



FRIMO. HIGH TECH AND HIGH PASSION.



PROVEN TECHNOLOGY
EXPERTISE
TO BENEFIT YOUR
PRODUCTION.

PU PROCESSING

PURE FASCINATION WITH A MATERIAL OF ENDLESS POSSIBILITIES.

It is fascinating to see all the things polyurethane (PU) makes possible. Our production solutions are just as versatile, ensuring optimal PU processing. An endless variety of parts can be made using soft, rigid, or integral foam. That is why our PU processing technology is used for a variety of applications in many industries, such as the sports and recreation and construction industries. We support you throughout the entire process so that even the smallest details meet your specific production requirements.

Highly-specialized solutions are common in the transportation industry. On the road, the rails, or in the air, there is just no way around polyurethane. FRIMO PURE tooling and equipment technology is used in series production around the world in instrument panel, door panel, seat, and headrest production, as well as for insulation and structural components, cable over-molding, and much more.

In addition, polyurethane-based composite materials are steadily gaining importance in modern lightweight construction.

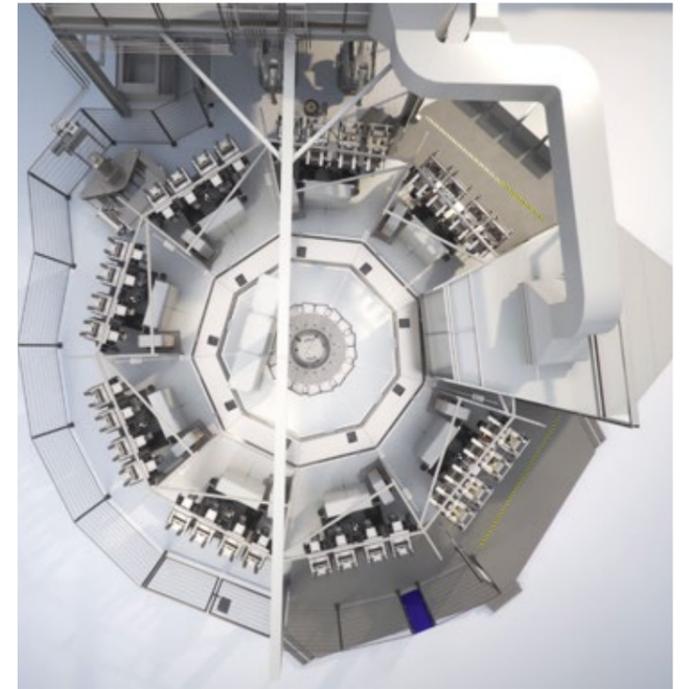
Innovative solutions begin with modeling technology, and 3D printing opens up a whole new set of opportunities. As far as tooling goes, we offer simple to complex trial, prototype, pre-series, and series production tools. At FRIMO, we have exclusive, specially-developed processes for back foaming premium decor materials, economically producing surface variations with PURE Skin, and using PURE Liner for foaming without release agents.

Our standard tool carriers cover a variety of clamping ton-nages and clamping area requirements. The machine layout is equally as versatile, with stationary or mobile options tailored to suit your needs. Maximum operational availability and process reliability are two of our biggest focuses.

WITH FRIMO PURE TECHNOLOGIES, WE OFFER A VARIETY OF CUSTOMIZED SOLUTIONS FROM A SINGLE SOURCE

Why FRIMO? Your advantages:

- One Stop, All Services for all PU technologies
- Manual to highly-automated solutions
- Solutions for small to large parts in low or high-volume series production
- Reliable production, reproducible part quality
- In-house sample, prototype, and spare parts production
- Refurbishing, relocation, retrofitting, and service for existing equipment



The **FRIMO Augmented Reality App** allows you to gain exciting 3D insights into our technologies. Simply download the app and scan the images labeled with the app icon!



> 60

YEARS OF PURE TOOLING & EQUIPMENT TECHNOLOGY

> 75

YEARS OF EXPERIENCE IN HIGH PRESSURE METERING TECHNOLOGY

AUTOMOTIVE ALLIANCE



HOW CAN WE HELP YOU? OUR **PURe PRODUCT PORTFOLIO** GUARANTEES PURE QUALITY.

Whether you are looking for a single machine or a complete system, we offer the best solution for your production from a technical and cost perspective.

Mix Heads



High-Pressure Mix Heads:

- L-shaped mix heads (MN Series)
- Straight Mix Heads (MT-A and MT-E Series)

Low-Pressure Mix Heads:

- Agitator Mix Heads (MEL Series)

Spray Mix Heads

- Airless, air-assisted

Metering Machines



High-pressure metering machines:

- TOPLINE
- HIGHLINE
- MICROLINE
- STREAMLINE MK2
- ECOPLUS

Low-pressure metering machines:

- IMPACT
- JETLINE
- HK-R 5000

Elastomer Casting Equipment

- ELASTOLINE F / ELASTOLINE V
- ELASTOLINE HP

FRIMO Foam Tools

- Forming foam tools
- Back foaming tools
- Front foaming tools (PURe Liner optional)
- Spray liners
- Castings

FRIMO Tool Carriers

- Electric tool carriers
- Pneumatic tool carriers
- Hydraulic tool carriers
- Manual tool carriers



FRIMO Stationary Systems

Custom machine layouts with

- Permanently installed mix heads
- Robotic manipulator
- Manual zero-gravity mix head manipulator
- Gantry system



FRIMO Mobile Systems

- PURe RT turn table systems
- PURe TRACK overhead track systems
- PURe FLOOR track systems



Peripheral Equipment

- Pre-mixing stations
- Barrel and container stations
- Nucleation
- Color additive metering
- Crushers (mechanical, vacuum, or combination)

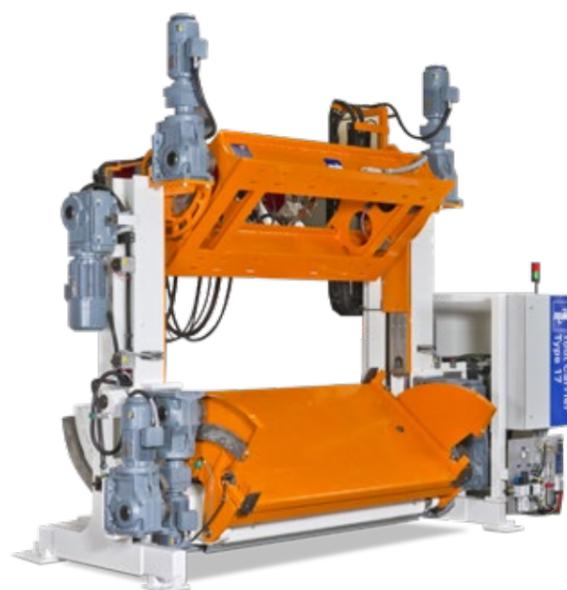
THE PERFECT SUPPORT TOOL CARRIERS FOR EVERY SITUATION.



LOOKING TO DO BIG THINGS? RELY ON POWERFUL FRIMO TOOL CARRIERS FOR LARGE PARTS.

Large parts pose special challenges. Our tool carriers allow optimal tool handling, even for large and heavy tools. High-speed closing and opening, as well as individually adjustable swiveling motions that bring the tool to the optimal position for the operator and for handling, ensure a smooth process.

The machine variations in our product portfolio differ in controls and kinematics. In addition to our standard machines, we offer the opportunity to customize the layout and options based on your specific project requirements. Special configurations can easily be integrated into highly-efficient and flexible production environments. Examples of these include shuttle systems or tool carriers that run either separately or continuously on an overhead track system (PURe TRACK) or on a floor track system (PURe FLOOR).



Over the past few years,
we've produced over

1000
TOOL CARRIERS

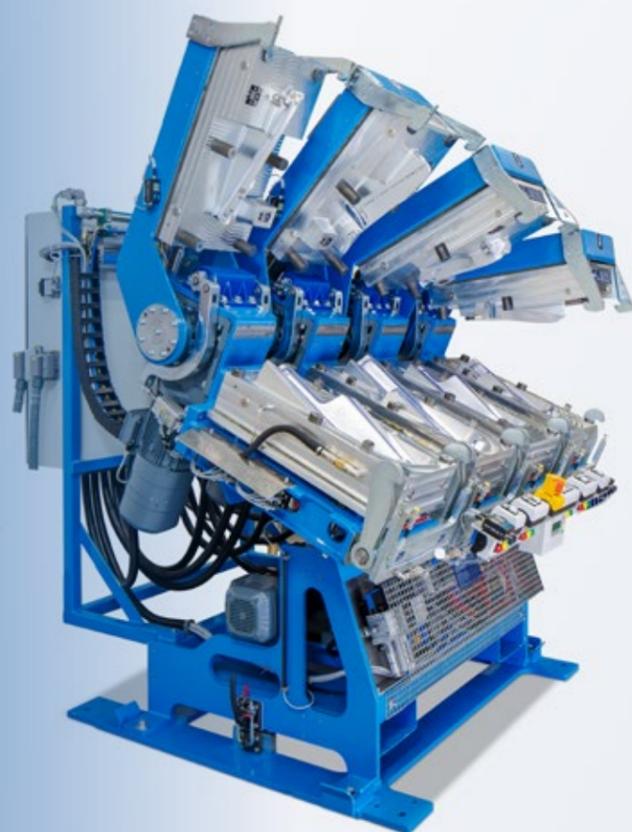
70
DIFFERENT TYPES



PRODUCING SMALL PARTS? SPECIALLY-ADAPTED **FRIMO TOOL CARRIERS** ARE IDEAL FOR BOTH LOW AND HIGH-VOLUME PRODUCTION.

Our sophisticated tool carriers enable small PU parts to be produced efficiently in both low and high volumes with foam molding, front foaming, or back foaming. Designs with specific opening and closing motions to suit every project and production environment are available.

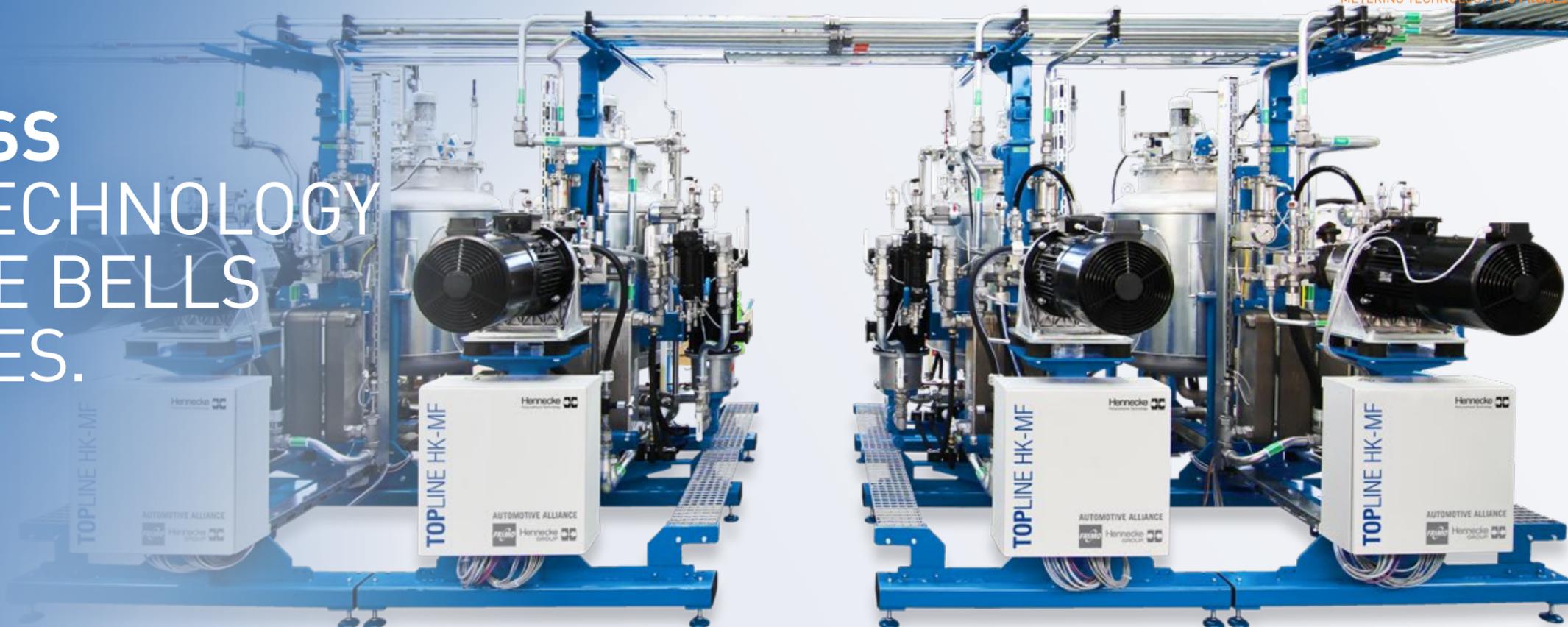
The extremely compact design of the tool carriers makes it easy to integrate them into your production process, even in the smallest spaces. The dimensions can be customized, and vary based on the part and tool dimensions. Multiple cavities can be used on a single platform for economic production. If you want to use existing foam tools, we can quickly create a solution for your requirements with our modular concept.



Why FRIMO tooling? Your advantages:

- Large product portfolio with standard and custom designs
- Variety of clamping forces and clamping areas
- All controls systems and kinematics
- Compact and modular design
- Fast, precise opening and closing
- Maximum tilting motion; optional carrier tilting functions
- Good accessibility and ergonomic operation
- Quick set-up and easy tool change
- Simple start-up; low-maintenance
- Solutions for low and high-volume production
- Sustainable concept for maximum profitability and energy efficiency
- Can easily be integrated into a variety of machine concepts

PURe SUCCESS METERING TECHNOLOGY WITH ALL THE BELLS AND WHISTLES.



DO YOU VALUE HIGHER STANDARDS? WE HAVE A SOLUTION THAT FITS YOUR NEEDS EXACTLY.

FRIMO and Hennecke have a cooperation called the Automotive Alliance for wet technologies. FRIMO therefore offers the entire portfolio of Hennecke metering technologies. You get the best of both worlds and profit from comprehensive system solutions from a single source. We offer customized solutions from soft, semirigid, rigid, and integral foam processing, to foam-in-place and spray systems.

All models are based on sophisticated, refined concepts with reliable standard components. The machines have been optimized for maintenance and operation. Modern controls and display systems create a reliable process and ensure consistent high quality. All high pressure and low pressure machine models include extensive standard equipment, which can be supplemented with a variety of options geared towards your application.



TOPLINE metering machines are best-in-class for high-pressure polyurethane processing and are the centerpiece of numerous polyurethane processing systems.

The TOPLINE series has a variable, compact, modular design. Our HIGHLINE high-pressure metering machines are great for small spaces and high energy efficiency. You don't have to make any compromises on performance or reliability with this model. It is also BLUE INTELLIGENCE compliant, reducing energy consumption by up to 50%.



DO YOU HAVE EXTREMELY SPECIFIC REQUIREMENTS? WE HAVE A CUSTOM SOLUTION FOR YOU.

Production system flexibility is becoming more and more important. Shorter product cycles with more variations create challenges that cannot always be solved with standard machines.

With the MICROLINE, STREAMLINE MK2, and COLOURLINE series are efficient, nonstandard options, perfect for diverse and complex requirements.

The MICROLINE series allows you to precisely achieve even the smallest outputs. The CSM version is best for custom metering in polyurethane coating. The COLOURLINE can quickly and easily switch between colors, making it ideal for finishing surfaces on decorative elements. Spray applications, however, are not only for surfaces, but also go much further in new applications where the spray also serves as an adhesive or to strengthen the component. Diverse CLEARMELT and CLEARRIM applications can be integrated into production flexibly with the STREAMLINE MK2.



Why AUTOMOTIVE ALLIANCE? Your advantages:

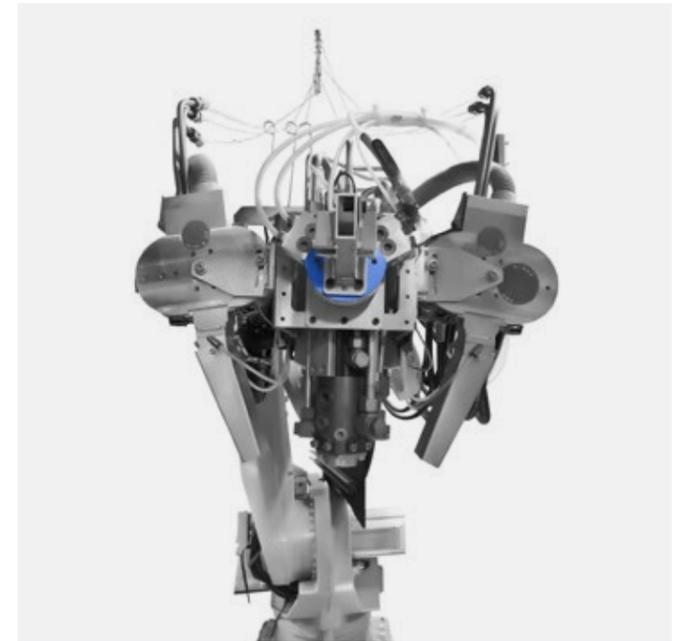
- Highly-specialized expertise and unique pu solutions.
- Real added value for customers
- Comprehensive turnkey production solutions for a broad range of applications within the automotive industry
- Uniting core competences
- FRIMO is contributing its extensive systems and tooling solutions
- Hennecke is providing its metering and mixhead technology
- Customers benefit from a common point of contact
- A unified interface for tooling, automation and process technology
- Both companies are working closely together on future developments for even more innovative, efficient and competitive system solutions





Why AUTOMOTIVE ALLIANCE mix heads? Your advantages:

- Compact design
- Lightweight
- Easier connection with small fitting dimensions
- Self-cleaning mix head concept
- Special surface-treated piston for low-friction operation
- Robust, reliable, and low-maintenance due to the hardened materials that are used



THE KEY TO PERFECTLY MIXED COMPONENTS? HEADS WITH BRAINS.

Mix heads are the most sensitive part of the system in PU processing. Various types of mix heads are key to achieving the perfect mixture and laminar output of the raw materials, which determines the quality of the part. Development and production of high pressure mix heads requires a lot of know-how and many years of experience. Continuous development and improvement of mix heads is therefore crucial for success.

Through the Automotive Alliance, FRIMO and Hennecke offer the market's largest product portfolio of mix heads for high and low pressure processes. Based on years of expertise and a variety of references, both partners guarantee precise, high-quality, efficient processing of soft, hard, integral, filler, or energy-absorbing foam for almost all applications that require countercurrent injection or, for low-pressure applications, a dynamic agitation mixer.



Various part sizes, nozzle shapes, and accessories allow perfect adaptation to your specific requirements.

Operators have access to intelligent accessories for spray applications, such as a spray lance for complex tool geometries or an extremely efficient chopping unit for glass fiber metering. In addition, MN mix heads are ideal for mounting and are therefore used for all RIM and RRIM processes.

Mix head portfolio with

> **30** MIX HEADS

> **500** MIX HEADS PER YEAR

AUTOMOTIVE ALLIANCE

FRIMO Hennecke GROUP



**UNIQUE DESIGN,
OPTIMAL FUNCTION
FRIMO PUR_e EQUIPMENT
GIVES YOU BOTH.**

**PERMANENT INSTALLATION OR MOBILE SOLUTION?
FRIMO EQUIPMENT TECHNOLOGY FOR PURE VARIETY.**



Our many years of processing experience allow us to offer machine concepts that let you produce PU parts economically and efficiently. We offer a variety of approaches for combining tool carriers and metering units along with peripheral equipment to form complete production systems. Stationary machines and turn tables for continuous or cyclical production are also part of our product portfolio.

In addition to these well-known machine concepts, overhead or floor track systems are interesting options because they combine maximum flexibility with higher productivity.

The style and layout of all machine types can be customized according to customer specifications and conditions.

**Why FRIMO system technology?
Your advantages:**

- Custom system layouts
- Long operating life, highly-reliable process
- Sustainable, energy-efficient solutions
- Low-maintenance
- Good ergonomics
- Individually adjustable display systems
- Remote service system integrated
- Latest controls system geared toward Industry 4.0

**PREFER SOMETHING MORE PERMANENT?
FRIMO STATIONARY MACHINES ENABLE CUSTOM LAYOUTS.**

Our stationary machines are configured specifically for your project and laid out to make the best possible use of the available floorspace. The tool carriers are positioned on the

floor in a way that creates optimal operability, handling, and logistics.



**Why FRIMO stationary machines?
Your advantages:**

- Custom layout, ex. island, linear, or specialty solutions
- Manual to fully-automated production possibilities
- Flexible production of product variations in differing volumes
- Can be combined with stationary or mobile robots
- Tool changes and maintenance can be completed without interrupting production

**IS ROUND A BETTER FIT FOR YOU?
FRIMO TURN TABLES ARE YOUR BEST BET.**

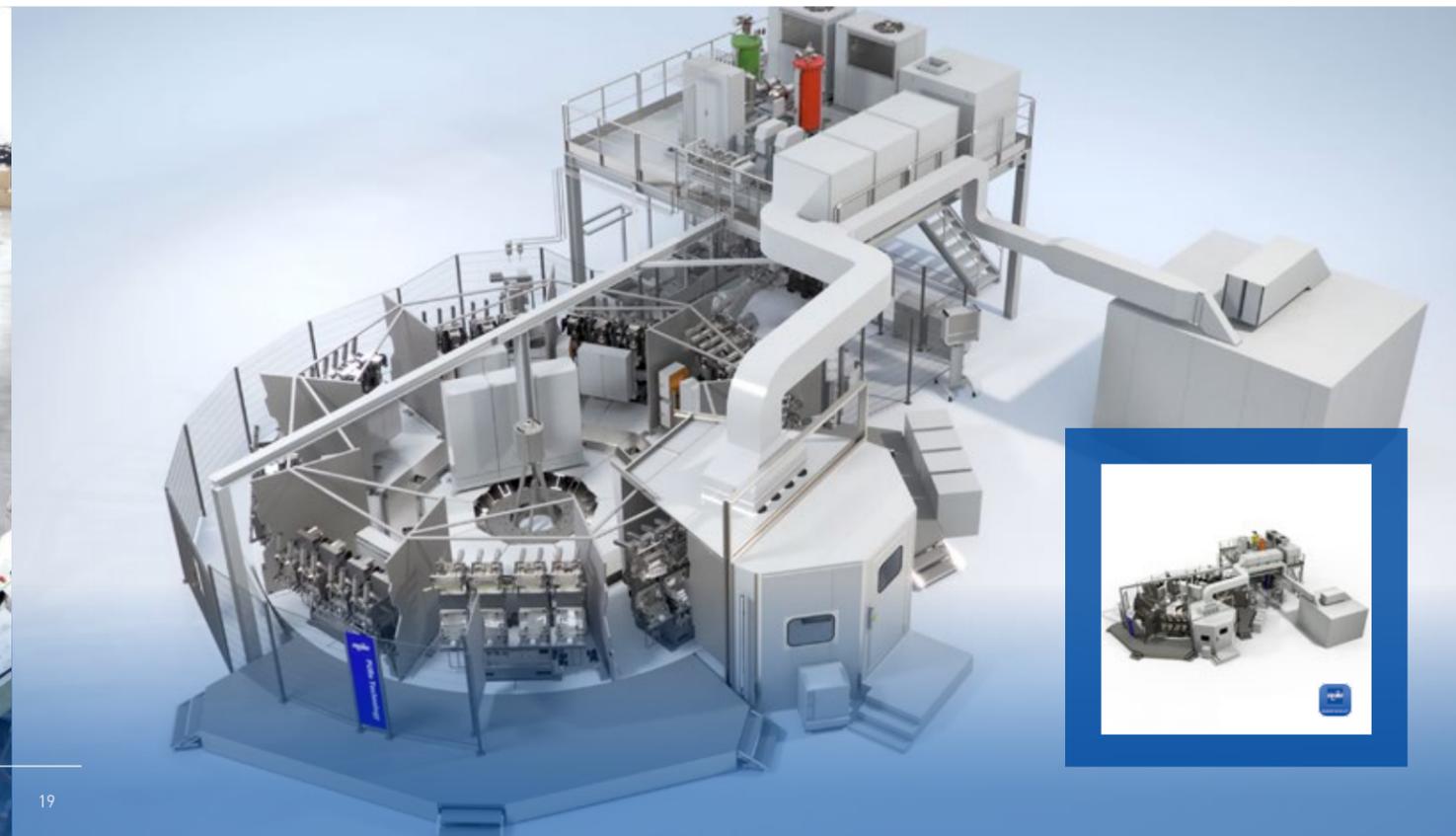
Turn tables are best for consistent production volumes that can be planned for ahead of time with few variations. Multiple tool fixtures are mounted to a rotating table where they are moved from one workstation to the next.

Additional processes can be integrated, such as surface activation on the part. Robotic handling allows material inflow and outflow to be fully-automated. In certain cases, it is possible to connect turn tables and stationary machines, combining the advantages of both concepts.



**Why FRIMO PURE turn tables?
Your advantages:**

- Ideal for high-volume production
- Fixed operator stations and production cycles
- Cyclical or continuous versions possible
- Lower height requirements
- Clearly defined material flow concepts
- Utility supplies (air, water, etc.) in center of turn table
- Self-supporting or external bearing, depending on size



NEED NON-AUTOMOTIVE PRODUCTION THAT RUNS LIKE CLOCKWORK? FRIMO PRe FLOOR KEEPS IT ON TRACK.

With the PRe FLOOR track system, tool carriers travel with the tools to different processing stations along a monorail. This design offers maximum flexibility and can be used for all applications outside of the automotive industry. Not only can the track layout be customized, but also the speeds at which

individual carriers, or groups of carriers, travel between different areas of the system. This system can be expanded in multiple stages, though its advantages can be experienced in the first stage.

HOW MUCH FLEXIBILITY IS POSSIBLE? FRIMO PRe TRACK SETS THE BAR HIGH.

The modular FRIMO overhead track system, PRe TRACK, provides maximum production flexibility. This system offers multiple expansion options and can produce small, medium,

and large parts. Tool carriers with high clamping forces and tool weights are possible. They are guided by a double track system that hangs from a gantry mounted to the floor.



Why FRIMO PRe FLOOR or PRe TRACK? Your advantages:

- Maximum flexibility with customizable design for all non-automotive applications
- Multiple operator stations for simultaneous processing
- High productivity for high volumes
- Tool carrier changes are fully-automated and do not increase cycle time
- System can be added on to in multiple stages
- Easy access for cleaning and maintenance
- Minimal wear and long operating life
- Keeps floor clear of obstacles (PRe TRACK)
- Parallel tracks for aligning cycle times (PRe TRACK)



JUST BACKGROUND NOISE? NOT PERIPHERAL EQUIPMENT.

We supply efficient peripheral equipment to make sure every last detail fits because that is what completes a system. This

includes equipment for material conditioning and preparation, as well as part reworking.



Why AUTOMOTIVE ALLIANCE peripheral equipment? Your advantages:

- Reliable production
- Easy operation and maintenance
- Modular design allows low-cost custom solutions



WANT TO BE IN COMPLETE CONTROL? INTELLIGENT FRIMO CONTROLS GIVE YOU EVERYTHING YOU WANT.

Our system controls actively support you. The newest FRIMO Intelligent Process controls system, which uses the Siemens TIA Portal Platform, takes a step towards Industry 4.0 and sets a new standard for the future.

It uses the latest hardware and software and features clear, easy-to-understand operator guidance with voice commands. Extensive process data collection and analysis help derive process improvements, which increase operational availability and quality. By adding network connections to all machines, we can actively support you in optimizing process safety and stability, and in planning upcoming maintenance and repairs.



Why FRIMO controls? Your advantages:

- Simple, intuitive HMI
- Operator guidance through voice commands
- Controlled access with keyed systems
- Reliable, customizable data collection with databases
- Extensive communication and analysis tools, such as parameter change logs, camera analyses, bar code readers, etc.
- Latest industrial PCs with 19-22" touch screens
- Modular HMI software for integration of Windows-based applications
- Diagnostics sent continuously through network to the customer and/or FRIMO Service
- Use of tablets or smartphones for maintenance and repairs

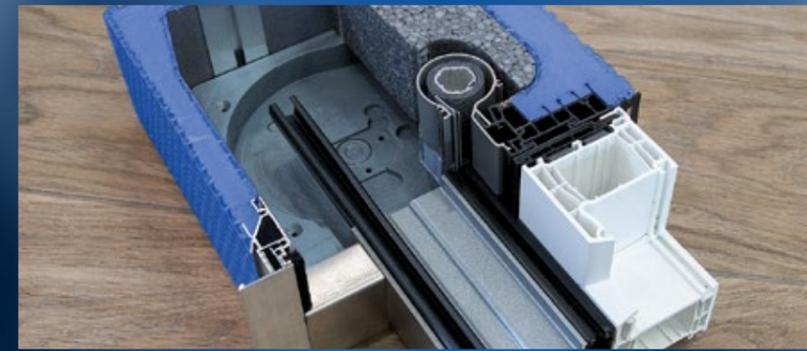


PURe FUTURE WE'RE THERE.

WANT TO DO SOMETHING COMPLETELY NEW?
WITH **FRIMO PURe TECHNOLOGIES** WE CAN ACCOMPLISH IT TOGETHER.

Building specialty machines is our daily business, and we want to be your partner in exploring changes or completely new paths. There can be many challenges. During a concept development phase, we examine even the smallest details with you and use our findings to develop a unique, highly-automated production system with custom tooling and machine technology.

What kind of project do you have for us? We offer comprehensive consultations and can help you bring new developments to market.





FULL DEDICATION FOR YOUR SUCCESS.

LOCAL COMPETENCE WITH THE GLOBAL FRIMO NETWORK

Locations

- FRIMO Group, Lotte
- FRIMO Center of Competence:
 - PU & Trim, Lotte
 - Form & Punch, Sontra
 - Surface & Finish, Freilassing
 - Joining, Hamburg
 - Automation
- FRIMO China
- FRIMO Hungary
- FRIMO USA
- FRIMO Mexico
- FRIMO Poland
- B+R Elektro-Steuerungstechnik, Ibbenbüren

Representatives

Bosnia-Herzegovina ▪ Brazil ▪ Colombia ▪ Croatia ▪ Czech Republic ▪ Ecuador ▪ France ▪ Great Britain ▪ India ▪ Indonesia
 Ireland ▪ Italy ▪ Korea ▪ Northern Cyprus ▪ Northern Macedonia ▪ Portugal ▪ Russia ▪ Serbia ▪ Scandinavia ▪ Slovakia ▪ Slovenia
 South Africa ▪ Spain ▪ Turkey

ONE STOP. ALL SERVICES.

An unparalleled range of technologies

We provide technology-neutral advice:

- PU PROCESSING
- FLEXIBLE TRIMMING
- PUNCHING
- PRESSING/FORMING
- THERMOFORMING
- PRESS LAMINATING
- EDGE FOLDING
- JOINING/GLUING

We support in every step of the process:

- ENGINEERING
- PROJECT MANAGEMENT
- PROTOTYPING
- TOOLING
- MACHINERY
- AUTOMATION
- SERVICE
- PART PRODUCTION

FRIMO Group GmbH

Hansaring 1
49504 Lotte
Germany

☎ + 49 (0) 5404 886-0

FRIMO GmbH

Center of Competence PU & Trim

Hansaring 1
49504 Lotte
Germany

☎ + 49 (0) 5404 886-0

✉ info.lotte@frimo.com

AUTOMOTIVE ALLIANCE



Hennecke
GROUP



www.frimo.com

