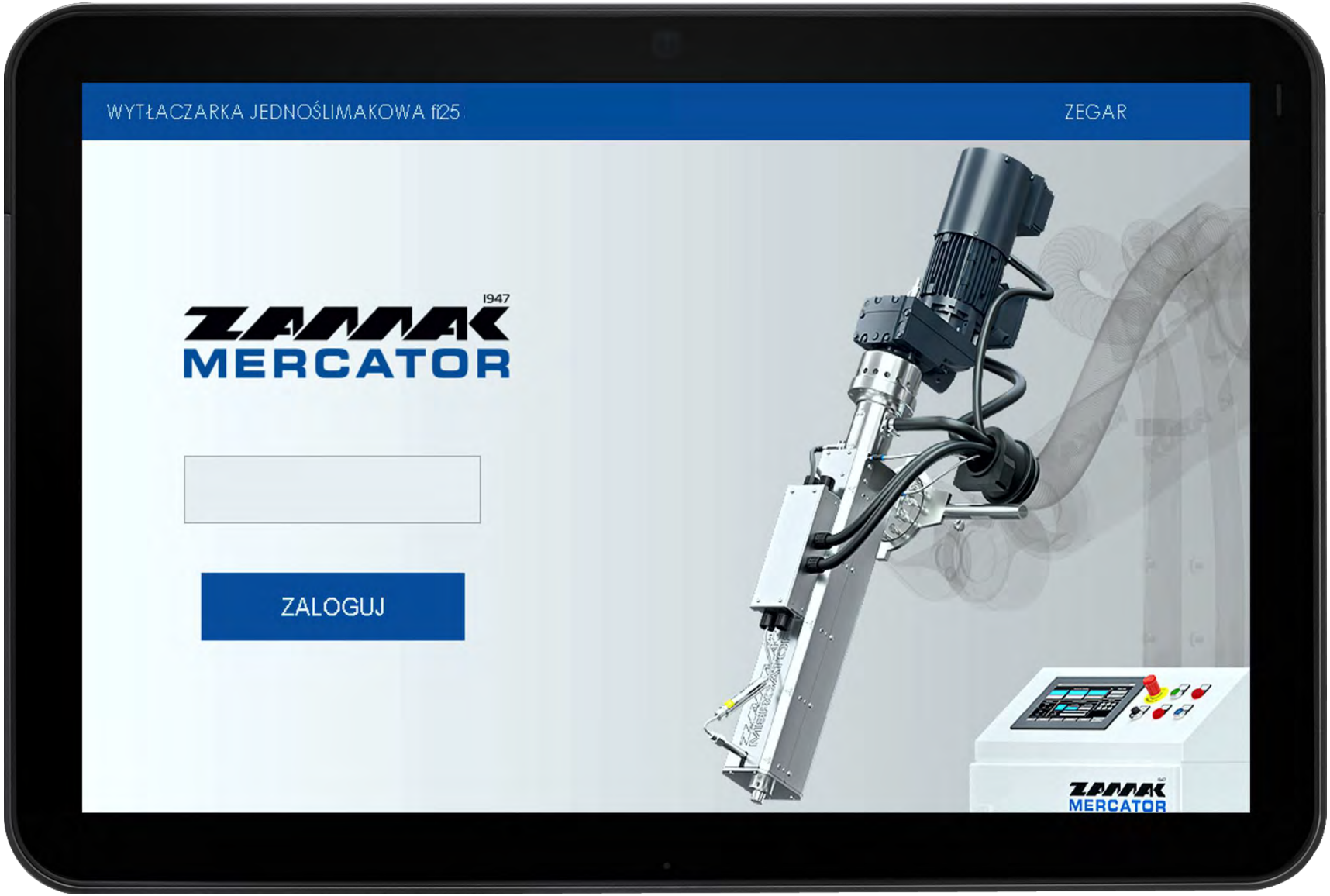
Sample laboratory device user interface - important functional features

- Access to advanced device settings - additional second level of access protected by a password
- Access to service settings - additional third level of access protected by a password
- Possibility to integrate the control system with other laboratory devices and Zamak Mercator lines and, optionally, devices from other manufacturers
- Possibility to control and service via WWW





An exemplary extruder user interface for a 3d printer visible on the tablet screen



Optional equipment of extruders and laboratory lines - requires the installation of a WiFi gate

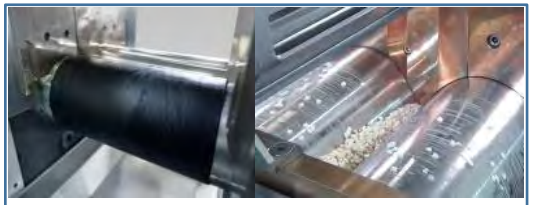
DOUBLE ROLLER ROLLING MILLS

for rubber and plastic

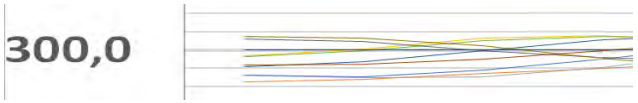
Pharmacy

Medicine

Laboratoryjne walcarki Zamak Mercator – ważne cechy użytkowe



Rollers:
- Made with high accuracy
- Double chrome plated and ground
- Adapted to work with rubber, plastics and other materials
- The working chamber is made of stainless or acid-resistant steel



The roller heating and cooling system ensures accurate and reliable temperature regulation

Integration of volumetric dispensers for liquids

Rollers:
- Rollers are moved with precision ball screws
- Change and dynamic control of the width and parallelism of the joint under full load
- Stabilization of the slot width in the full range of operating temperatures

- Gap adjustment range 0.2-10 mm
- Special execution 0.05-5 mm for the LM 150/320 rolling mill

- Two independent roller drives
- High power and torque
- Any friction

Professional roller heating and cooling systems

Multi-zone heating system - **electric.**
Forced air cooling system
Temp. max 300°C

One or two-zone heating and cooling system - **oil.**
Temp. max 270°C

One or two-zone heating and cooling system - **water.**
Temp. max 150°C / 200°C

Safety system compliant with the	EN-1417 standard
Emergency braking	<60o
The rollers' emergency separation is	50 mm
Roller emergency spreading time	<5s
Mechanical covers with safety sensors	
Safety switches - manual buttons	4
Safety switches - knee buttons	2

Automatic bidirectional mixing system

Force measurement between cylinders

Digital control and communication system

Laboratory rolling mills LM 150/320

Technical data of the rolling mill for rubber and plastics		
Model		LM - 150/320
Number of rollers	[pcs]	2
Roller-working width	[mm]	320
Roller diameter	[mm]	150
Working gap	[mm]	0,2 – 10 [50]
Accuracy of gap positioning between rollers	[mm]	± 0,1
Adjusting the distance of rollers during operation		Yes [from the touch screen]
Automatic control and adjustment of rollers parallelism		Yes
Adjustable linear roller speed	[m/min]	0,25 - 17
Adjustable rotational roller speed	[rev/min]	0,5 - 36
Fraction adjustment during operation		Yes
Roller temperature adjustment during operation		Yes
Roller temperature measurement		Multizone spatial - 6 measurement points
Distance between rollers measurment		Yes [0,01mm]
Measurement of work parameters of each engine		Yes
UPS battery voltage measurement		Yes
Temperature measurement of UPS batteries		Yes
Strain-gauge tension measur. between rollers		Yes
Maximum force between rollers - dynamic	[N]	56 600
Maximum force between rollers - static	[N]	254 400
Torques of rollers / motor power - (Rolling mill models with higher motor power are recommended for rubber mixtures)	[Nm/kW]	2 x 750 / 2 x 3,0 2 x 1 000 / 2 x 4,0 2 x 1 250 / 2 x 5,5
Fraction adjustment range		Any within the range of rotation
Roller surface		Chrome-plated
Roller temperature for water system	[°C]	20 - 130
Roller temperature for oil system	[°C]	20 - 250
Roller temperature for electrical systems	[°C]	20 - 300
Roller temperature control		Advanced digital PID controller
Independent heating and cooling units for rollers		Option
Heating-and-cooling power		Depending on the system selected
Refrigerant		Depending on the system selected
Control of all functions		Touch Screen 12”
Control unit		Bernecker + Rainer Industrie Elektronik GmbH
Drives		Bernecker + Rainer Industrie Elektronik GmbH and Lenze Drives GmbH
Process memory (archiving)		Yes

Laboratory rolling mills LM 150/320

Laboratory rolling mills LM 200/400

Technical data of the rolling mill for rubber and plastics		
Model		LM - 200/400
Number of rollers	[pcs]	2
Roller-working width	[mm]	400
Roller diameter	[mm]	200
Working gap	[mm]	0,2 – 10 [50]
Accuracy of gap positioning between rollers	[mm]	± 0,1
Adjusting the distance of rollers during operation		Yes
Automatic control and adjustment of rollers parallelism		Yes
Adjustable linear roller speed	[m/min]	0,25 - 17
Adjustable rotational roller speed	[rev/min]	0,5 - 27
Fraction adjustment during operation		Yes
Roller temperature adjustment during operation		Yes
Roller temperature measurement		Multizone spatial - 6 measurement points
Distance between rollers measurment		Yes [0,01mm]
Measurement of work parameters of each engine		Yes
UPS battery voltage measurement		Yes
Temperature measurement of UPS batteries		Yes
Strain-gauge tension measur. between rollers		Yes
Maximum force between rollers - dynamic	[N]	149 000
Maximum force between rollers - static	[N]	500 000
Torques of rollers / motor power - (Rolling mill models with higher motor power are recommended for rubber mixtures)	[Nm/kW]	2 x 1 300 / 2 x 4,0 2 x 2 000 / 2 x 5,5 2 x 2 700 / 2 x 7,5
Fraction adjustment range		Any within the range of rotation
Roller surface		Chrome-plated
Roller temperature for water system	[°C]	20 - 130
Roller temperature for oil system	[°C]	20 - 250
Roller temperature for electrical systems	[°C]	20 - 300
Roller temperature control		Advanced digital PID controller
Independent heating and cooling units for rollers		Option
Heating-and-cooling power		Depending on the system selected
Refrigerant		Depending on the system selected
Control of all functions		Touch Screen 12”
Control unit		Bernecker + Rainer Industrie Elektronik GmbH
Drives		Bernecker + Rainer Industrie Elektronik GmbH and Lenze Drives GmbH
Process memory (archiving)		Yes

Laboratory rolling mills LM 200/400

Laboratory rolling mills LM 250/500

Technical data of the rolling mill for rubber and plastics		
Model		LM - 250/500
Number of rollers	[pcs]	2
Roller-working width	[mm]	500
Roller diameter	[mm]	250
Working gap	[mm]	0,2 – 10 [50]
Accuracy of gap positioning between rollers	[mm]	± 0,1
Adjusting the distance of rollers during operation		Yes
Automatic control and adjustment of rollers parallelism		Yes
Adjustable linear roller speed	[m/min]	0,25 - 17
Adjustable rotational roller speed	[rev/min]	0,5 - 22
Fraction adjustment during operation		Yes
Roller temperature adjustment during operation		Yes
Roller temperature measurement		Multizone spatial - 6 measurement points
Distance between rollers measurement		Yes [0,01mm]
Measurement of work parameters of each engine		Yes
UPS battery voltage measurement		Yes
Temperature measurement of UPS batteries		Yes
Strain-gauge tension measur. between rollers		Yes
Maximum force between rollers - dynamic	[N]	149 000
Maximum force between rollers - static	[N]	500 000
Torques of rollers / motor power - (Rolling mill models with higher motor power are recommended for rubber mixtures)	[Nm/kW]	2 x 2 300 / 2 x 5,5 2 x 3 000 / 2 x 7,5 2 x 4 200 / 2 x 11
Fraction adjustment range		Any within the range of rotation
Roller surface		Chrome-plated
Roller temperature for water system	[°C]	20 - 130
Roller temperature for oil system	[°C]	20 - 250
Roller temperature for electrical systems	[°C]	20 - 300
Roller temperature control		Advanced digital PID controller
Independent heating and cooling units for rollers		Option
Heating-and-cooling power		Depending on the system selected
Refrigerant		Depending on the system selected
Control of all functions		Touch Screen 12”
Control unit		Bernecker + Rainer Industrie Elektronik GmbH
Drives		Bernecker + Rainer Industrie Elektronik GmbH and Lenze Drives GmbH
Process memory (archiving)		Yes

Laboratory rolling mills LM 250/500

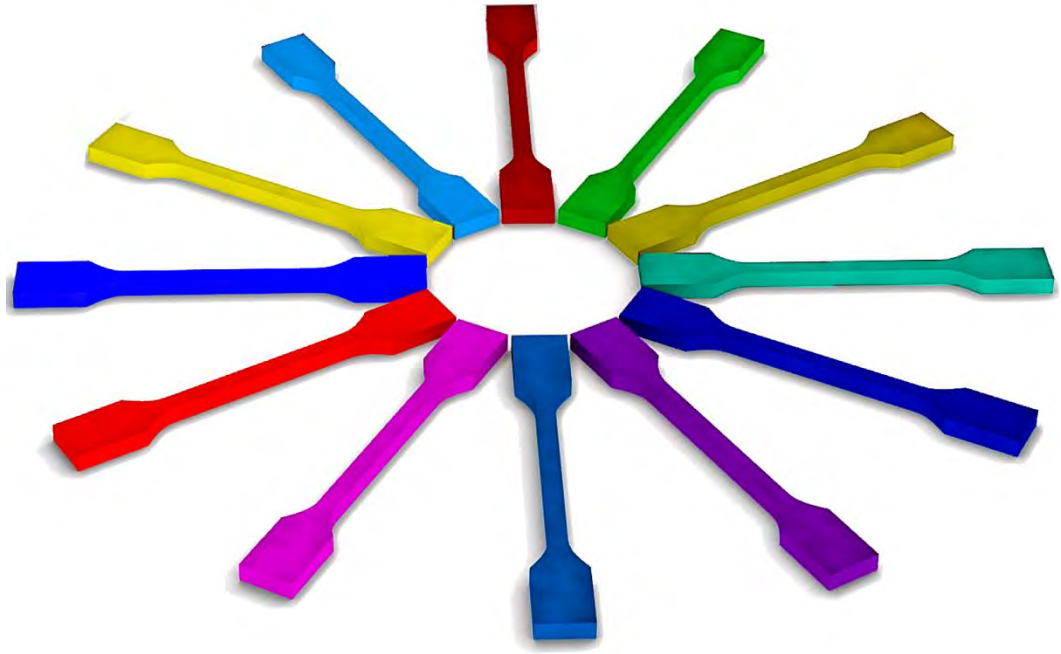
Laboratory Rolling Mills

Laboratory Rolling Mills LM – safety system and optional equipment

Safety system				
		LM-150/320	LM-200/400	LM-250/500
Safety system compliant with applicable standard EN - 1417		Yes	Yes	Yes
Emergency braking		Yes < 60°	Yes < 60°	Yes < 60°
Emergency roller disengagement	[mm]	50	50	50
Emergency roller disengagement time	[s]	< 5	< 5	< 5
Mechanical guards with safety sensors		Yes	Yes	Yes
Safety switches - hand operated buttons		2 [option 4]	2 [option 4]	2 [option 4]
Safety switches - elbow buttons		1 [option 2]	1 [option 2]	1 [option 2]
Backup power supply for UPS security systems		Yes - it supports the operation of security systems and facilitates the emergency disengagement of the rollers after a power failure		
Safety switches for head or hand		Yes	Yes	Yes
Electronic-overload protection		Yes	Yes	Yes
Short-circuit protection		Yes	Yes	Yes
Anti-shock protection		Yes	Yes	Yes
Main switch		Yes	Yes	Yes
Optional equipment				
Liquid-dosing system		Yes	Yes	Yes
Pyrometric-temperature measurement of rolled material		Yes	Yes	Yes
Automatic wrapping (mixing) of material		Yes	Yes	Yes
Independent heating-and-cooling units for each roller		Yes - for maintaining different roller temperatures		

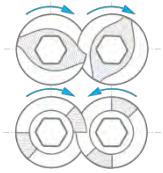
LABORATORY TEST STAND

for research



Laboratory test stand with a twin-screw cone non-modular extruder series REM-2CA Vertex and with:

- Electric microinjection molding machine RIM-20/1250
- Pneumatic microinjection molding machine RWM-20/800
- Pneumatic microinjection molding machine RWM-16/1000
- Pneumatic microinjection molding machine WT-11/1200



Laboratory test stand with a twin-screw cone non-modular extruder series REM-2CA Vertex

The test stand optimizes the development process, enabling testing of mechanical properties of samples from 5ml to 20ml.
It is the answer to the need to produce various samples with variable geometry, combined with a limited amount of material, which is usually a barrier to product development.

Rigorous management of all parameters when creating a sample enables optimal repeatability and precision of research. The unintentional potential impact of the user on the quality of the sample has been limited by control and storage of all operating parameters in the device's memory.

The injection molding machine can be equipped with molds for dumbbells, bars, rings and other plastic samples. Prepared molds meet current standards and can also be adapted to the specific needs of the Client. Ready samples can be used, among others, for strength tests of thermoplastics, impact tests using the Charpy method, determination of hardness using the Shore method, as well as for determining mechanical properties and the modulus of elasticity, e.g. when stretching or bending. What's more, the molds are great for research on the thermal degradation of polymeric materials and for determining the processing and secondary shrinkage of samples.

Test samples can be prepared from powders, granules or by direct transfer from a conical twin screw extruder. Geometry of the samples is offered from standard sets to custom molds that can be ordered individually.

The ZAMAK MERCATOR testing system was designed based on the RIM micro injection molding machine and REM-2C Vertex II conical micro-extruder as a piston injection system for test samples. This method dramatically reduces, compared to conventional injection molding equipment, the amount of material consumed due to the small volume of the injection molding cylinder. Almost entire material transport from the extruder to the mold reduces material losses to a minimum. In addition, injection pressures of up to 1250 bar can be achieved with volumes up to 20ml. The mold and cylinder of the injection molding machine are equipped with precisely adjustable two-zone heating systems.

The molds into which the melted polymer is injected are divided into three parts, which makes removing the samples much easier. The shape of the samples can be in accordance with standards or any, and the only limit is the size of the mold and the capacity of the injection system. The molds are made entirely of alloy steel. The injection process is completely automated. Thanks to the microprocessor-based PLC and special software dedicated to the injection molding machine it is possible to control not only the injection force, but also the injection and pressure time as well as cylinder and mold temperatures. Test results and recipes can be saved to a USB stick to be transferred next to e.g. a spreadsheet. The device is controlled via a modern touch panel. Our micro injection molding machine can work autonomously or cooperate with the REM-2C Vertex II conical extruder, in which the injection material is plasticized.

The REM-2C Vertex II extruder is a professional testing device with a large torque of 2x60Nm and a rotation range from 0 to 400 rpm, thanks to a modern 3kW drive.

Laboratory twin-screw conical non modular extruder series - REM-2C Vertex II

Conical extruder REM-2C Vertex II		
Model	Unit	Extruder REM-2C Vertex II
Number of screws	[pcs]	2
Corotating screws	Standard	Yes [standard]
Counterrotating screws	Option	Yes [option]
Gearbox type	Vertex	switchable - corotational / counterrotational with adjustable gap between the barrel and the screws and measurement of axial force
Unit capacity	[ml]	od 5 do 20 [replaceable cylinder inserts]
Barrel design [split horizontally with replaceable inserts]		The cylinder has inserts, the replacement of which allows obtaining a variable capacity of the system.
The water-cooled charging area is standard	Standard	Yes
Additional port in the middle of barrel length	Option	Yes [dosing/ degassing/ gas blowing]
Basic barrel insert 20 ml	Standard	Yes [20 ml insert]
Optional barrel insert 15 ml	Option	Yes [15 ml insert]
Optional barrel insert 10 ml	Option	Yes [10 ml insert]
Optional barrel insert 5 ml	Option	Yes [5 ml insert]
Internal cylinder surface type [nitrided in standard]		insert [nitrided/ hardened/ HIP/ other on request]
Screw design		monolithic
Type of outer surface of the screws		[nitrided/ hardened/ HIP/ other on request]
Maximum torque	[Nm]	2 x 30
Screw torque measurement		yes
Measurement of axial force acting on screws	Option	Yes option [0 - 10 000 N, 0,2 class]
Regulation of the gap between the barrel and the screws		Yes [precise mechanical adjustment of the position of the screws along the longitudinal axis]
Maximum working pressure	[bar]	200
Pressure measurement accuracy	[%]	± 0,5
Maximum screws revolution speed	[rev/min]	400
Maximum working temperature	[°C]	400
Temperature measurement accuracy	[°C]	± 0,3 in the range of 20-400 °C
Temperature measurement resolution	[°C]	0,1 in the range of 20-400 °C
Temperature regulation [stabilization]		Multi-zone PID controlling heating and cooling power
Number of heating zones	[pcs]	5
Cooling system		Air, individual for each zone operating temperature 40 - 450°C
Cooling the feed zone		Yes, water in a closed circuit with its own cooler
Dosing system		Volumetric or gravimetric dosers
A system for easy emptying of the hopper		Yes
Gas purge system	Option	Yes
Remote control	Option	Yes
Ethernet	Option	Yes
User interface		Color touch screen HMI 7"lub 10"
Control		PLC processor working in distributed architecture
Drive power		Maximum power of the drive motor 3 kW

Electric microinjection molding machine RIM-20/1250

Electric injection molding machine RIM-20/1250		
Model		**Electric injection molding machine RIM-20/1250**
Maximum sample volume	[ml]	20
Maximum injection capacity	[ml]	20
Maximum cylinder temperature	[°C]	300
Maximum mold temperature	[°C]	300
Injection cylinder heaters power	[W]	600
Mold heater power	[W]	2200
Maximum actuator stroke	[mm]	140
Actuator stroke during injection	[mm]	0-100
The cross-sectional area of the injection cylinder piston	[mm^2]	200 [2 cm^2]
Maximum injection force	[kN]	25 [for the lifetime of the electric actuator 2500 km / 15 000 000 injection cycles]
Maximum injection pressure	[bar]	1250 [For injection cylinder volume 20 cm^3]
Injection force control		Yes [Can be defined in the range to 25 000 N]
Actuator stroke control		Yes [stroke can be defined with a resolution of 0,05 mm]
Injection time control		Yes
Mold temperature regulation		Yes [two zones]
Cylinder temperature regulation		Yes [two zones]
Stand temperature adjustment for the injection cylinder		Yes [maintains a constant temperature of the injection nozzle, one zone 20-300°C]
Basic injection mold		Yes [1 pc]
Replaceable injection mold inserts		Yes [1 pc]
Additional injection molds [according to the order]	Option	Yes [according to the order]
Additional replaceable inserts for the injection mold [according to the order]	Option	Yes [according to the order]
Additional injection cylinder	Option	Yes [according to the order]
Additional stand for the injection cylinder	Option	Yes [according to the order]
Temperature measurement accuracy	[°C]	± 0,3 in the range of 20-400 °C
Temperature measurement resolution	[°C]	0,1 in the range of 20-400 °C
Temperature regulation [stabilization]		Multi-zone PID controlling heating power
User interface		7" HMI color touch screen
Control		PLC processor working in distributed architecture, equipped with a touch screen, real time communication bus, Power Link
Remote control	Option	Yes
Ethernet	Option	Yes
Security		yes [overload, short circuit, anti-shock] - Main and safety switch

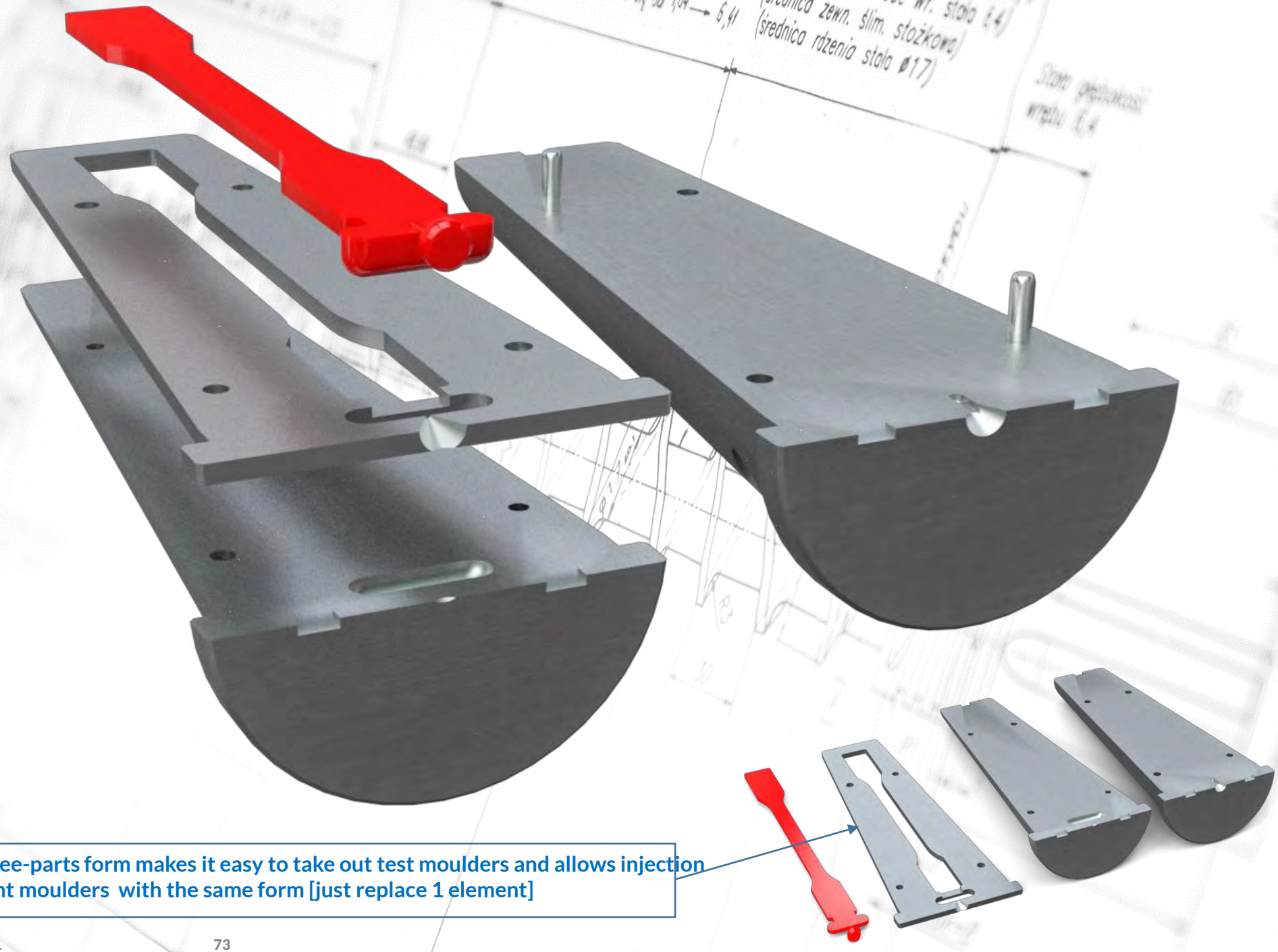
Pneumatic microinjection molding machine RWM-20/800
Pneumatic microinjection molding machine RWM-16/1000

Pneumatic injection molding machine RWM-20/800 / RWM-16-1000		
Model		**Pneumatic IMM RWM-20/80** **Pneumatic RWM-16-1000**
Maximum sample volume	[ml]	20 / 16
Maximum injection capacity	[ml]	20 / 16
Maximum cylinder temperature	[°C]	300
Maximum mold temperature	[°C]	300
Injection cylinder heaters power	[W]	600 / 400
Mold heater power	[W]	2200
Maximum actuator stroke	[mm]	140
Actuator stroke during injection	[mm]	140
The cross-sectional area of the injection cylinder piston	[mm^2]	200 [2 cm^2] or 160 [1,6 cm2]
Maximum injection force	[kN]	16 [for air pressure 8 bar]
Maximum injection pressure	[bar]	800 [For injection cylinder volume 20 cm^3] 1000 [For injection cylinder volume 16 cm^3]
Injection force control		Yes [by setting air pressure up to 16 kN]
Actuator stroke control		No
Injection time control		No
Mold temperature regulation		Yes [two zones]
Cylinder temperaturę regulation		Yes [two zones]
Stand temperature adjustment for the injection cylinder		Yes [maintains a constant temperature of the injection nozzle, one zone 20-300°C]
Basic injection mold		Yes [1 pc]
Replaceable injection mold inserts		Yes [1 pc]
Additional injection molds [according to the order]	Option	Yes [according to the order]
Additional replaceable inserts for the injection mold [according to the order]	Option	Yes [according to the order]
Additional injection cylinder	Option	Yes [according to the order]
Additional stand for the injection cylinder	Option	Yes [according to the order]
Temperature measurement accuracy	[°C]	± 0,3 in the range of 20-400 °C
Temperature measurement resolution	[°C]	0,1 in the range of 20-400 °C
Temperature regulation [stabilization]		Multi-zone PID controlling heating power
User interface		7" HMI color touch screen
Control		PLC processor working in distributed architecture, equipped with a touch screen, real time communication bus, Power Link
Remote control	Option	Yes
Ethernet	Option	Yes
Security		yes [overload, short circuit, anti-shock] - Main and safety switch

Pneumatic microinjection molding machine WT-11/1200

Pneumatic injection molding machine WT-11/1200		
Model		**Pneumatic IMM WT-11/1200**
Maximum injection capacity	[ml]	11
Maximum cylinder temperature	[ml]	11
Maximum mold temperature	[°C]	300
Injection cylinder heaters power	[°C]	300
Mold heater power	[W]	400
Maximum injection capacity	[W]	400
Actuator		Pneumatic
Actuator stroke	[mm]	100
Maximum injection force	[kN]	15000
Maximum injection pressure	[Bar]	1200
Injection force control		Yes [by setting air pressure]
Actuator stroke control		No
Injection time control		No
Mold temperature regulation		Yes
Cylinder temperature regulation		Yes
Basic injection mold [1 pc]		Yes
Temperature measurement accuracy	[°C]	± 0,3 in the range of 20-400 °C
Temperature measurement resolution	[°C]	0,1 in the range of 20-400 °C
Temperature regulation [stabilization]		Multi-zone PID controlling heating power
User interface		7" HMI color touch screen
Control		PLC processor working in distributed architecture, equipped with a touch screen
Additional injection cylinder	Option	No
Additional injection molds	Option	Yes
Remote control	Option	Yes
Ethernet	Option	Yes
Security		Yes [overload, short circuit, anti-shock] - Main and safety switch

The three-parts form for test moulders used in micro injection molding machines



The three-parts form makes it easy to take out test moulders and allows injection different moulders with the same form [just replace 1 element]

CATERPILLAR HAUL-OFFS
CATERPILLAR HAUL-OFFS WITH ROTARY KNIFE

Caterpillar haul-offs optionally equipped with a rotary knife [200 cuts / min]

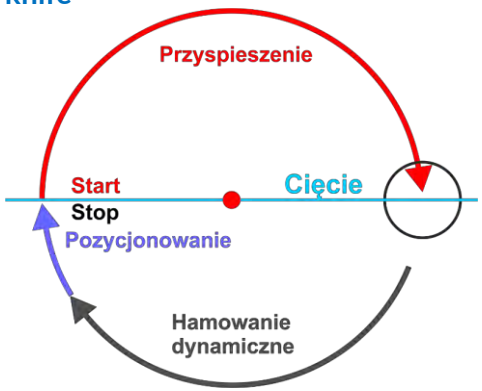
Programmable caterpillar haul-offs			
Caterpillar haul-offs		OG-400	OG-600
Active caterpillar length	[mm]	400	600
caterpillar width	[mm]	80	80 or 120
Linear caterpillar speed range [app-ready]	[m/min]	10 - 120	10 - 120
Independent caterpillar drive		YES	YES
Power of caterpillar drive engines [asynchronous motors with encoders]	[kW]	2 x 0.55	3 x 0.75
Inverter for constant pulling force over the entire speed range		YES	YES
Power of caterpillar drive motors [synchronous servo engines] [Option]	[kW]	2 x 0.50	3 x 0.75/1.0
Servo [inverter] drive for constant pulling force over the entire speed range [Option]		YES	YES
Measuring distance between caterpillars in the range of 0-80 mm with a resolution of 0.01 mm		YES	YES
Electrically from the operator's desktop, the distance between the caterpillars is set		YES	YES
Additional direct digital measurement of linear caterpillar speed [Option]		Option	Option
Touch screen operator [HMI] 3 access levels		YES	YES
Programmable rotary knife for cutting profiles			
Programmable rotary knife for cutting profiles		N-100	N-200
Power of the rotary knife drive motor - asynchronous motor	[kW]	0,75	Nd
Power of the rotary knife drive motor - synchronous motor [servo]	[kW]	Nd	1
Maximum number of cuts per minute		100	200
Maximum diameter of soft tube cutting	[mm]	2 x 20	2x 20
Maximum cut diameter of soft filaments	[mm]	4 x 8	4 x 8
Positioning of the knife in each cycle		YES	YES
Programmable cut length		YES	YES
Knife torque	[Nm.]	30	30
Independent installation method [suitable for in-line application]		Option	Option
Mounting method integrated with OG-400 or OG-600 extraction		YES	YES
Cutting discharge		YES	YES
Replaceable guide insert adapted to cut profiles		YES	YES
Digital synchronization of knife cutting cycles		YES	YES
Programming all cutting knife functions from one integrated touch panel		YES	YES
Knife type [removable, standard]		YES	YES
thickness of the removable knife	[mm]	0,20/0,5	0,20/0,5

Caterpillar haul-offs optionally equipped with a rotary knife [200 cuts / min]

Caterpillar haul off OG - 400/80
Equipped with a two-axis diameter measurement system

Caterpillar haul off OG – 600/120

Caterpillar haul off OG - 400/80
Equipped with the N - 200 rotary knife



Rotary knife N - 200 - 200 cuts / min with measurement of the length of the cut element

Caterpillar haul off OG – 600/120
Equipped with the N - 200 rotary knife

LABORATORY GRANULATORS

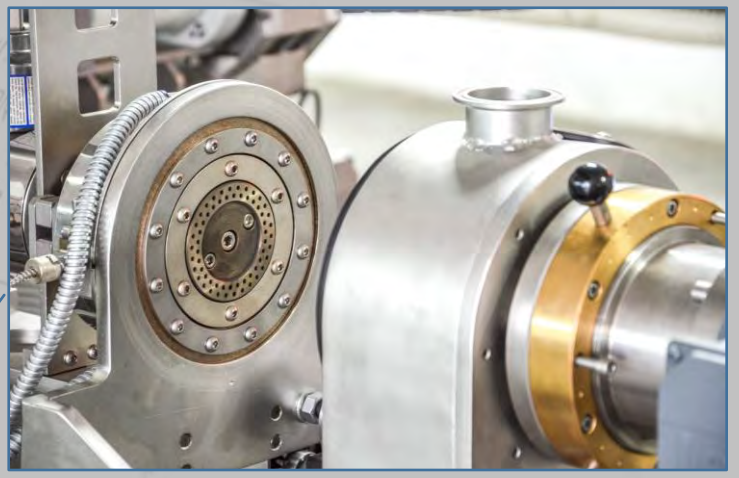
RESEARCH AND GANULATION STATIONS

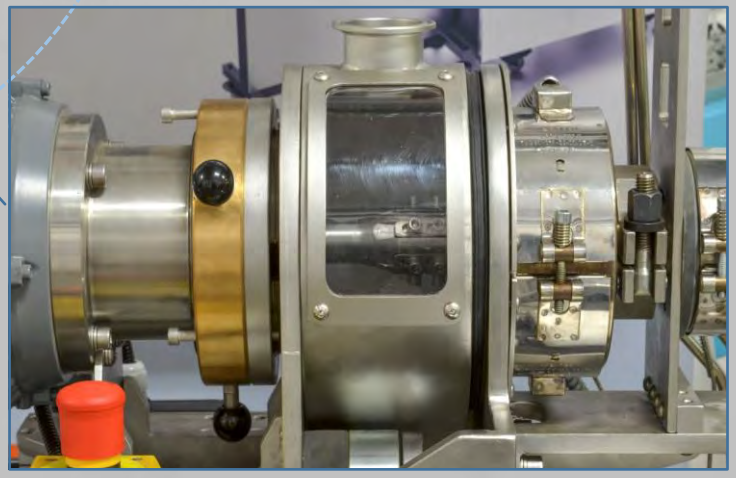
Air-cooled granulator at the head

Laboratory granulation station equipped with Zamak Mercator twin-screw extruders - technical data of the granulator

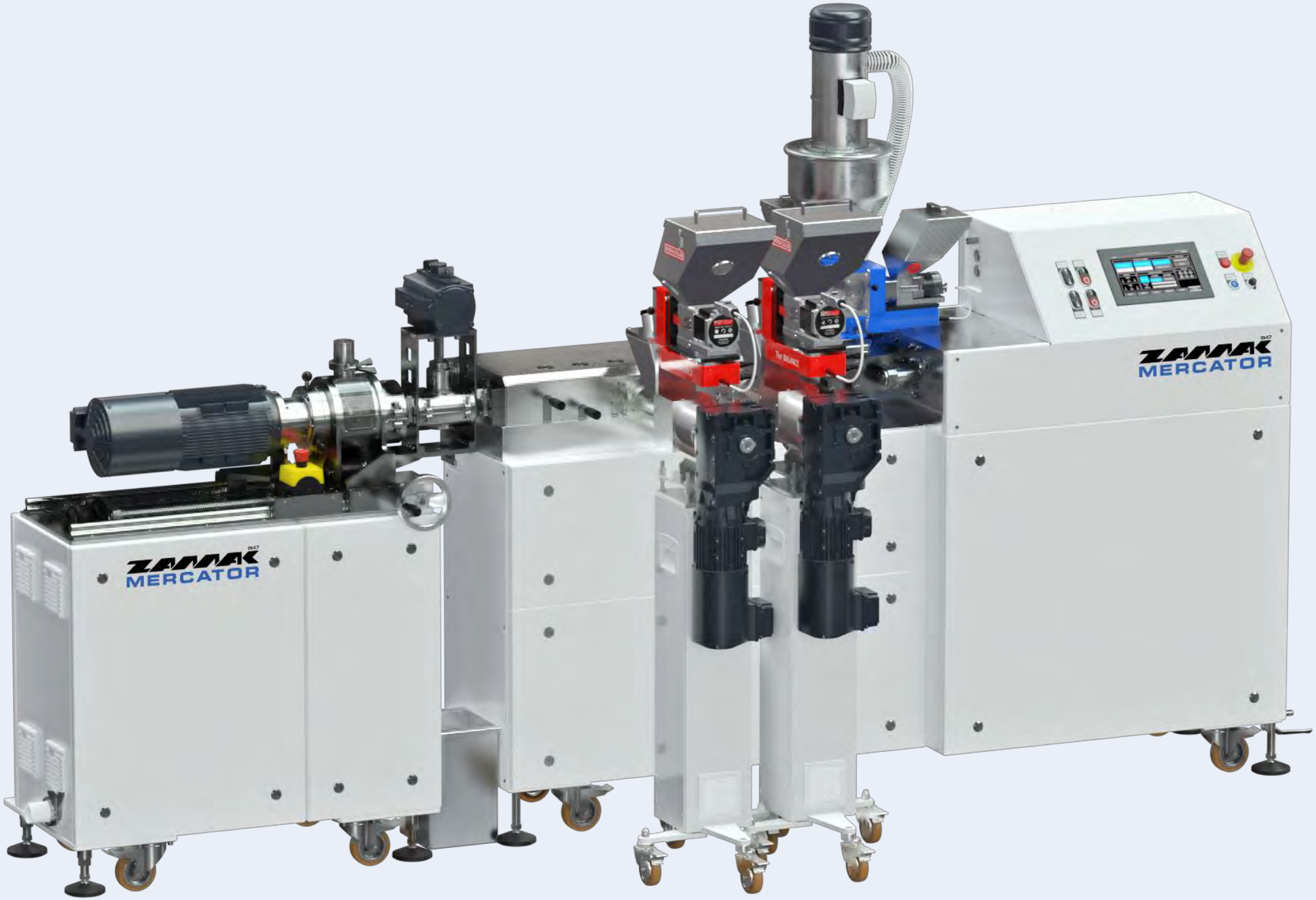
Laboratory granulator with cut at air-cooled head		
Device control		HMI touch panel and PLC
Maximum knife speed	[rev/min]	980/1450/2600/3500
Knife speed control		Yes [Inverter]
Number of cutting blades	[pcs.]	3 or 6
Knife drive motor power	[kW]	2,2
Diameter of cut monofilaments	[mm]	1.5 to 4
Granules length	[mm]	2 to 5
Cut into flakes	[mm]	0.1to1
Maximum linear velocity of the monofilaments	[m/min]	dependent on extruder
Security System		YES
Digital PLC		YES

Zamak Mercator laboratory granulation station - important functional features of the granulator





Granulation station equipped with air-cooled granulator at the head - [non-modular extruder]



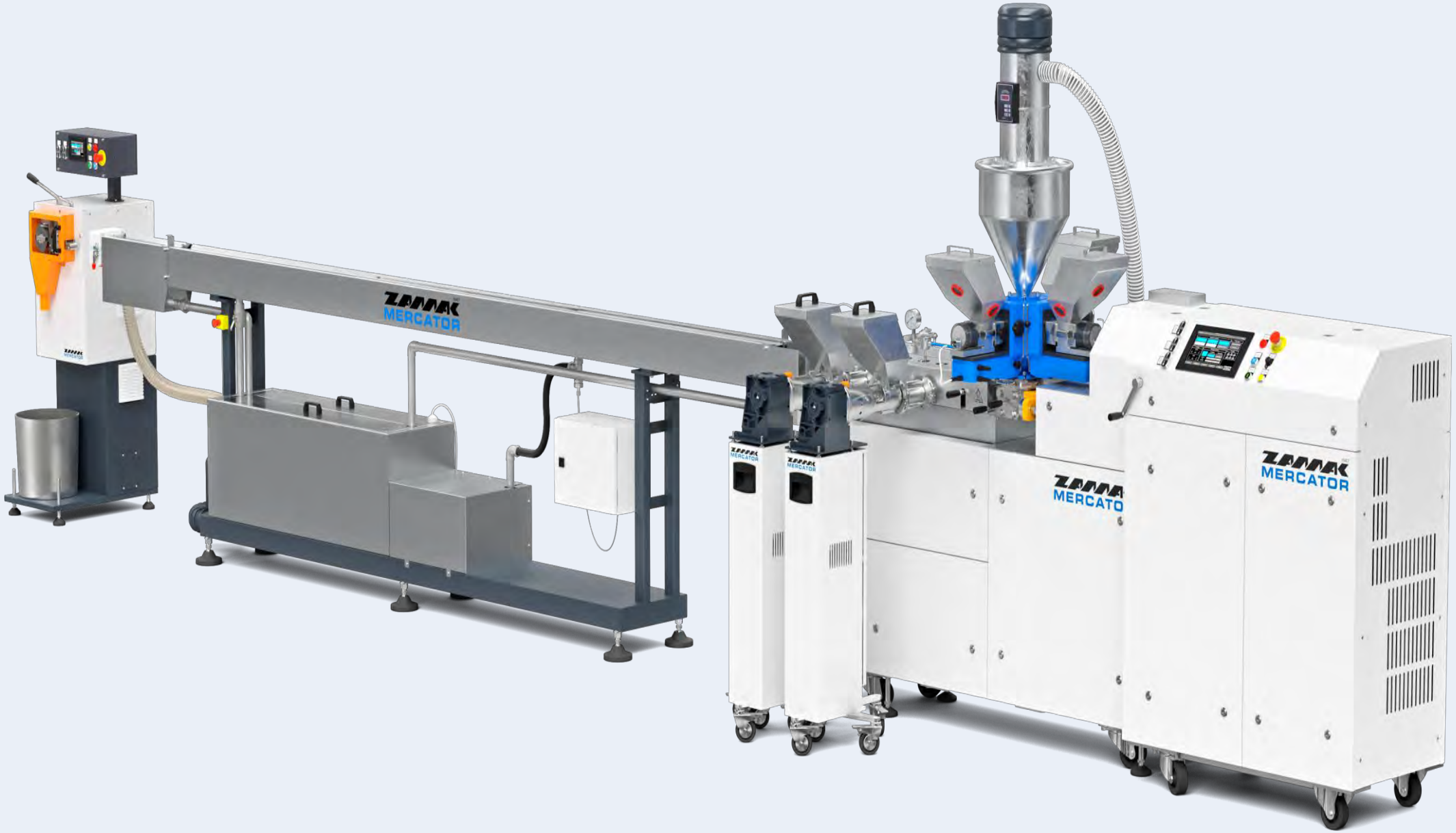
RESEARCH AND GANULATION STATIONS

Free-standing granulator, water cooling

Laboratory granulator for monofilaments - technical data

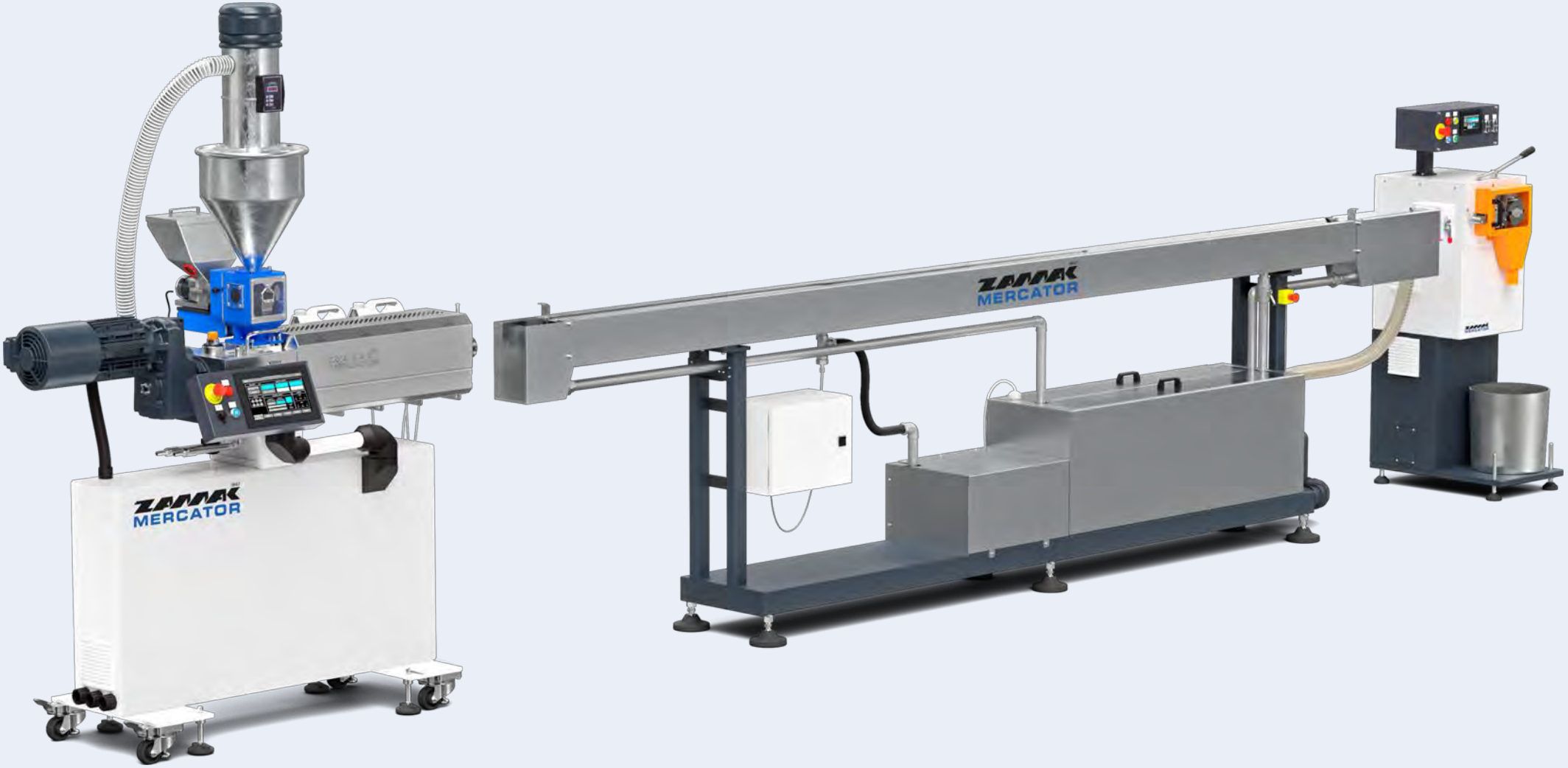
Laboratory granulator for monofilaments		
Device control		HMI touch panel and PLC
The diameter of the removable cutting knife	[mm]	125
Maximum knife speed	[rev/min]	2600/3500
Knife speed control		Yes [Inverter]
Number of cutting blades	[pcs.]	4 to 12
Knife drive motor power	[kW]	2,2
The power of the drive motor receiving the monofilaments	[kW]	0,55
Diameter of cut monofilaments	[mm]	1.5 to 4
Granules length	[mm]	2 to 5
Cut into flakes	[mm]	0.1to1
Maximum linear velocity of the monofilaments	[m/min]	10/20/30/40
Linear speed control		Yes [Inverter]
Security System		YES
Digital PLC		YES

Granulation station equipped with a water-cooled free-standing granulator - [modular extruder]



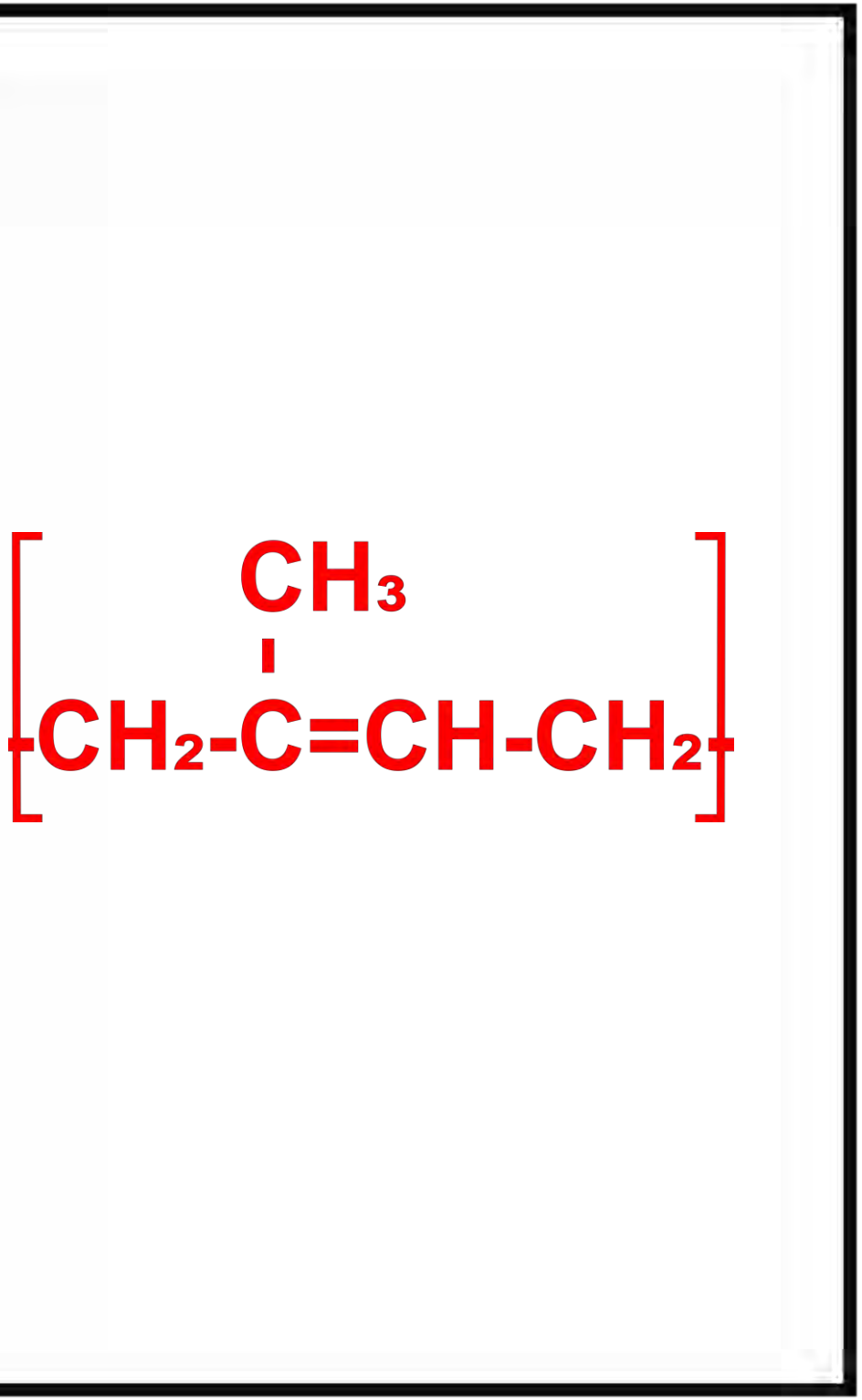
Granulation station equipped with a water-cooled free-standing granulator - [2x12 mm non-modular twin-screw extruder]

Granulation station equipped with a water-cooled free-standing granulator - [25 mm single-screw extruder]



SEQUENTIAL INJECTION MOULDING MACHINE

for rubber compounds



View of the programmed sequential injection molding machine for rubber, integrated with the base, in which the power supply and control system as well as the heating and cooling aggregate are located

Sequential rubber injection molding machine is designed to work with rubber profile extrusion lines.

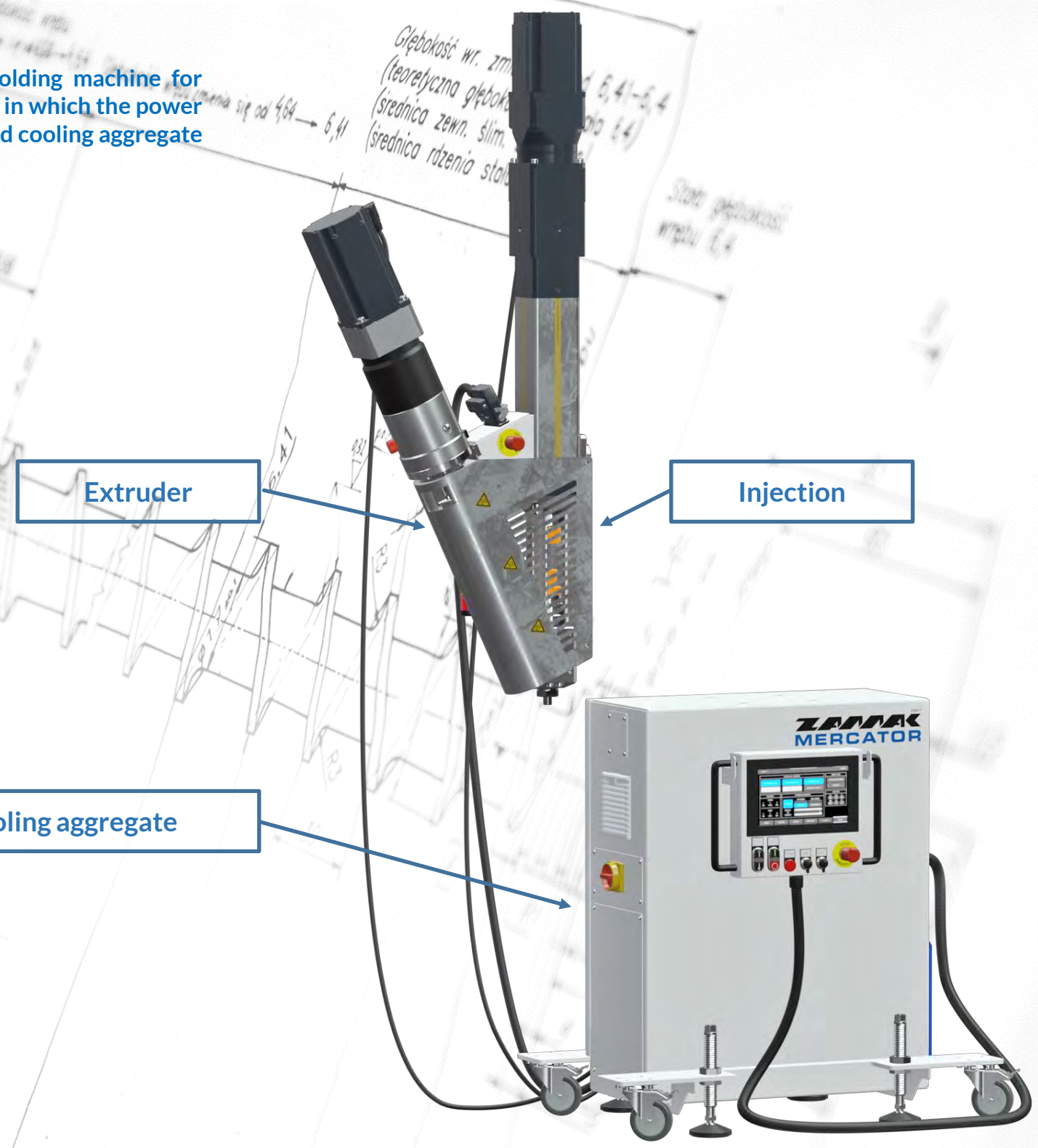
Cooperating with the extrusion head during profile extrusion, enables sequential injection of the rubber compound inside the profile in order to obtain the desired mechanical properties of the profile over the programmed section.

The injection molding machine is fed by a plasticized rubber compound through an integrated extruder.

The digital control system allows precise synchronization of the injection moment as well as volume and speed control.

The injection molding machine can also work as an auxiliary unit for another injection molding machine.

View of the programmed sequential injection molding machine for rubber separated from the supply and control unit, in which the power supply and control system as well as the heating and cooling aggregate are located.



Extruder module model 40/12					
Extrusion capacity	[kg/h]	30			
Screw diameter	[mm]	36			
Plasticization unit	[L/D]	12			
Rotation speed	[rev/min]	150			
Maximum torque	[Nm]	230			
Extruder servo motor power	[kW]	4			
Maximum pressure	[bar]	400			
Heating and cooling zone		2			
Supply with a rubber belt		Yes			
Feed belt dimensions [width/ thickness]	[mm]	30x5			
Electric injection molding machine module RIG-30					
Electric injection molding machine		RIG-30/600	RIG-30/800	RIG-30/1200	RIG-30/1600
Maximum injection capacity	[ml]	30	30	30	30
Minimum injection capacity	[ml]	5	5	5	5
Maximum cylinder temperature	[°C]	150	150	150	150
Heating and cooling aggregate					
Heating power of the heating and cooling aggregate	[kW]	6	6	6	6
Cooling power at temperature 80 °C / 15 °C	[kW]	45	45	45	45
Cooling aggregate pump performance	[l/min]	27	27	27	27
Maximum water pressure in the circuit	[bar]	4,5	4,5	4,5	4,5
Tank capacity of the heating and cooling aggregate	[l]	9	9	9	9
Actuator and injection cylinder		ETH-100 M-20	ETH-100 M-20	ETH-125 M-20	ETH-125 M-20
Maximum actuator stroke	[mm]	140	140	140	140
Actuator stroke during injection	[mm]	0-80	0-110	0-80	0-110
The cross-sectional area of the injection cylinder piston	[mm^2]	380 [3,8 cm^2]	280 [2,8 cm^2]	380 [3,8 cm^2]	280 [2,8 cm^2]
Maximum injection force	[kN]	25	25	50	50
Maximum injection pressure	[Bar]	600	800	1200	1600
Injection force control		Yes [In the range up to 25 000 N]		Yes [In the range up to 50 000 N]	
Actuator stroke control		Yes [the stroke can be defined with the resolution of 0.05 mm]			
Injection time control		Yes	Yes	Yes	Yes
Programming the injection sequence		Yes	Yes	Yes	Yes
Maximum injection speed	[mm/s]	100	200	100	200
Filling time (30 cm3)	[s]	4,5	4,5	4,5	4,5
Minimal injection time (30 cm3)	[s]	0,85	0,85	0,85	0,85
Cylinder temperature control		Yes	Yes	Yes	Yes
Injection molding machine servo-drive power	[kW]	4	6	8	12
Additional injection cylinder	Option	Yes [according to the order]			
Control		PLC processor working in distributed architecture			
Synchronization with extrusion line or injection molding machine		Yes	Yes	Yes	Yes
User interface		7 "HMI color touch screen			
Remote control	Option	Yes	Yes	Yes	Yes
Ethernet	Option	Yes	Yes	Yes	Yes
Cooperation with devices from other manufacturers	Option	Yes	Yes	Yes	Yes

EXAMPLES OF LABORATORY LINES

Laboratory miniature single and double screw extruders

Miniature twin screw extruder for medicine and pharmacy applications

A miniature single screw extruder for applications in medicine and pharmacy

Miniature twin screw extruder for medicine and pharmacy applications

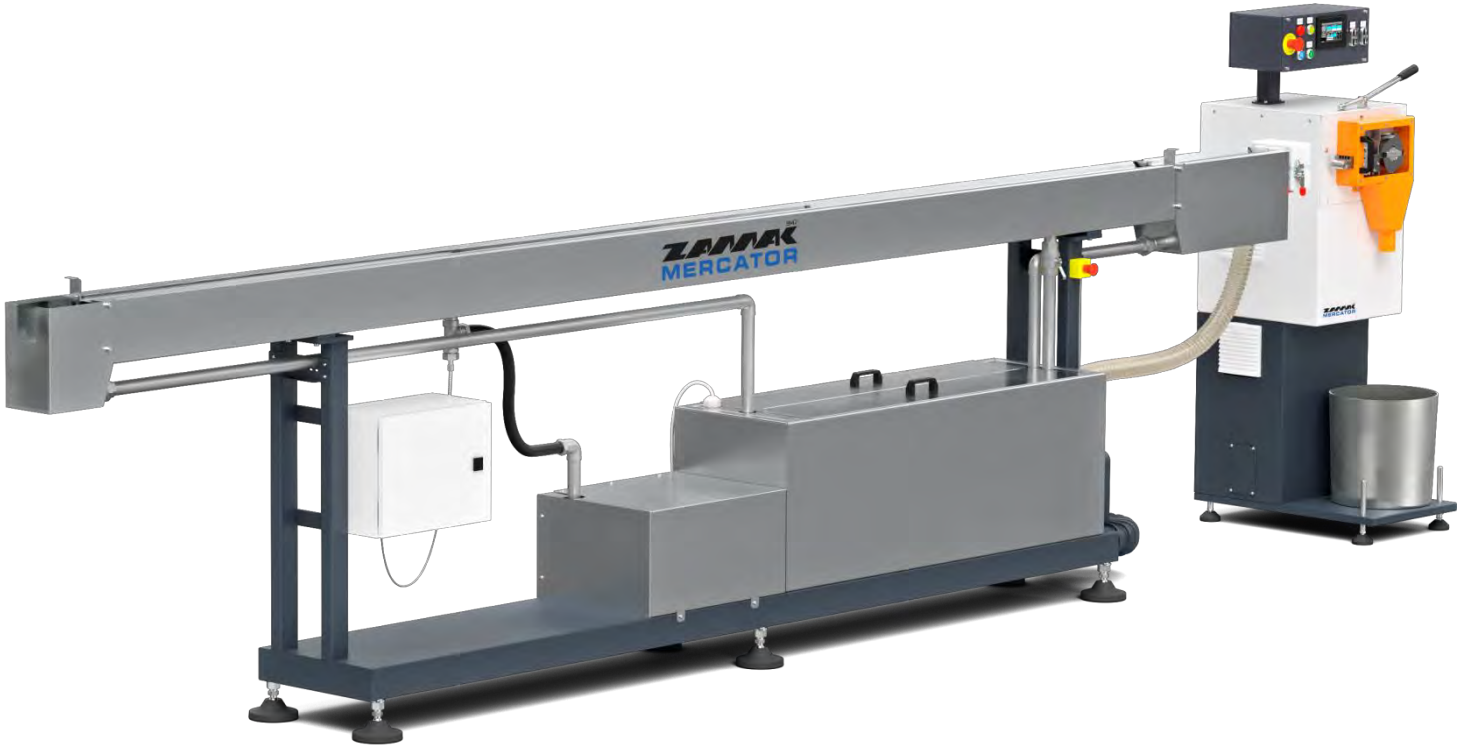
A specialized single-screw extruder for medical micro tubes

Sample laboratory lines

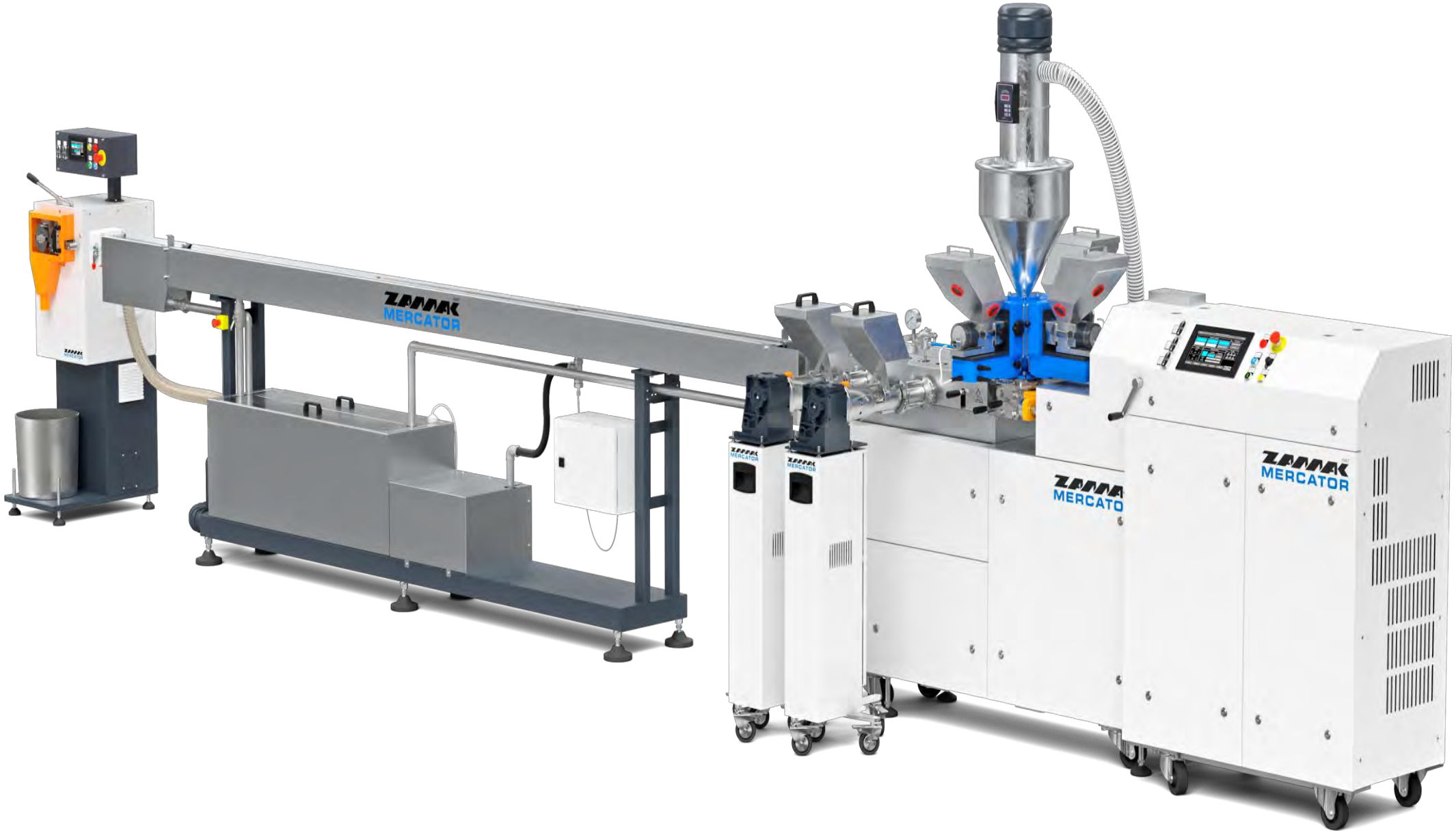
Sample laboratory lines

Sample laboratory lines

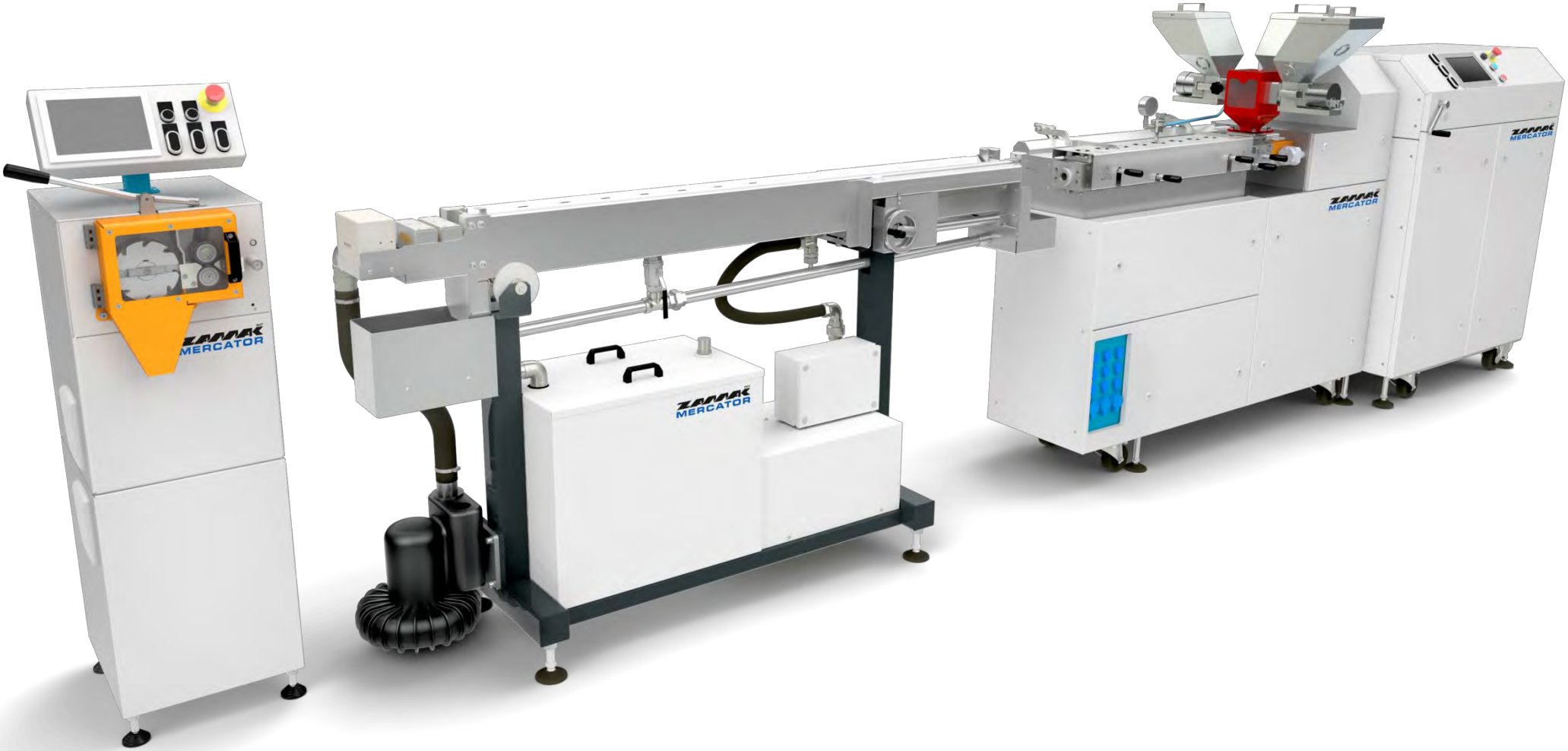
Sample laboratory lines



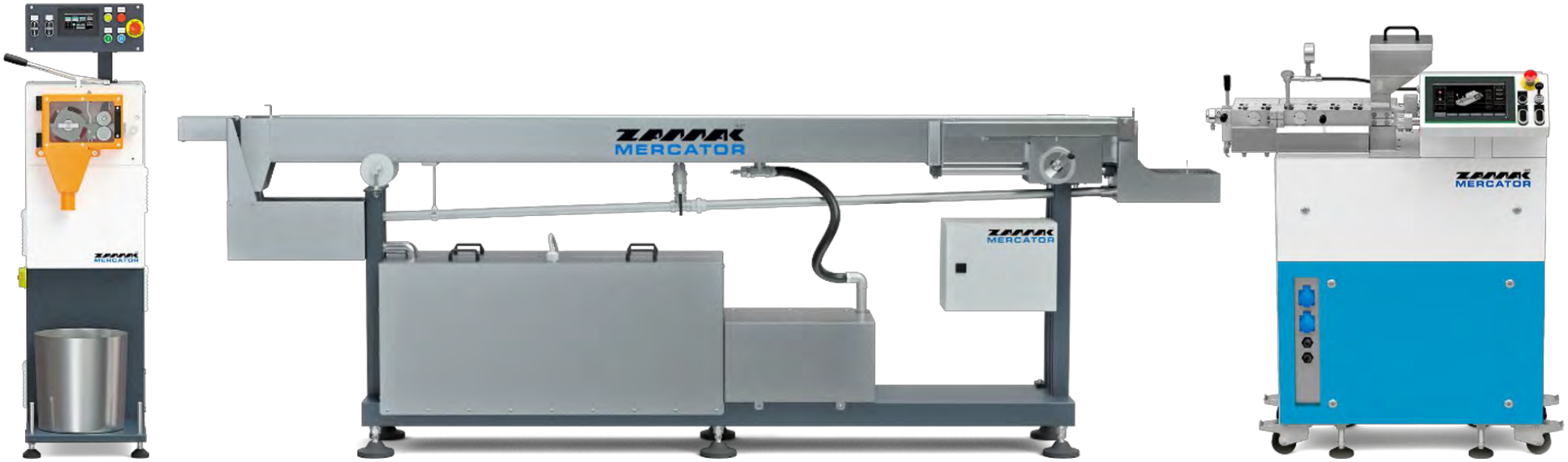
Sample laboratory lines



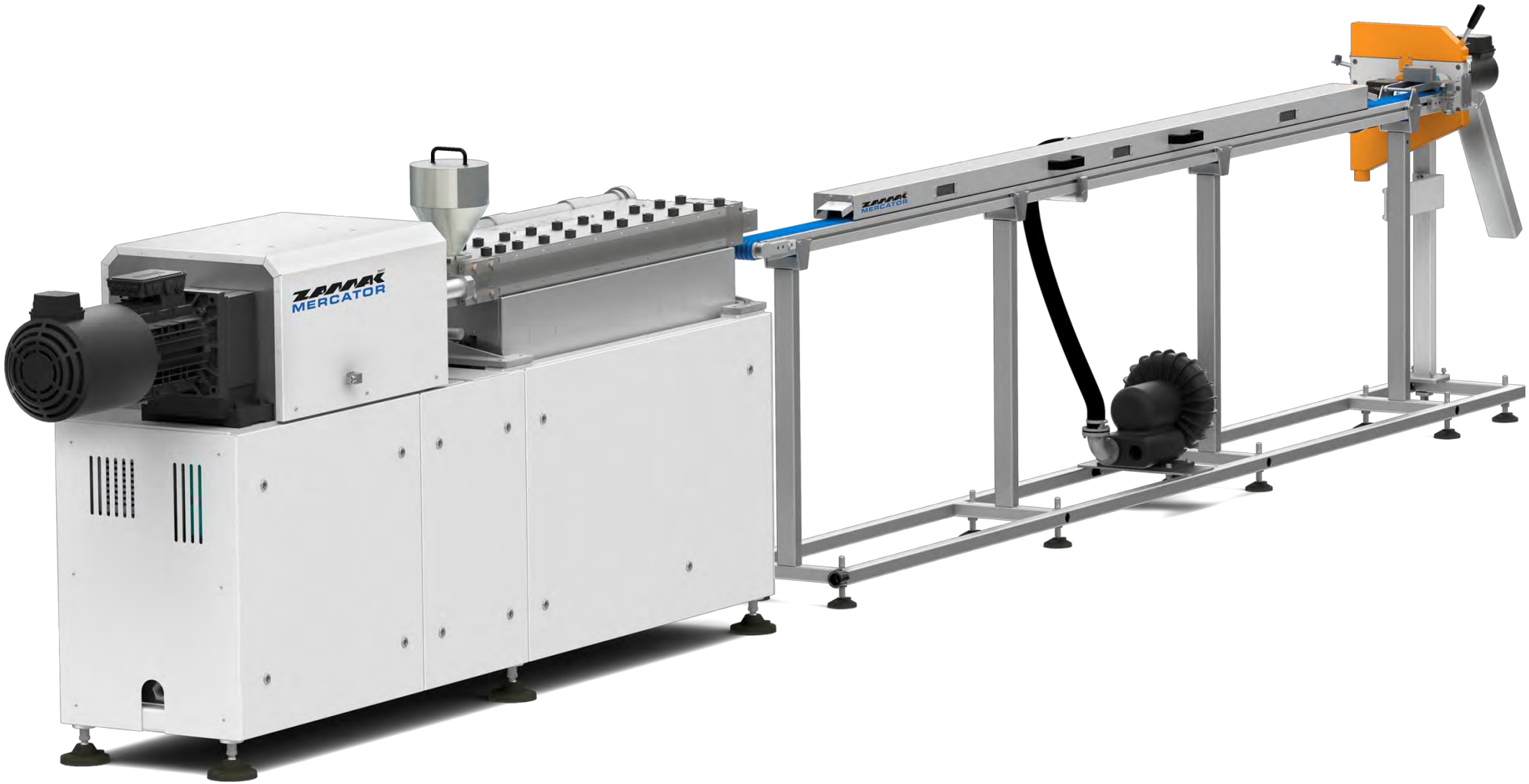
Sample laboratory lines



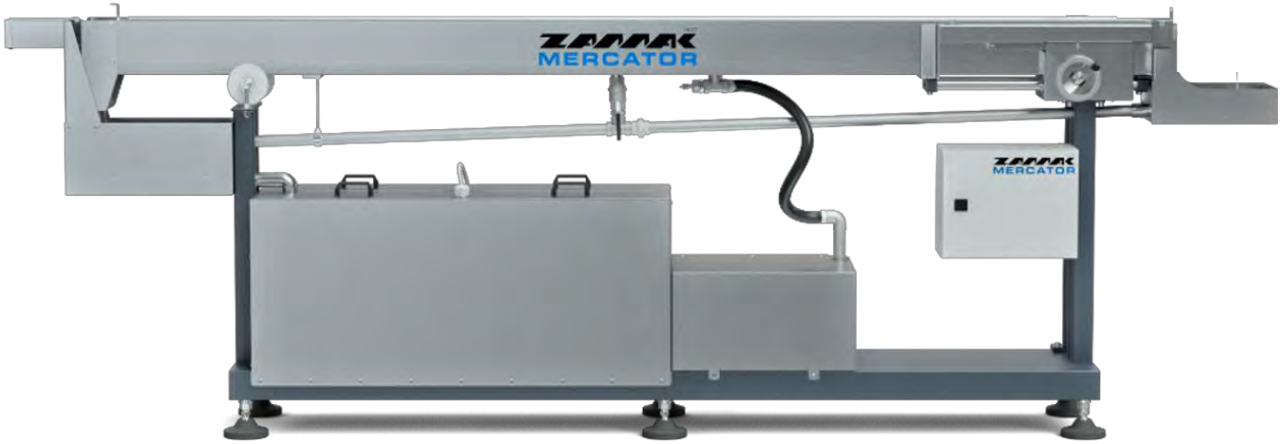
Sample laboratory lines



Sample laboratory lines

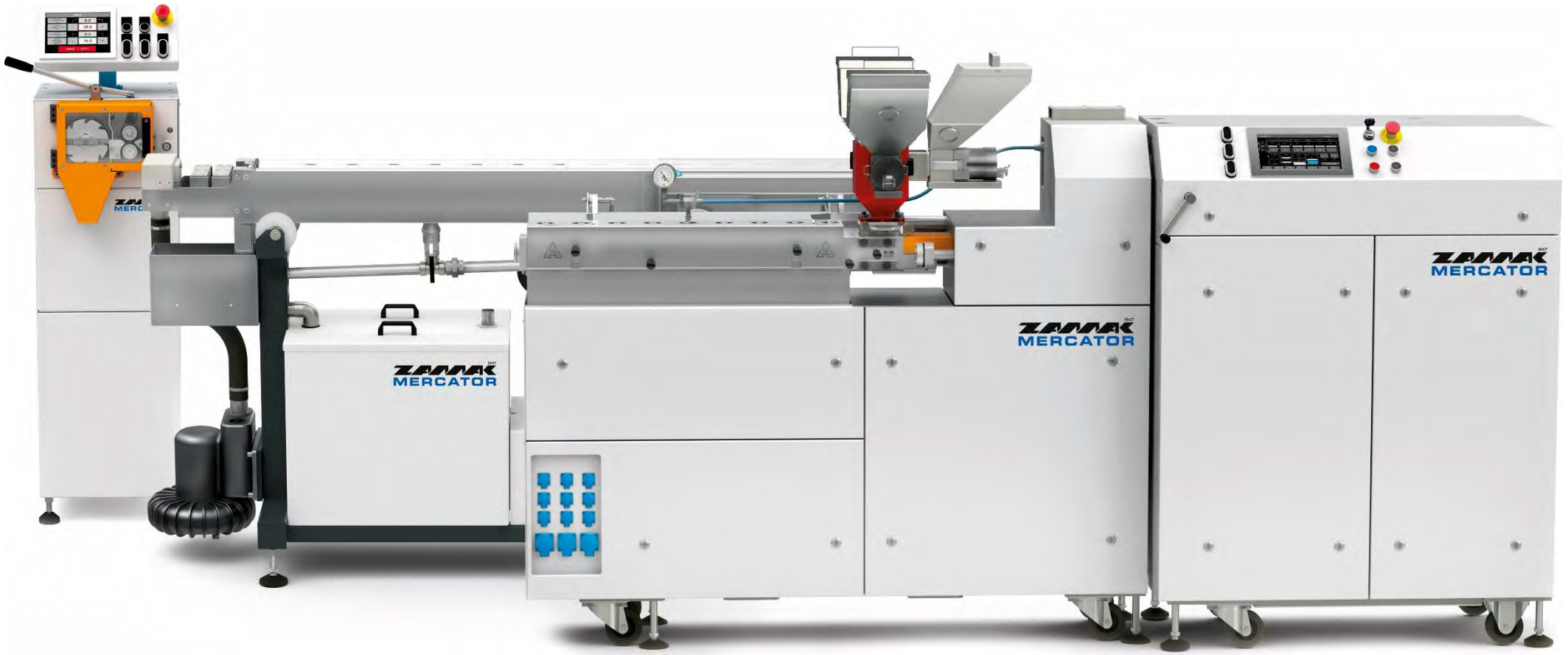


Sample laboratory lines



Sample laboratory lines

Sample laboratory lines



Sample laboratory lines

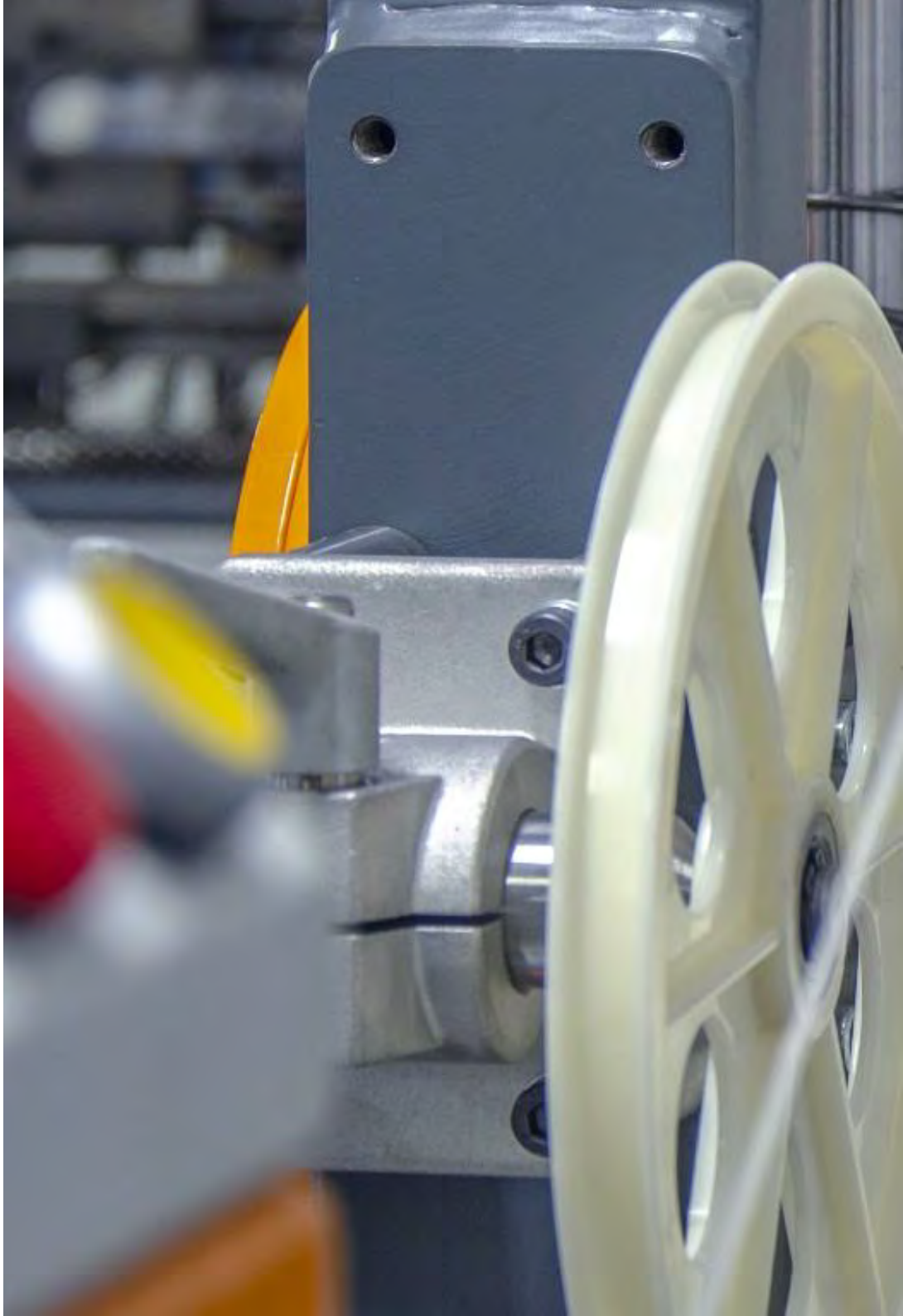
Sample laboratory lines

Sample laboratory lines

Sample laboratory lines

ACCESSORY DEVICES

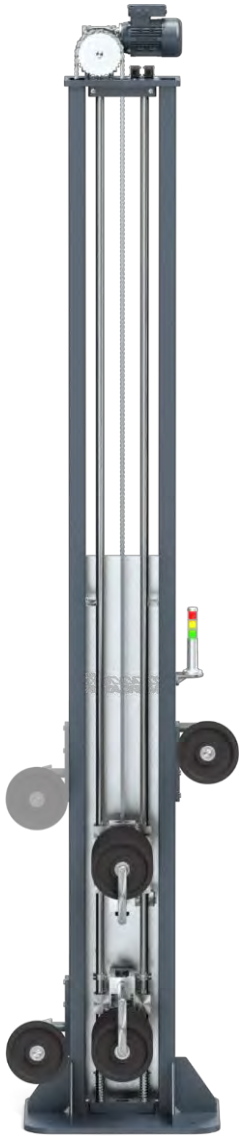
for laboratory lines



Auxiliary devices for laboratory lines

Laboratory caterpillar haul-offs
OD – 600 /120 OD – 400 /80

Laboratory roller haul-off



Laboratory mixer

Laboratory granulator

Filament storage devices
30/40mb

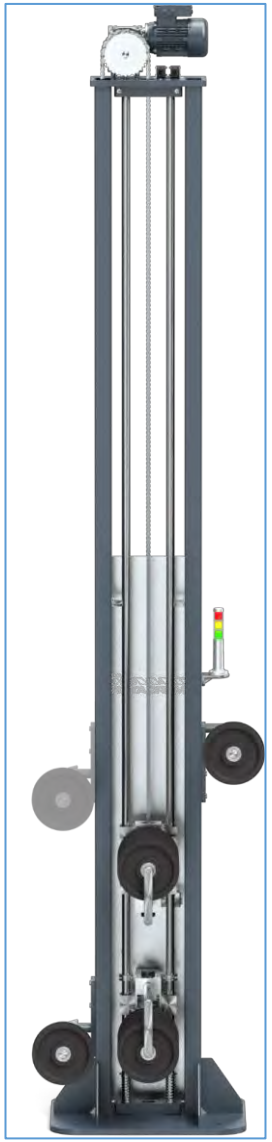
Filament storage devices
52/72mb

Auxiliary devices for laboratory lines

Laboratory caterpillar haul-offs OG – 600 /120 , OG – 400 /80 equipped with a rotating integrated cutting knife N-100 lub N-200

Optional knife control panel

Knife for profiles, tubes N-100, N-200 up to 200 cuts / min



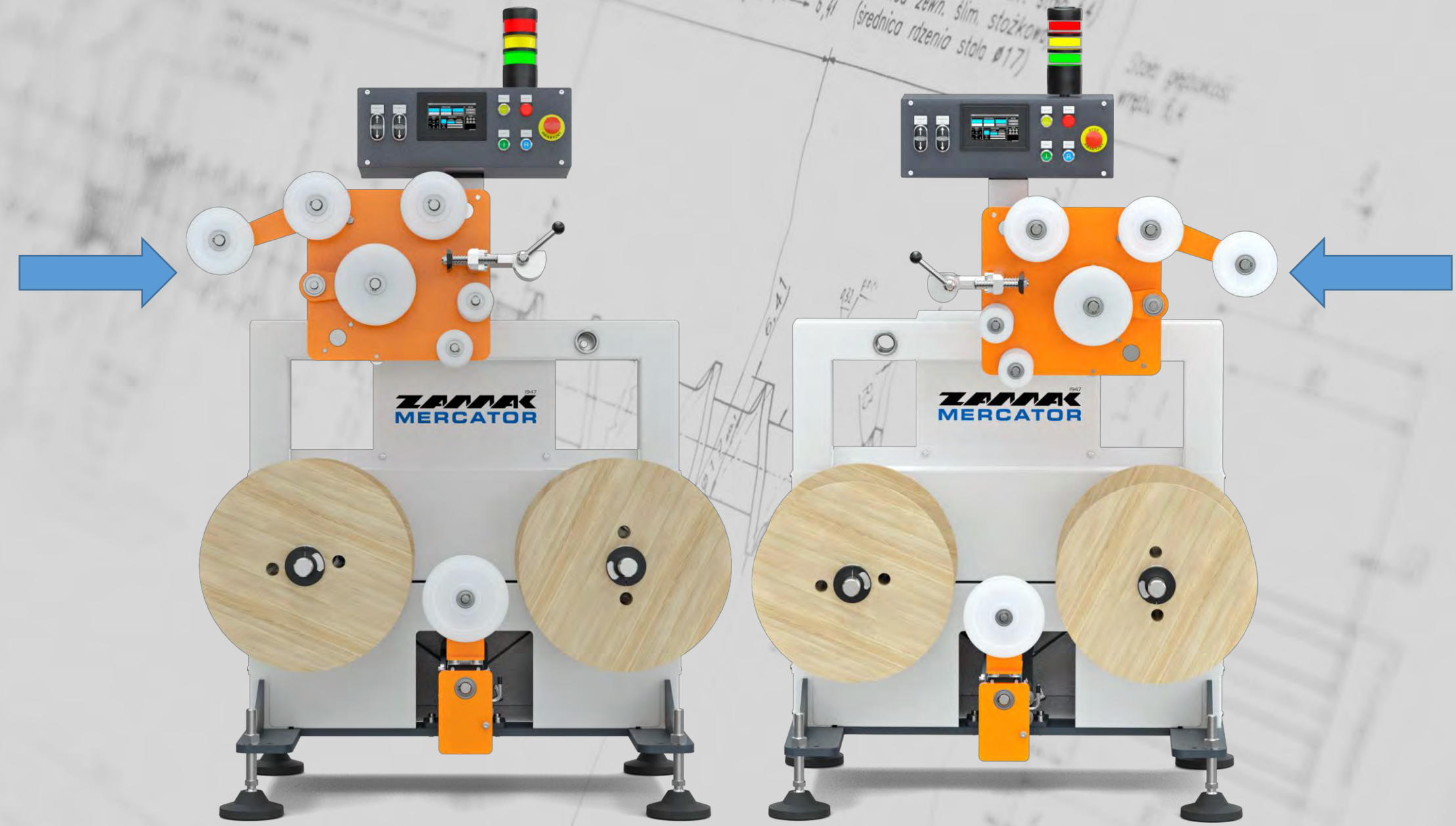
Double spindle winder with mechanical spool stacker [uhing]

Double spindle winder with digital spool stacker [Servo]

Double spindle winder with a digital spool stacker [servo] cooperating with a 72 m filament storage devices

Winders

with a mechanical spool stacker



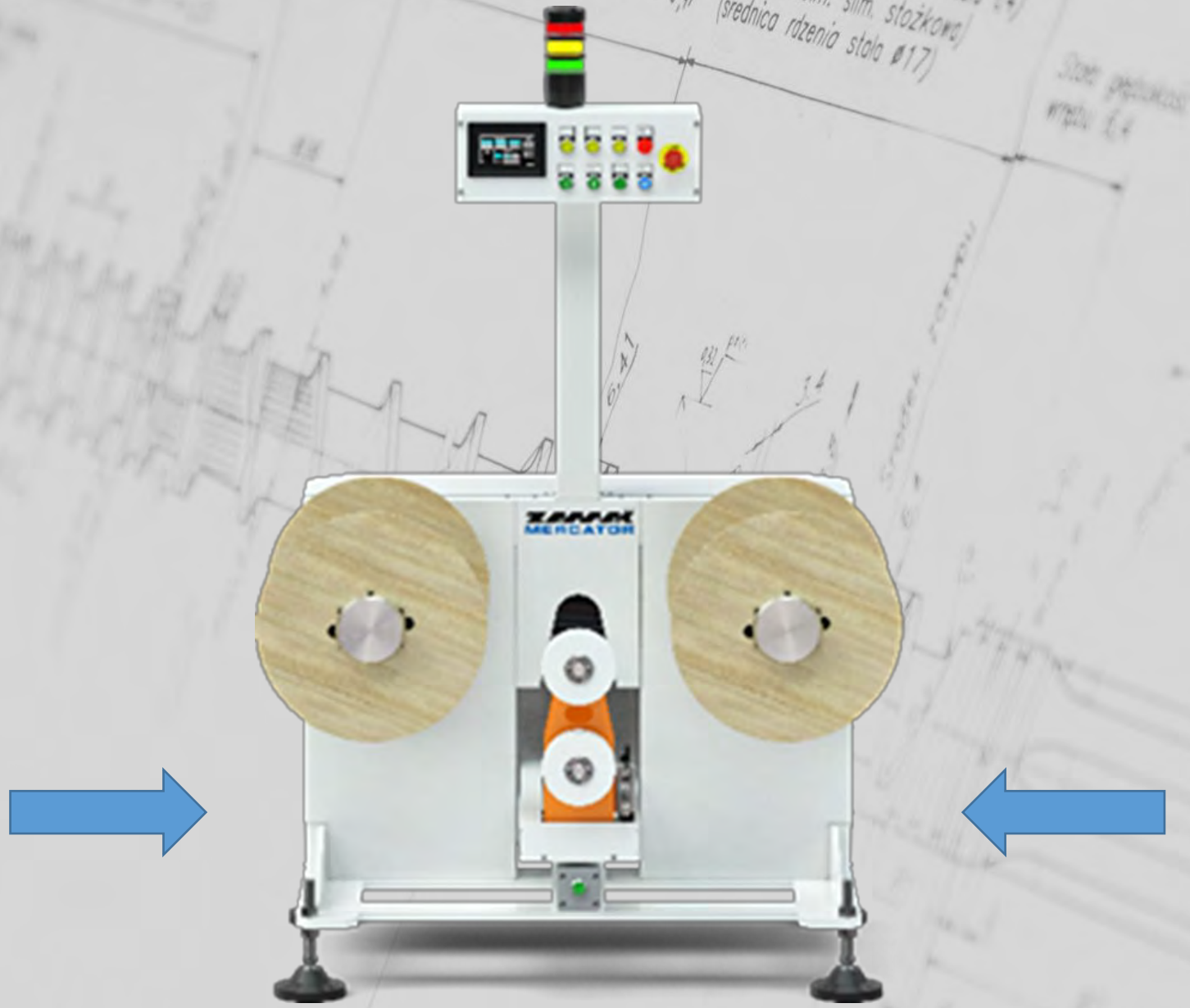
Uhing mechanical spool stacker winders can be configured for left and right hand operation

Double spindle winder with mechanical spool stacker [uhing 3d]	Model Jm	NU-400/140	NU-600/140	NU-400/120	NU-600/120	NU-400/60	NU-600/60	NU-400/30	NU-600/30
Maximum winding speed	[m/min]	140	140	120	120	60	60	30	30
Minimum winding speed	[m/min]	15	15	14	14	7	7	3,5	3,5
Max spool width	[mm]	600	600	600	600	600	600	600	600
Max. coil diameter on the reel	[mm]	400	600	400	600	400	600	400	600
Min. diameter of the reel on the spool	[mm]	100	100	100	100	100	100	100	100
Mechanical spool mounting [high-speed mechanical clamps]		YES	YES	YES	YES	YES	YES	YES	YES
Profile roll width range	**[mm]**	**[0.5-1.5] to [6-18]**							
Multiple width of the winding profile	**[x]**	**3**							
Set filament diameter and spool width [mechanical]		YES	YES	YES	YES	YES	YES	YES	YES
Maximum spool speed	**[n^{-1}/min]**	**446**	**446**	**382**	**382**	**191**	**191**	**96**	**96**
Max. torque[1]	[Nm.]	12	24	14	27	54	54	110	108
Max. tension force[1]	[N]	60	80	70	90	270	180	550	360
Power of drive motors[1]	[KW]	2x0.55	2x1.1	2x0.55	2x1.1	2x1.1	2x1.1	2x1.1	2x1.5
Max. torque[2]	**[Nm.]**	**16**		**28**					
Max. tension force [2]	**[N]**	**80**		**140**					
Power of drive motors[2]	**[KW]**	**2x0.75**		**2x1.1**					
Digital speed measurement		YES	YES	YES	YES	YES	YES	YES	YES
Digital programmable meter counter		YES	YES	YES	YES	YES	YES	YES	YES
Tensometric measurement of tension force		Option	Option	Option	Option	Option	Option	Option	Option
Tension force measurement resolution	[N]	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Average spool change time	[s]	15	15	15	15	15	15	15	15
Brake for the time of changing spools [mechanical]		YES	YES	YES	YES	YES	YES	YES	YES
Brake for the time of changing spools [pneumatic]		Option	Option	Option	Option	Option	Option	Option	Option
Digital PLC		YES	YES	YES	YES	YES	YES	YES	YES
Touch screen operator		YES	YES	YES	YES	YES	YES	YES	YES
Mechanical Stacker [Uhing]		YES	YES	YES	YES	YES	YES	YES	YES
Safety system		YES	YES	YES	YES	YES	YES	YES	YES
Digital communication bus		YES	YES	YES	YES	YES	YES	YES	YES
Digital collaboration with all Zamak Mercator magazines		YES	YES	YES	YES	YES	YES	YES	YES
Possibility of autonomous work		YES	YES	YES	YES	YES	YES	YES	YES
Ability to work with other lines		YES	YES	YES	YES	YES	YES	YES	YES

The technical data of the winders can be adapted to the customer's needs

Winders

with a spool stacker based on a stepper motor



Winders with digital spool stacker can work as left and right sides

Double spindle winder with digital spool stacker [Stepper Motor 3d]	Model	NK-400/140	NK-600/140	NK-400/120	NK-600/120	NK-400/60	NK-600/60	NK-400/30	NK-600/30
	Jm								
Maximum winding speed	[m/min]	140	140	120	120	60	60	30	30
Minimum winding speed	[m/min]	15	15	14	14	7	7	3,5	3,5
Max spool width	[mm]	600	600	600	600	600	600	600	600
Max. coil diameter on the reel	[mm]	400	600	400	600	400	600	400	600
Min. diameter of the reel on the spool	[mm]	100	100	100	100	100	100	100	100
Mechanical spool mounting [high-speed mechanical clamps]		YES	YES	YES	YES	YES	YES	YES	So
Pneumatic spool mounting [pneumatic expansion shaft]		Option	Option	Option	Option	Option	Option	Option	Option
Profile roll width range	**[mm]**	**[0.5-1.5] to [6-18]**							
Multiple width of the winding profile	**[x]**	**3**							
Set filament diameter and spool width [digital]		YES	YES	YES	YES	YES	YES	YES	So
Maximum spool speed	**[n^{-1}/min]**	**446**	**446**	**382**	**382**	**191**	**191**	**96**	**96**
Max. torque[1]	[Nm.]	12	24	14	27	54	54	110	108
Max. tension force[1]	[N]	60	80	70	90	270	180	550	360
Power of drive motors[1]	[KW]	2x0.55	2x1.1	2x0.55	2x1.1	2x1.1	2x1.1	2x1.1	2x1.1
Max. torque[2]	**[Nm.]**	**16**		**28**					
Max. tension force [2]	**[N]**	**80**		**140**					
Power of drive motors[2]	**[KW]**	**2x0.75**		**2x1.1**					
Digital speed measurement		YES	YES	YES	YES	YES	YES	YES	So
Digital programmable meter counter		YES	YES	YES	YES	YES	YES	YES	So
Tensometric measurement of tension force		Option	Option	Option	Option	Option	Option	Option	Option
Tension force measurement resolution	[N]	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Average spool change time	[s]	15	15	15	15	15	15	15	15
Brake for the time of changing spools [mechanical]		YES	YES	YES	YES	YES	YES	YES	So
Brake for the time of changing spools [pneumatic]		Option	Option	Option	Option	Option	Option	Option	Option
Digital PLC		YES	YES	YES	YES	YES	YES	YES	So
Touch screen operator		YES	YES	YES	YES	YES	YES	YES	So
Digital stacker -stepper motor		YES	YES	YES	YES	YES	YES	YES	So
Safety system		YES	YES	YES	YES	YES	YES	YES	So
Digital communication bus		YES	YES	YES	YES	YES	YES	YES	So
Digital collaboration with all Zamak Mercator magazines		YES	YES	YES	YES	YES	YES	YES	So
Possibility of autonomous work		YES	YES	YES	YES	YES	YES	YES	So
Ability to work with other lines		YES	YES	YES	YES	YES	YES	YES	So

The technical data of the winders can be adapted to the customer's needs

Winders

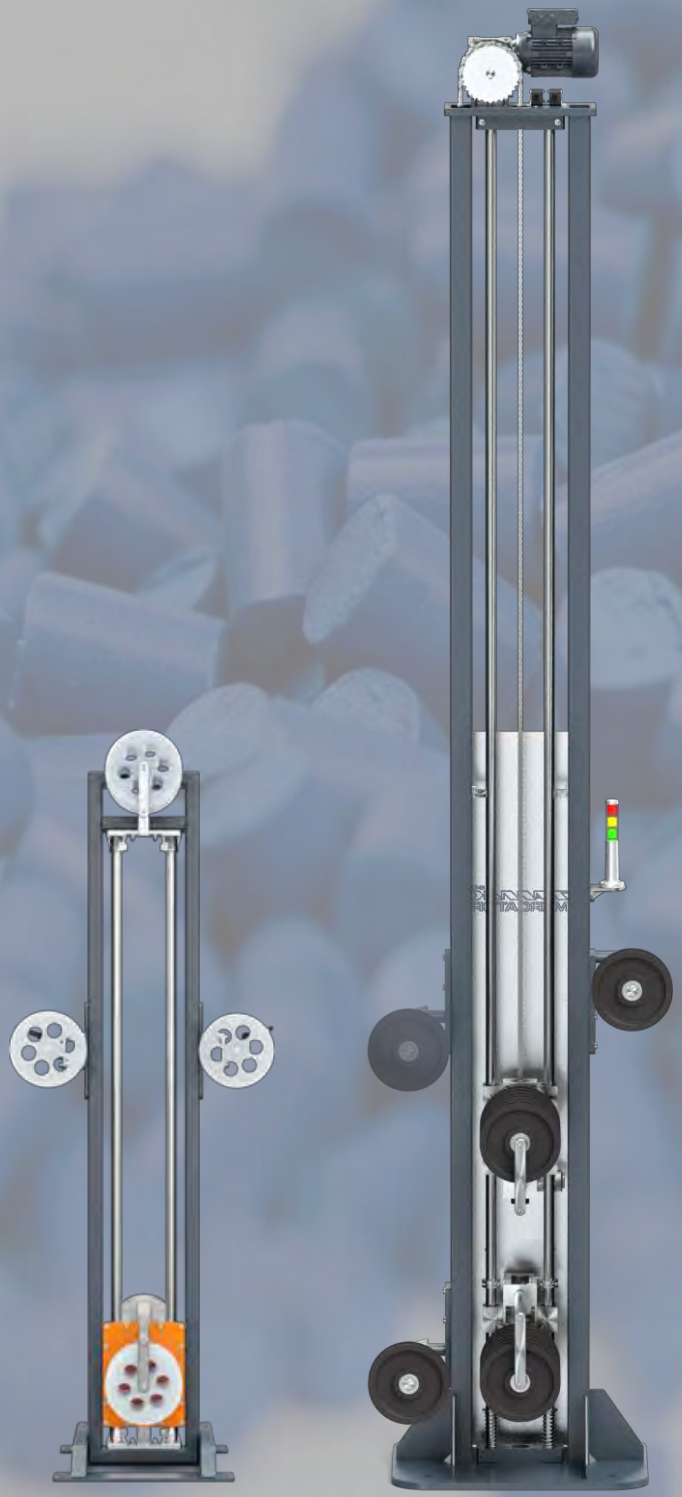
with a spool stacker based on a synchronous motor [servo]

Double spindle winder with digital spool stacker [Synchronous motor - 3d servo]	Model	NS-400/180	NK-600/180	NS-400/180	NK-600/180	NK-400/120	NK-600/120	NK-400/60	NK-600/60	NK-400/30	NK-600/30
	Iu.										
Maximum winding speed	[m/min]	180	180	140	140	120	120	60	60	30	30
Minimum winding speed	[m/min]	15	15	14	14	14	14	7	7	3,5	3,5
Max spool width	[mm]	600	600	600	600	600	600	600	600	600	600
Max. coil diameter on the reel	[mm]	400	600	400	600	400	600	400	600	400	600
Min. diameter of the reel on the spool	[mm]	100	100	100	100	100	100	100	100	100	100
Mechanical spool mounting [high-speed mechanical clamps]		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Pneumatic spool mounting [pneumatic expansion shaft]		Option	Option	Option	Option	Option	Option	Option	Option	Option	Option
Profile roll width range	**[mm]**	**[0.5-8] to [3-48]**									
Multiple width of the winding profile	**[x]**	**16**									
Set filament diameter and spool width [digital]		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Maximum spool speed	**[n^{-1}/min]**	**573**	**573**	**446**	**446**	**382**	**382**	**191**	**191**	**96**	**96**
Max. torque[1]	[Nm.]	12	18	16	24	18	27	54	54	110	108
Max. tension force[1]	[N]	60	60	80	80	90	90	270	180	550	360
Power of drive motors[1]	[KW]	2x0.75	2x1.1	2x0.75	2x1.1	2x0.75	2x1.1	2x1.1	2x1.1	2x1.1	2x1.1
Max. torque[2]	**[Nm.]**	**18**		**24**		**28**					
Max. tension force [2]	**[N]**	**90**		**120**		**140**					
Power of drive motors[2]	**[KW]**	**2x1.1**		**2x1.1**		**2x1.1**					
Digital speed measurement		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Digital programmable meter counter		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tensometric measurement of tension force		Option	Option	Option	Option	Option	Option	Option	Option	Option	Option
Tension force measurement resolution	[N]	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Average spool change time	[s]	15	15	15	15	15	15	15	15	15	15
Brake for the time of changing spools [mechanical]		YES	YES	YES	YES	YES	YES	YES	YES	YES	So
Brake for the time of changing spools [pneumatic]		Option	Option	Option	Option	Option	Option	Option	Option	Option	Option
Digital PLC		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Touch screen operator		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Digital stacker -stepper motor		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Safety system		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Digital communication bus		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Digital collaboration with all Zamak Mercator magazines		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Possibility of autonomous work		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Ability to work with other lines		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

The technical data of the winders can be adapted to the customer's needs

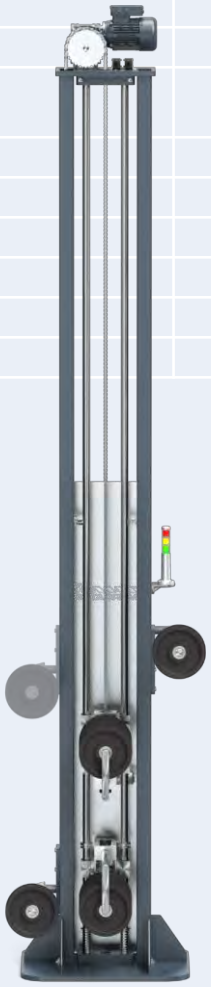
Storage

Tension compensators



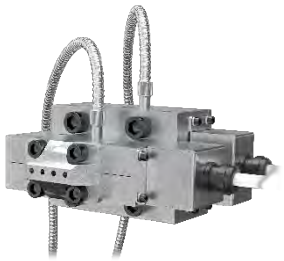
Storage [tension compensator]	Model	MB-30	MB-40		MBS-52	MBS-72
	Iu.					
Storage capacity [m]	[m]	30	40		52	72
Storage capacity [s] for 100m/min	[s]	18	24		31,2	43,2
Storage capacity [s] for 50m/min speed	[s]	36	48		62,4	86,4
Diameter of guide rollers	[mm]	200	200		200	200
Warehouse Height	[mm]	2000	2000		4000	4000
number of rolls	[pcs.]	11	15		11	15
number of weights	[pcs.]	5	5		5	5
weight weight	[N]	22	22		22	22
Linear laser rangefinder [measurement of the position of the lower rollers regulating the tension]		YES	YES		YES	YES
Laser linear rangefinder [measurement of the position of the upper roller assembly]		N/A	N/A		YES	YES
Laser rangefinder resolution						
Independent drive of the upper roller assembly repositioning mechanism		N/A	N/A		YES	YES
Adjustable travel speed of the upper roller assembly [inverter]						
Cooperation with the winder		YES	YES		YES	YES
Larger diameter rollers can be used [300 mm]		Option	Option		Option	Option
Adjustable roller width		Option	Option		Option	Option
Possibility of autonomous work		Option	Option		Option	Option
Ability to work with other lines		Option	Option		Option	Option

Storage MB-30/40



Storage MBS-52/72

Auxiliary devices for laboratory lines









Examples of extrusion heads



Molten plastic pumps

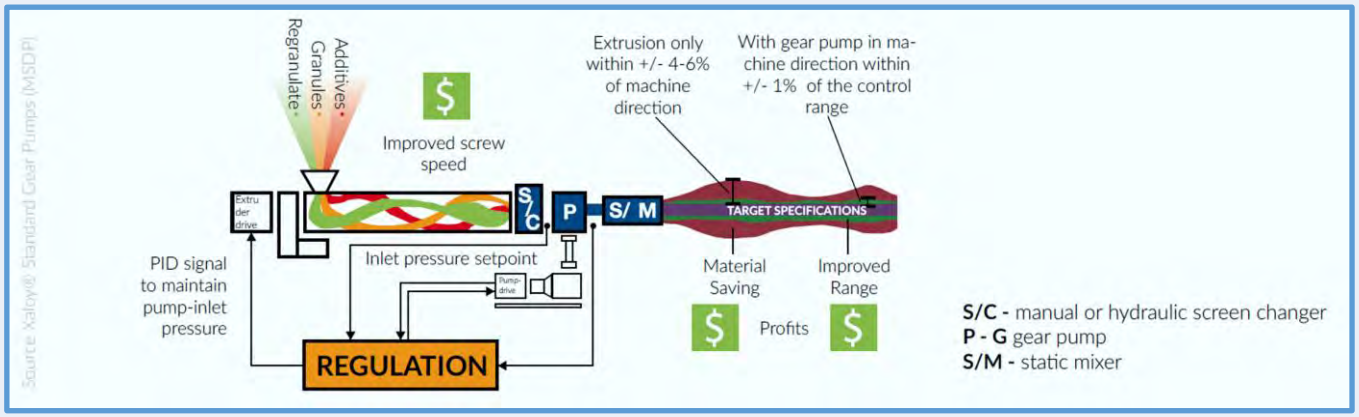

Auxiliary devices - molten plastic pumps designed to work with laboratory extruders

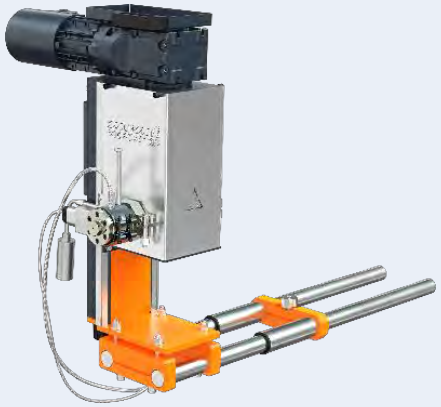
Specifications of molten plastic pumps

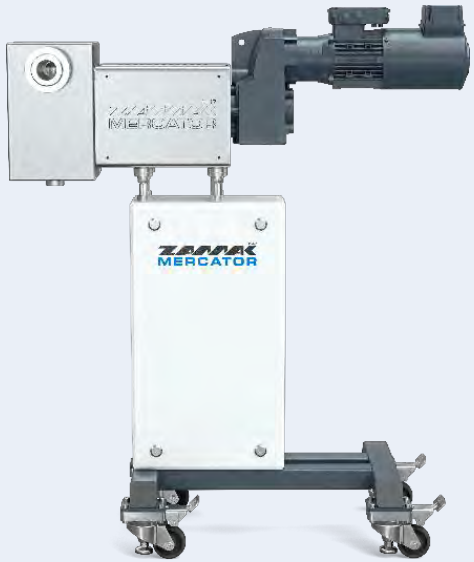
Model		**MP-0.6**	**MP-1.2**	**MP-2.5**	**MP-3.5**	**MP-7**	**MP-12**	**MP-24**	**MP-43**	**MP-60**
Volume per revolution of the pump	[CC/REV]	0,11	0,21	0,43	0,59	1,2	2,1	3,9	7,1	10,1
Capacity per pump revolution	[kg/rpm] [S.G. = 1.0]	0,007	0,013	0,026	0,035	0,070	0,123	0,236	0,427	0,605
Minimum capacity at 5 rpm[1]	5 rpm (kg/hr)	0,03	0,06	0,13	0,18	0,35	0,62	1,2	2,1	3,0
Maximum capacity at 100 rpm[1]	100 rpm (kg/hr)	0,66	1,3	2,6	3,5	7,0	12,3	23,6	42,7	60,4
120Hz drive motor power	[kW]	0,55	0,55	0,55	0,75	0,75	0,75	0,75	0,75	0,75

The table contains pump data from the low-yield basic series.

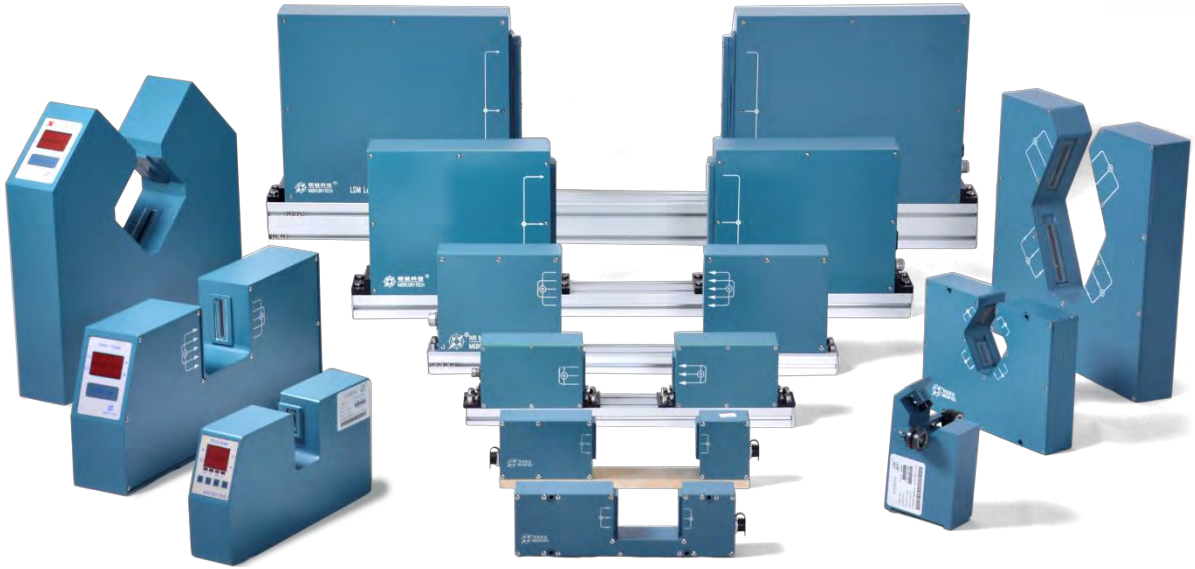
Since the pumps are selected and designed individually for a specific application, it is possible to choose a different pump model from a series of reputable suppliers.







Auxiliary devices for laboratory lines

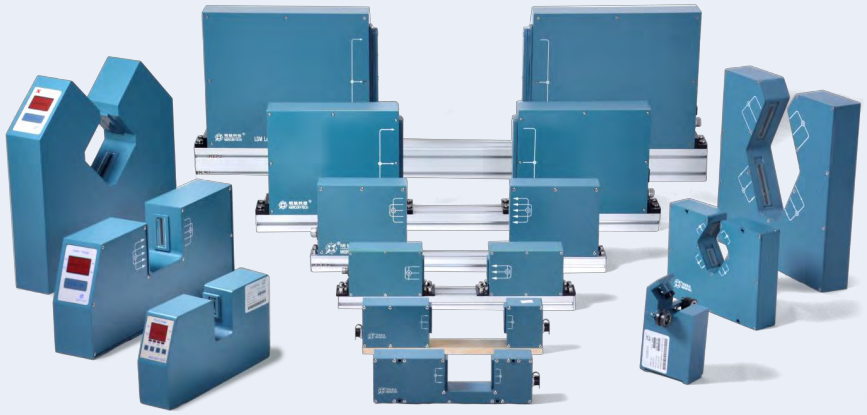


One, two and three axis laser measuring heads

Haul-off unit with a profile measuring head

Measuring devices for extrusion lines

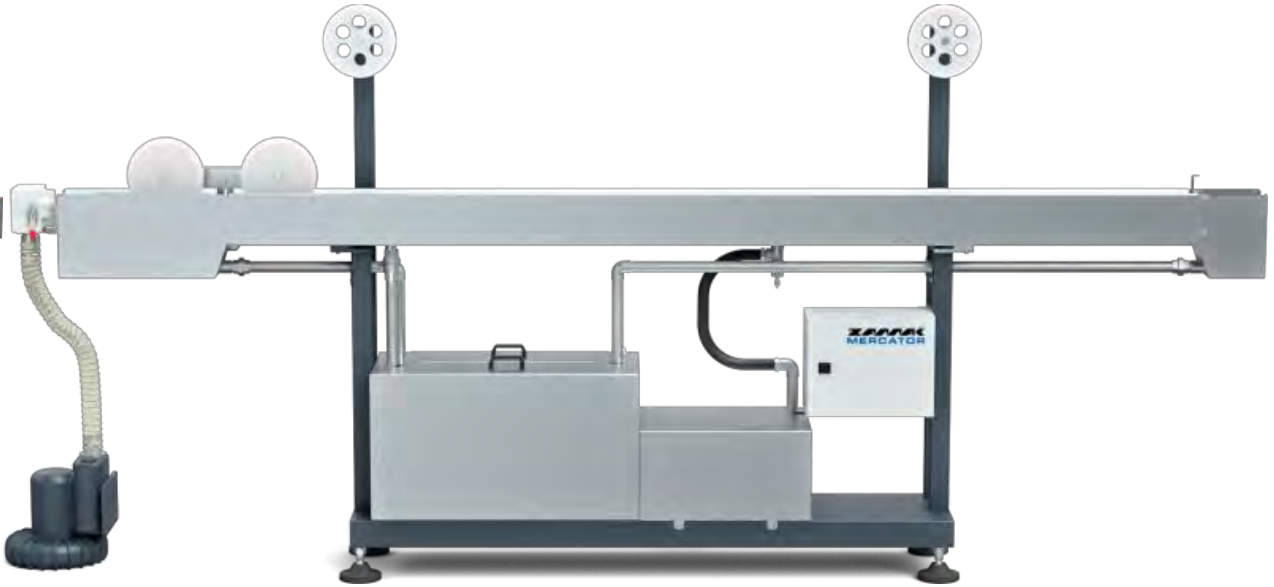
Measuring devices implement non-contact measurement online using a laser scanner.
Depending on the version, the instruments can measure: uniaxial [X axis], biaxial [XY axis], triaxial [XYZ axis]. They are applicable to measure and control the diameter of: filaments, rods, plastic pipes and metal wires, glass, pipes and cables, etc.
The display can show the mean diameter value and roundness simultaneously.
The meters are integrated in terms of automation with lines manufactured by Zamak Mercator.
The meters can be integrated with devices of other manufacturers



One- and two-axis laser measuring heads

Specifications of laser diameter meters

Device type		**LDM 20 HI**		
Measuring range	[mm]	0,1 - 20		
Measurement resolution	[+/-]	0,0001		
Accuracy	[mm]	0,0005		
Device type		**LDM 25**	**LDM 25XY**	**LDM 25XYZ**
Measuring range	[mm]	0,1 - 20	0,1 - 20	0,1 - 2-
Measurement resolution	[+/-]	0,001	0,001	0,001
Accuracy	[mm]	0,001	0,001	0,005
Device type		**LDM 50**	**LDM 50XY**	**LDM 50XYZ**
Measuring range	[mm]	0,2 - 45	0,2 - 45	0,5 - 25
Measurement resolution		0,002	0,001	0,001
Accuracy	[mm]	0,001	0,002	0,01
Device type		**LDM 100**	**LDM 60XY**	
Measuring range	[mm]	0,2 - 95	0,2 - 55	
Measurement resolution		0,01	0,001	
Accuracy	[mm]	0,001	0,002	
Device type		**LDM 150**		
Measuring range	[mm]	0,2 - 145		
Measurement resolution		0,01		
Accuracy	[mm]	0,001		
Device type		**LDM 210**		
Measuring range	[mm]	0,2 - 205		
Measurement resolution		0,001		
Accuracy	[mm]	0,002		
Device type		**LDM 380**		
Measuring range	[mm]	0,2 - 375		
Measurement resolution		0,001		
Accuracy	[mm]	0,002		
Measurement/laser		Laser scanning - visible red semiconductor laser		
Laser output power	[mW]	2	2	2
Communication		RS-485	RS-485	RS-485
Operating temperature	[°C]	-10 - 40	-10 - 40	-10 - 40
Humidity	[%]	<85% relative humidity		
Type of work		Continuous mode	Continuous mode	Continuous mode



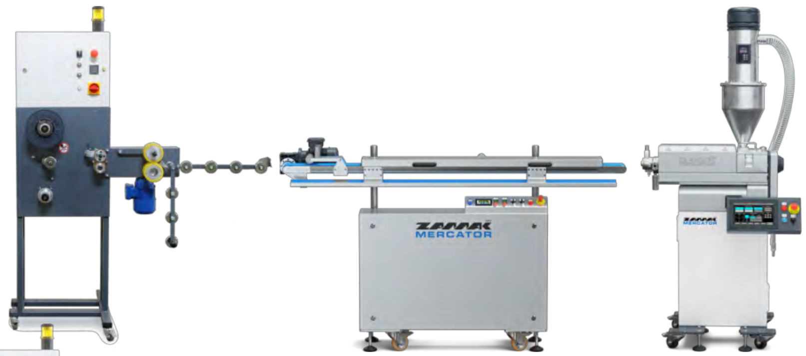
Cooling baths and belt conveyor

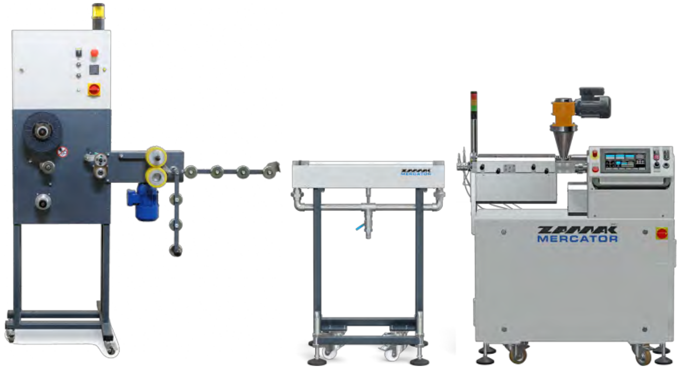
Auxiliary devices for laboratory lines

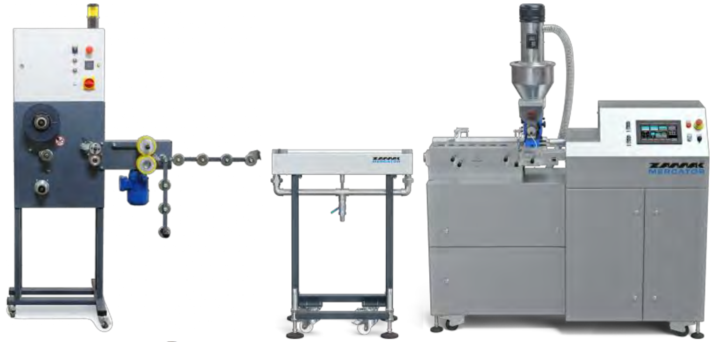
Cooling baths and belt conveyor

LABORATORY LINES FOR FILAMENTS*do for 3D printing*

Laboratory lines for research on filaments for 3D printing - sample configurations







Laboratory lines for research on filaments for 3D printing - sample configurations

SINGLE-SCREW EXTRUDERS

for processing rubber and silicone

Professional laboratory extruders for rubber and silicone mixtures

Technical data of professional research extruder for rubber and silicone

• Screw diameter	[mm]	32
• Screw length	[L/D]	14 - 18
• Maximum torque per screw	[Nm]	520
• Maximum screw rotational speed	[rev/min]	100 - 130
• Main drive power	[kW]	7,5
• Rubber belt feeder drive power	[kW]	1,5
• Maximum work temperature	[°C]	150

Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of mixture pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

• **Granule/ belt rubber feeding system**	**Yes**
• Zonal cylinder heating and cooling system	Yes
• Cooled feeding zone	Yes
• Professional gearmotors [Lenze]	Yes
• Rubber belt feeder with independent drive	Yes
• Friction regulation in any range	Yes
• Professional wedge closure	Yes
• Water-heating chillers up to 150 °C	Yes
• Heating and cooling aggregates programmable from the touch screen	Yes
• Real time PLC control	Yes
• 10 inch touch screen	Yes
• Height adjustment	Yes
• Ethernet	Yes
• Top dosing and measuring ports	[option]
• Degassing system	[option]
• WIFI and control from tablet	[option]
• Remote monitoring and service diagnosis	[option]

Laboratory extruders for rubber and silicone mixtures

Laboratory extruders for rubber and silicone mixtures

Technical data of professional research extruder for rubber and silicone

• Screw diameter	[mm]	32
• Screw length	[L/D]	14 - 18
• Maximum torque per screw	[Nm]	520
• Maximum screw rotational speed	[obr/min]	100 - 130
• Main drive power	[kW]	7,5
• Rubber belt feeder drive power	[kW]	1,5
• Maximum work temperature	[°C]	150

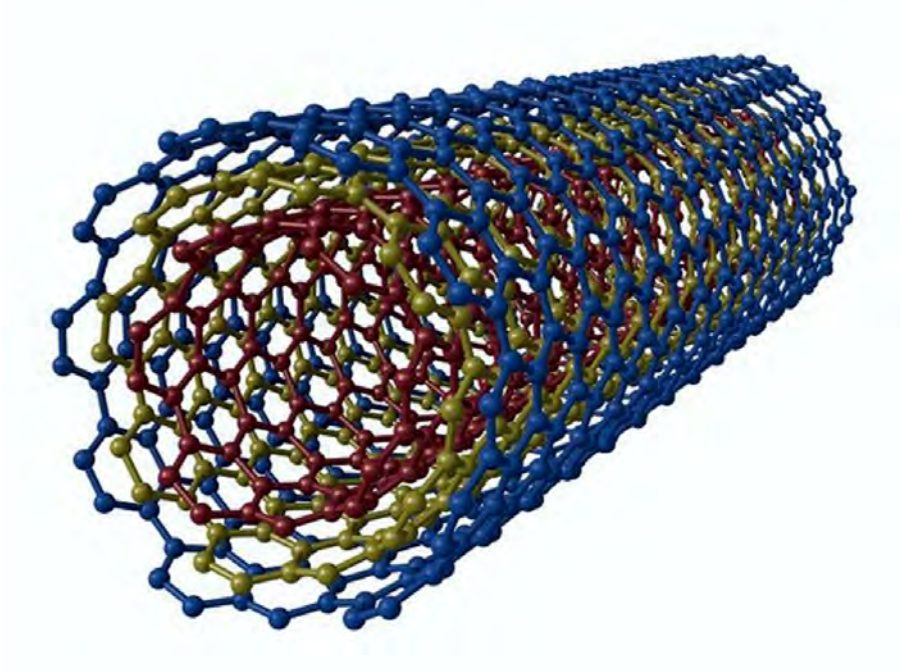
Precise measurements

• Temperature measurement and control of each barrel and head zone PID regulator	Yes
• Screw torque measurement	Yes
• Measurement of mixture pressure and temperature	Yes
• Measurement of drive load	Yes
• Recording and archiving of measurement data and recipes	Yes

Equipment

• **A two-piece cylinder designed for many rubber and silicone mixtures**	
• **Two screws with different L/D ratio**	
• **Granule/ belt/ pieces rubber feeding system**	**Yes**
• Zonal cylinder heating and cooling system	Yes
• Cooled feeding zone	Yes
• Professional gearmotors [Lenze]	Yes
• Rubber belt feeder with independent drive	Yes
• Friction regulation in any range	Yes
• Professional wedge closure	Yes
• Water-heating chillers up to 150 °C, 5 pcs	Yes
• Heating and cooling aggregates programmable from the touch screen	Yes
• Real time PLC control	Yes
• 10 inch touch screen	Yes
• Height adjustment	Yes
• Ethernet	Yes
• Top dosing and measuring ports	[option]
• Degassing system	[option]
• WIFI and control from tablet	[option]
• Remote monitoring and service diagnosis	[option]

Laboratory extruders for rubber and silicone mixtures



INDIVIDUAL RESEARCH

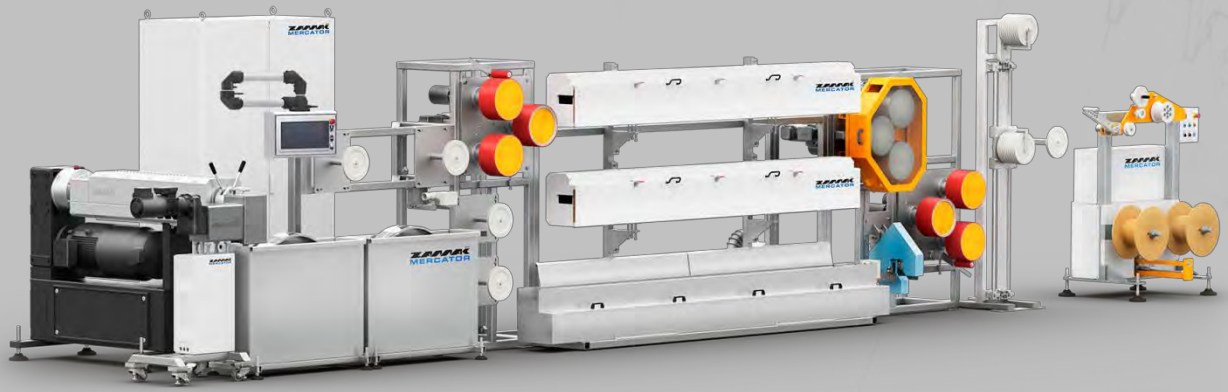
projects

Laboratory devices implemented according to individual projects - examples

A precise electric microinjection molding machine implementing programmed injection sequences

Specialized pump-extruder to cooperate with the polymerization reactor

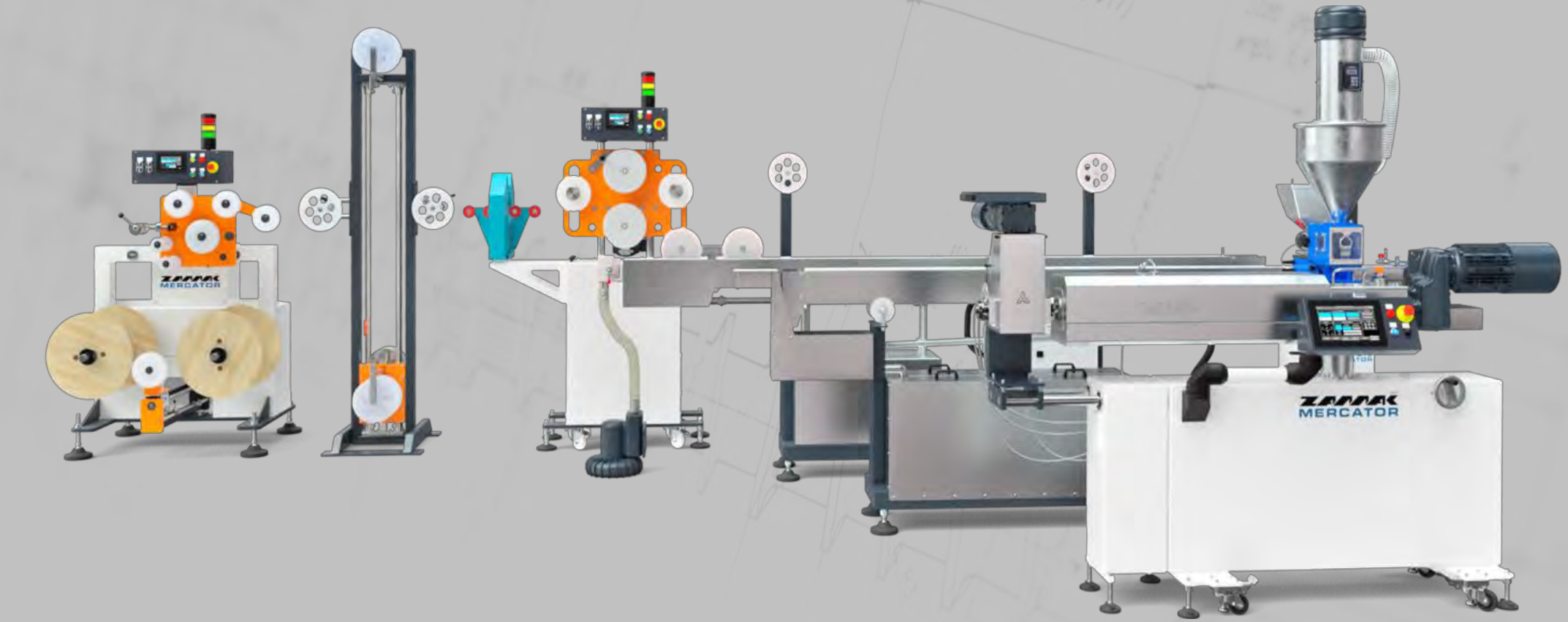
Test stand for extruding micro polymer fibers

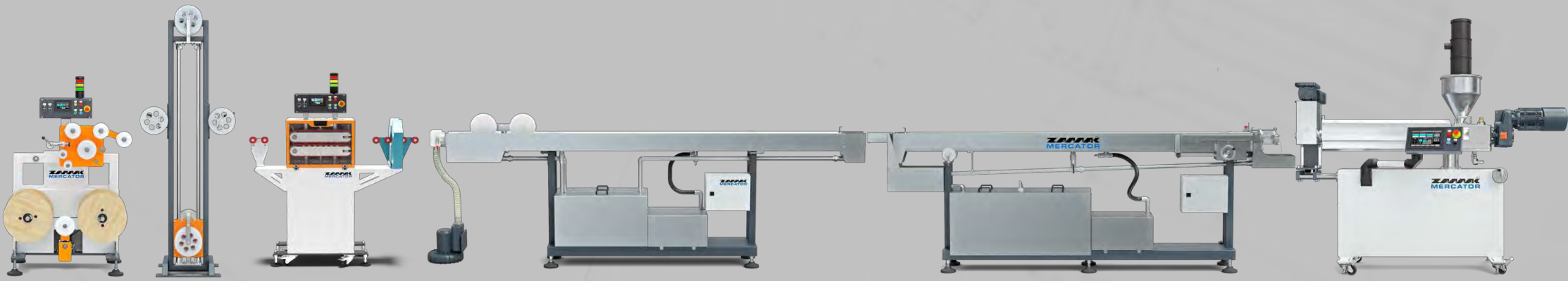


Stand for filaments stretching

Precision extruder for 3D printing with a multi-axis robot, capacity of 10 kg / h

Universal lines for research on filaments for 3D printing





Laboratory devices implemented according to individual projects - examples

Miniature twin screw extruder for medicine and pharmacy applications

A miniature single screw extruder for applications in medicine and pharmacy

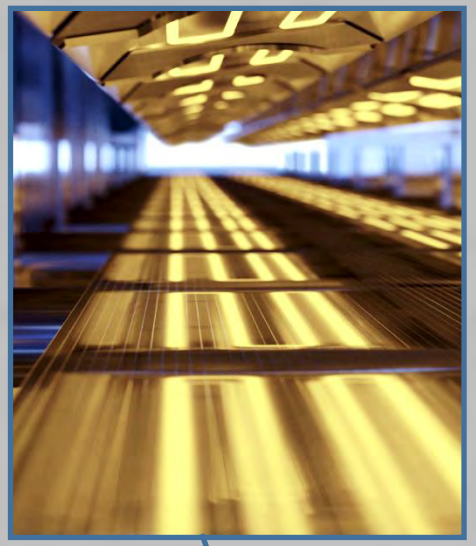
A specialized single-screw extruder for medical micro tubes

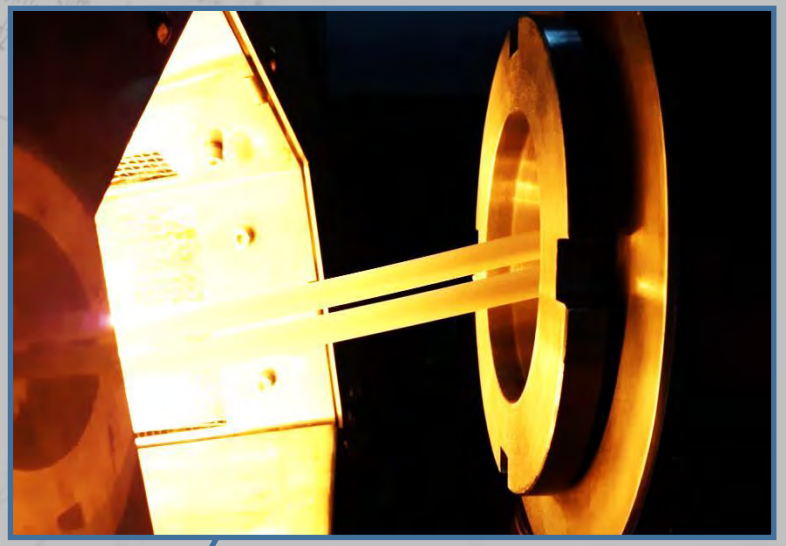
Laboratory measuring mixer

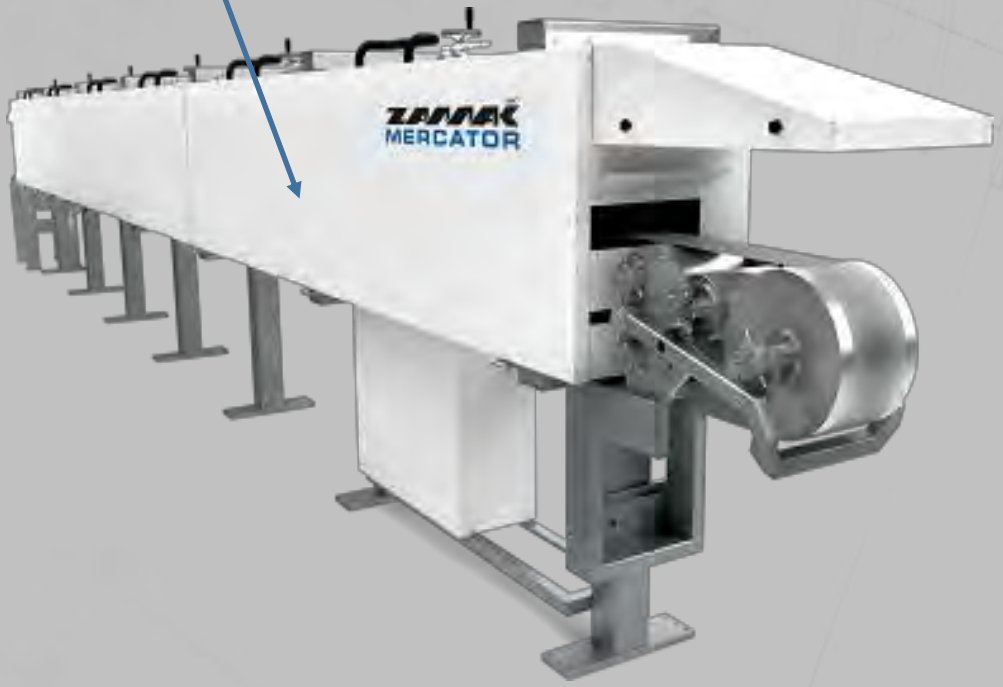
A device for filament stretching

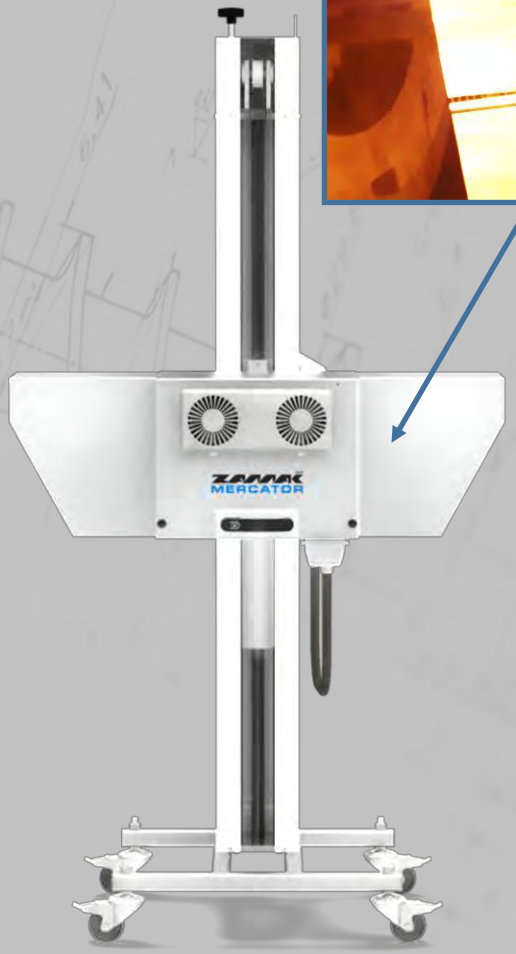
Extruder ø16 mm with a feeder of ø20 mm that freely draw standard granules

IR heating and vulcanization systems









Medium wave IR vulcanization furnace

High temperature shortwave IR blast furnace

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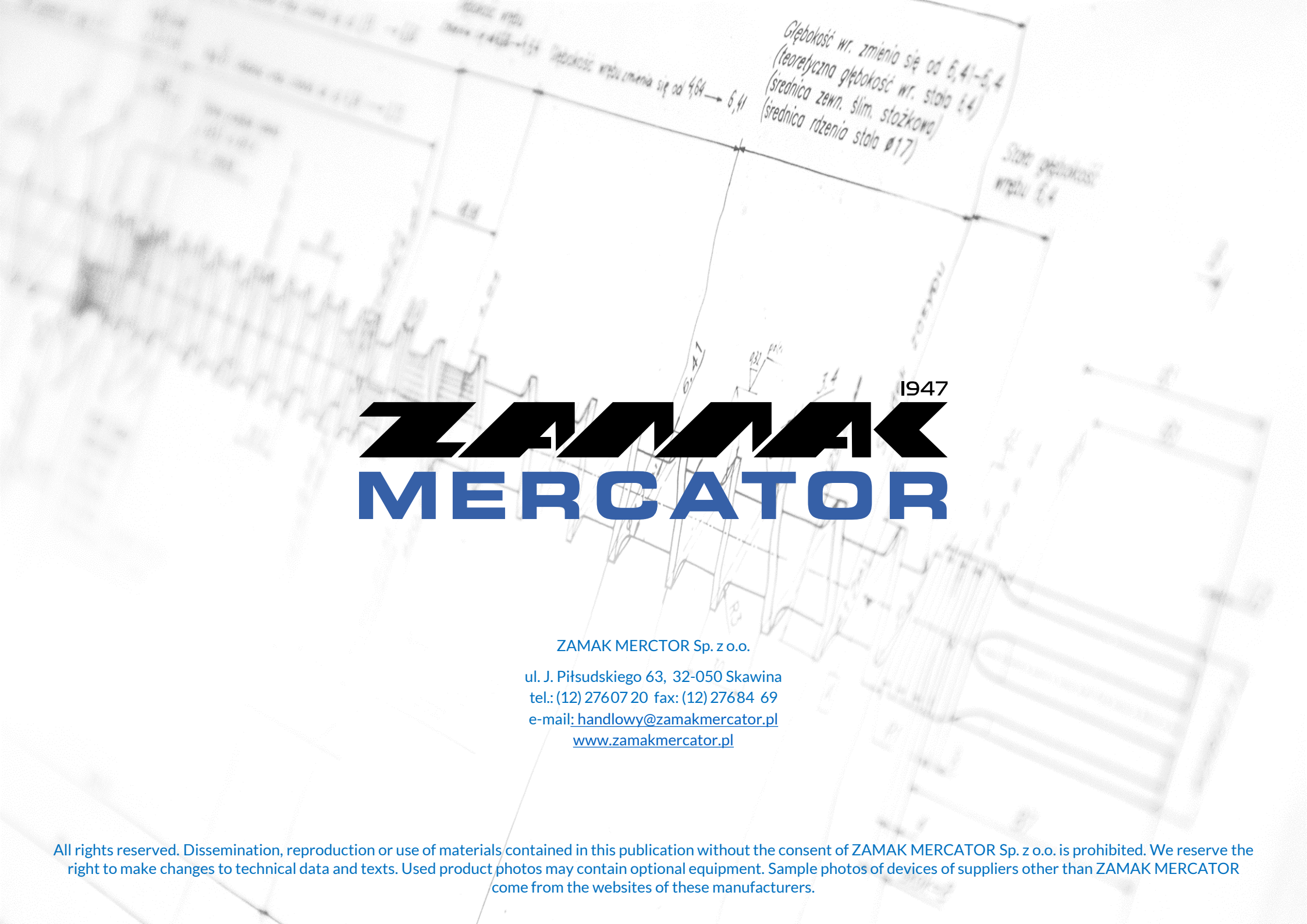
MERCATOR

made in POLAND

Information about our products is included in e-catalogs:

- Zamak Mercator - Laboratory equipment
- Zamak Mercator - Industrial equipment
- Zamak Mercator - Extruders for 3D printing
- Zamak Mercator - Stand for testing and granulation



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