Screen Changers, Gear Pumps, Mixers, and Pelletizers for Extrusion

Extrusion Line Solutions

maag group

brands of maag group

maag
- pump systems

automatik
- pelletizing systems

maag
- filtration systems
Since Maag introduced pump-assisted extrusion more than 30 years ago, we have become a world leader in extrusion solutions.

With our extrusion labs and global engineering, service, and sales network, we not only have the equipment but also the infrastructure to assist your selection and support your equipment investment.

Since the development of that first extrusion pump, Maag has continued to innovate and broaden our ability to help processors get the most from their extrusion lines.

While Maag doesn’t make extruders, we make them perform better. Our products are typically used in:

- Cast film and sheet
- Tube, pipe, and profile
- Cable and hose
- Blown film
- Recycling

We manufacture a full range of melt pumps, with rates to 14,000 lb/hr. Our latest extrex® gear pump series is one more example of how Maag continues to raise the bar in extrusion pump technology. Along with these pumps we also offer a choice of pump controllers, from discrete component units to sophisticated touch screen models.

We offer slide plate and piston type screen changers that provide dependable, leak-free filtration. A wide variety of choices are available to suit the economic and production requirements of any extrusion line.

For recycling and compounding lines, our durable Automatik pelletizing systems provide the utmost in reliability and flexibility.

We also can provide standard design and custom engineered thermoprofiler® in-line static mixers to ensure isothermal melt profiles and uniform dispersion of colors and additives.

In addition to these individual components, we can integrate them into custom engineered systems that also include controllers, power units, sensor technology, adapters, connectors, drives, and other components. Either way, Maag offers the most complete package of extrusion enhancement equipment and support available in the industry today.

Maag also manufacturers pumps and filtration systems for the polymer and compounding industries.

This integrated system combines an extrex® pump, CSC/BF-4F screen changer, static mixer, drive, and controls; the system is cart-mounted for easy retrofitting to an extrusion line.
Gear pumps produce a consistent flow regardless of discharge pressure. Installed between the extruder and die, the pump takes on the job of generating pressure, and does so at efficiencies approaching 98% versus 30% for an extruder. This leaves the extruder responsible for only feeding, melting, and mixing. The result is a much more efficient line and significant energy savings.

The gear pump’s close clearances also dampen extruder pressure pulsations. This provides a more consistent die pressure and less gauge variation (typically ±1.0% or better) on the finished product, resulting in better quality and higher yields.

A gear pump will also lower product temperature by lowering the extruder head pressure (see diagram). This will result in more production where the throughput was otherwise limited by the product temperature and/or extruder pressure capacity.

Finally, because the extruder is relieved of pressure building, additional long term savings are realized from less extruder barrel and screw wear.

**Benefits Summary**

- Greater dimensional consistency
- Eliminates pulsations
- Improved appearance
- Higher production rates
- Handles high levels of regrind
- Higher yield / less material usage
- Lower overall energy usage
- Longer extruder life
- Adaptable to all extruders
- **Paybacks under one year**

**How the extrex® pays for itself**

Due to the many variables that can enter into the extrusion process (flow pulsations, less than optimum screw design, extension of the extruder's initial output rate, use of regrind or off-spec materials, cycling of the heat zones, moisture in the product, etc.), the typical single screw thermoplastic extrusion line has a gauge variation of ±3 to 5%.

With a very conservative reduction (from ±4% to ±3%) in gauge variation from use of an extrex® pump, payback for the investment is easy to calculate.

**Example:** a HIPS sheet line running at 1,500 lb/hr on three shifts, five days/week, in a 50 week year, with a $35,000 gear pump system in place.

Normal material usage = 1,500 lb/hr x (40 x 3 x 50) = 9,000,000 lb/yr
Material savings w/pump = 9,000,000 lb/yr x 1% = 90,000 lb/yr saved
Dollar savings = 90,000 lb/yr x $0.85/lb = $76,500 saved per year
Payback period = $35,000/$76,500 = 0.46 years (< 6 months)

**Bottom line:** on material savings alone an extrex® system pays for itself in less than six months and adds $85,500 to the bottom line each year thereafter. And you can expect about a 20% reduction in energy costs as well.
The Maag Difference

As part of our tradition of continuous improvement, we are now offering our 5th generation extrex® series. This incorporates a number of benefits that take performance to a new level in extrusion pumping:

- New bearing design runs cooler for higher speeds and throughputs
- Refined inlet and outlet flow channel geometry for less melt shearing
- Four standard clearance classes to more closely match melt viscosity with pressure requirements
- Optimized electric zone heating for more uniform temperature distribution
- tribex® hardening technology for 2x the standard gear shaft life

Our 3rd and 4th generation extrex® pumps can also be retrofitted to 5th generation specifications.

The extrex® Pump Family

**Thermoplastics**

- extrex® GP – a general purpose pump for a wide range of applications. Nine sizes from 300 to 23,250 lb/hr.
- extrex® HV – a higher volume, lower pressure version of the GP with wider gears for 25% more throughput. Four sizes from 1,220 to 5,500 lb/hr.
- extrex® HP – a higher pressure, lower volume version of the GP with narrower gears for 40% more discharge pressure. Seven sizes from 380 to 8,600 lb/hr.

All pumps are supplied with reversible flow path bearings and shaft seal cooling capability.

*Throughput figures are for polyethylene @ 2,000,000 cP and ethylene-propylene-terpolymer @ 20-70 Mooney*

**Elastomers**

- extrex® RB – designed specifically for general purpose rubber applications, with cooled shafts and larger clearances than standard thermoplastic extrusion pumps. Four sizes from 400 to 2,150 lb/hr.
- extrex® RV – a higher volume version of the RB with wider gears for 50% more throughput. Six sizes from 230 to 2,550 lb/hr.
- extrex® RQ series – these are split housing versions of the RB and RV, allowing quicker, easier cleaning. Five RV-Q sizes from 400 to >3,300 lb/hr, and seven RV-Q sizes from 230 to >3,300 lb/hr.

All pumps are supplied with reversible flow path bearings, shaft and shaft seal cooling capability, and housing bores for liquid heating or cooling.

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**How It Works**

- Unmeshing gear teeth (Zone A) create a void, drawing product into the pump.
- Product is captured between the teeth and carried around to the pump’s discharge side.
- Re-meshing gear teeth (Zone B) compresses the product, forcing it from the pump.
Systems and Controls

Extrusion pumps are usually part of a larger system that includes a drive package and controls to synchronize the operation of the pump with the extruder.

Our systems typically include:
- **extrex®** gear pump
- High resolution AC drive
- Gear reducer
- Universal drive shaft with couplings
- Pressure transducers and thermocouple
- Electrical enclosure
- VFD controller
- Stationary or mobile support cart
- Maag pump controller

Maag’s standard series of PLC-based controllers range from simple discrete instrument units to our fully automatic MPC-4000:
- One-touch auto start and shutdown
- Intuitive color touchscreen interface for easy operation
- Adaptable for all processes
- Proven Siemens or equal PLC with off-the-shelf components
- Recipes for repeatability
- Compact design
- Optional integral heat zones
- Built to withstand harsh operating environments

Maag MPC-4000 touchscreen controller

An expac® with extrex® RB pump for a rubber extrusion line.
Maag’s screen changers are backed by many years of experience, numerous patented filtration concepts, and manufacturing that meets the highest quality requirements of the plastics processing industry.

Our screen changers also run the full spectrum of price and performance needs, and include:

- Manual and hydraulic slide plate, discontinuous and semi-continuous designs for economical filtration at pressures over 10,000 psi.
- Piston type, sealless designs with a 5-year guarantee for leak-free operation. Choices include four continuous and two discontinuous series, and a constant pressure option.

The benefits of using Maag screen changers include:

- Increased quality of the final product by removing contaminants, dirt, gels, etc.
- Backflush capability available for increased screen pack life and less operator attention
- Reduced production downtime
- Improved extrudate homogenization
- Protection of downstream components (melt pumps, spin packs, etc.)
- Vented design eliminates air entrapment during screen change

Together, these designs and options are part of the complete package Maag offers for extrusion filtration.

**Filter Element Choices**

Maag piston screen changers can be provided with standard flat screens or pleated candle elements, which greatly increase filter effectiveness.

Flat screens are a simple means of filtration. They can be used singularly or in packs of screens with different meshes. And by adding a support plate behind the screen, screen area utilization can be increased from 50% to as much as 98%, greatly extending on-stream life.

As an alternative, Maag has incorporated candle filter technology in our piston screen changers. Candle filters have been used by Maag for years in the fiber industry to remove gels and other difficult contaminants from thermoplastic streams.

Replacing flat screens with candle filters increases filter area up to 60 times, resulting in:

- Longer screen change intervals
- Lower pressure drop
- Increased mesh without increased pressure (compared to flat screens) or frequency of screen change
- The ability to use depth filtration (sintered metal fibers) to capture gels and increase dirt holding capacity

A screen changer fitted with candle filters will dramatically increase filtration performance over what is possible with flat screens.

**Flat Screen**

- Disposable
- Inexpensive
- Surface filtration
- High $\Delta p$ at higher mesh

**Pleated Candles**

- Reusable
- Large filter area
- Depth filtration possible
- Reduced $\Delta p$ at higher mesh
Discontinuous Screen Changers

**HSC**

The HSC is a hand operated slide plate, discontinuous screen changer; it is available with an innovative torque multiplying ratchet handle for manual operation. The HSC minimizes residence time and pressure loss through compact design and rheologically optimized straight-through flow channels. It can be mounted directly on the extruder or melt pump without adapters. A pressure activated seal provides leak-free operation.

The HSC is available in 13 standard sizes to match extruder size.

**Standard Design Limits**

- Temperatures to 500°F
- Inlet pressures to 10,150 psi
- Differential pressures to 2,900 psi

**Options and Accessories**

- High temperature version to 844°F
- Chrome or nickel plated flow channels
- Special coatings for fluoropolymer applications
- Special designs for PVC, PC, PET, and PMMA
- Support stand

**FSC**

The FSC is a semi-continuous hydraulic slide plate screen changer which can operate like a continuous screen changer in applications that are not sensitive to pressure fluctuations.

The product stream flows through one large cylindrical channel that conveys the stream through one of the two breaker plates contained within one slide plate.

Screen change is performed with the aid of a hydraulic actuator. Both sides of the screen changer need to be accessible to allow screen pack removal from either breaker plate.

The FSC is available in 15 standard sizes to match extruder size.

**Standard Design Limits**

- Temperatures to 500°F
- Inlet pressures to 10,150 psi
- Differential pressures to 2,900 psi

**Options and Accessories**

- High temperature version to 844°F
- Inlet pressures to 10,150 psi
- Differential pressures to 2,900 psi

**DSC**

The DSC is a discontinuous piston type screen changer for extrusion pressures up to 7,250 psi. It is a single piston design with one screen pack.

Screen changes are performed when the extruder is stopped. The piston is moved via hydraulic actuator until the contaminated screen is outside the body, where it can be removed. A clean screen is then inserted, and the piston is returned into the housing.

Available in 16 standard sizes from 10 to 7,250 lb/hr.

**Standard Design Limits**

- Temperatures to 840°F
- Inlet pressures to 7,250 psi
- Differential pressures to 1,450 psi

**Options and Accessories**

- High pressure version to 14,500 psi
- Dual breaker plate option for quick screen change
- Jacketed design for fluid or steam heating
- Chrome or nickel plated flow channels
- High pressure breaker plate for differential pressures to 4,350 psi
Continuous Screen Changers and Auxiliaries

C-SSC
This design is an economical continuous piston type screen changer for applications where interruption of the melt flow is not acceptable. It is a single piston design with two filter packs. The C-SSC is typically used for filtration of stable thermoplastics like PS, PE, and PP.

During screen changes one screen pack is moved out of the housing. The second screen pack remains in the product stream. Both sides of the screen changer need to be accessible to allow screen pack removal.

The C-SSC is available in nine standard sizes from 110 to 3,200 lb/hr.

Standard Design Limits
- Temperatures to 840°F
- Inlet pressures to 5,075 psi
- Differential pressures to 1,450 psi

Options and Accessories
- Stainless steel construction
- Jacketed design
- Auto or pendant control systems
- High pressure breaker plate for differential pressures to 4,350 psi

CSC
The CSC screen changer incorporates two pistons, each containing one filter pack. It is used for continuous filtration of thermoplastics, resins, and adhesives.

At the inlet, product is divided into two streams. During normal operation, each screen pack handles half of the total flow. After exiting the filter packs, the two streams, now filtered, are recombined at the outlet. During screen change, one piston moves out of the housing for screen pack removal, blocking that melt stream. After the dirty screen pack is replaced, the off-line piston is moved to a venting position to eliminate process upsets, and then returns to the normal operating position.

The CSC is available in 16 standard sizes from 10 to 30,000 lb/hr.

Standard Design Limits
- Temperatures to 840°F
- Inlet pressures to 7,250 psi
- Differential pressures to 1,450 psi

Options and Accessories
- Stainless steel construction
- Jacketed design
- Auto or pendant control systems
- High pressure breaker plate for differential pressures to 4,350 psi
- Special PET, PMMA, and PC designs
- Special foam application design
- High pressure breaker plate for differential pressures to 4,350 psi

CSC/DV
This is the same design as the CSC with the addition of a divert position. It is typically used with twin-screw extruders or in processes that benefit from purging startup or changeover material.

The CSC/DV is available in 16 standard sizes from 10 to 9,900 lb/hr.

Standard Design Limits
- Temperatures to 840°F
- Inlet pressures to 7,250 psi
- Differential pressures to 1,450 psi

Options and Accessories
- Stainless steel construction
- Jacketed design
- Auto or pendant control systems
- High pressure breaker plate for differential pressures to 4,350 psi
CSC/BF-4F
This continuous screen changer incorporates two pistons, each with two screen packs. In addition, the screens may be cleaned by the melt, flowing in the reverse direction (backflush). This automated process increases the service life of the screens, particularly with highly contaminated polymers.

When backflushing, three screen packs (75% of the filter area) remain in the melt flow for production. During screen changes, two screen packs remain in the melt flow.

The CSC/BF-4F is available in 14 standard sizes from 100 to 17,600 lb/hr.

Standard Design Limits
- Temperatures to 840˚F
- Inlet pressures to 7,250 psi
- Differential pressures to 1,450 psi

Options and Accessories
- Stainless steel construction
- Jacketed design
- Auto or pendant control systems

CSC-CC
This continuous screen changer uses candle filters in place of the filter screen to provide up to 60 times larger filter area than flat screens. The CSC-CC is available in 7 standard sizes from 660 to 143,000 lb/hr.

Standard Design Limits
- Temperatures to 660˚F
- Inlet pressures to 5,080 psi
- Differential pressures to 1,450 psi

Options and Accessories
- Stainless steel construction
- Oil, liquid, or steam heated
- High temperature version up to 840°F
- Auto or pendant control systems

DV
DV continuous divert/dump valves are used to direct product flow from upstream equipment to a receptacle or other location. The DV is a unique design that provides bumpless changeovers and eliminates the possibility of a deadhead condition.

Standard Design Limits
- Temperatures to 840˚F
- Inlet pressures to 7,250 psi

Options and Accessories
- Stainless steel construction
- Jacketed design for fluid or vapor heating
- Special PET, PMMA, and PC designs
Maag Automatik pelletizing systems are well known for economical production, flexibility, and outstanding reliability. With over 8,000 systems installed worldwide, we have the experience and leading technology to meet your needs.

We offer a complete line of pelletizing equipment from lab machines to high performance production systems, including:

- Underwater pelletizers for producing spherical or cylindrical pellets
- Dry-cut strand pelletizers
- Belt, centrifugal, and impact pellet dryers
- Die heads
- Classifiers
- Process water treatment
- Controls
- Water troughs, polymer valves, belt conveyors, etc.

**Sphero** – this underwater pelleting system is designed for all types of thermoplastic materials and produces spherical pellets of superb quality, ideally suited for further processing. It provides high flexibility in a small footprint, with throughputs from 440 to 40,000 lb/hr.

- Optimum knife contact pressure for increased lifetime and high availability
- Optimized fluid dynamics in the cutting chamber
- Free access to all components from all sides

**Primo** – available in three models, Primo strand pelletizers offer a range of capabilities from simple to sophisticated. Throughputs from 770 to 11,000 lb/hr.

- Intake widths from 60 to 400 mm
- Easy access for cleaning and maintenance

**Baoli** – a simple, robust dry-cut strand pelletizer offering reliable operation at an economical price. Throughputs from 1,500 to 6,000 lb/hr.

- Least expensive/pound produced
- Easiest pelletizer on the market to maintain

**JSG and M-USG** – strand pelleting systems (JSG is dry cut, M-USG is underwater) for producing cylindrical pellets; they can be configured for the exact processing requirement. Throughputs to 44,000 lb/hr.

- Automatic strand lacing on startup and during operation
- Quick exchange of cutting head
- Wear-resistant cutting tools and minimal maintenance requirements result in very high machine availability
Dryers

Three types of dryers are available, allowing impartial advice on the optimal and most cost-effective drying solution to meet your exact needs.

In all units, the collected water is recirculated back to the process loop.

**Aero** – provides gentle, low-impact removal of cooling water; typically is used with the **M-USG** pelletizing system. Throughputs from 8,800 to 33,000 lb/hr.
- Very gentle drying of pellets
- No moving parts
- Extremely low residual surface moisture, depending on the polymer
- Fast and easy cleaning

**Centro** – a centrifugal dryer suitable for use with both **Sphero®** or **USG** pelletizing systems. Throughputs from 1,100 to 48,000 lb/hr.
- Extremely compact design; lowest space requirement on the market
- Very low energy consumption
- Optimized access for cleaning and maintenance

**Duro** – this belt dryer is ideal for brittle pellets, glass-fiber reinforced materials, or compounds with high chalk compositions. It connects directly to **Sphero®** pelletizing systems. Throughputs from 1,100 to 13,200 lb/hr.
- No movement of pellets against dryer components
- Small number of moving parts results in virtually no wear
- Reduced energy consumption, no additional heating required

*JSG system with die head, water-flooded strand guide, suction dryer, and Primo® strand pelletier*
To support our individual products and integrated systems, Maag backs its equipment with multi-lingual factory trained service personnel in service centers and manufacturing plants throughout the world. Our service network’s guarantee of parts availability and on-site service on a 24/7 basis provide the confidence of long term, uninterrupted production. Maag’s support is not limited to field service alone. Our capabilities include our technical support and service capabilities cover not only our own products but those of other makes as well.

Most repairs are performed in our own facilities. Many repairs can be done onsite.

Through our worldwide sales, service, and support network we also conduct internal and external training courses for our own personnel, representatives, and customers in general. Our support services have also included feasibility studies, consulting services, profitability studies, and rheological measurements in either of our two major test facilities.

By understanding our customer’s needs, we develop full repair and customer service programs tailored to specific customer locations. We also offer preventive maintenance plans, emergency planning, and inventory control.

Overall, our customer support solutions include:

- Complete service and repair of all major brands of pumps and screen changers
- Complete servicing on pelleting, extrusion, and injection molding equipment
- Preventative maintenance programs
- Refurbished equipment programs
- Customer satisfaction follow-up
- 24/7 field service support

If you are interested in lowering your maintenance costs or increasing your production yields, let the world leader in auxiliary extrusion equipment show you what is possible.