EXTRUSION CONTROL SOLUTIONS

38 YEARS

RELIABLE AUTOMATION AND OPTIMIZATION OF EXTRUSION PROCESSES
We continuously develop our technologies and offer nowadays complete solutions, among others, in these areas:

- Material conveying PRO-VAC (p.8-10)
- Gravimetric weighing PRO-GRAV (p.5)
- Dosing: continuous PRO-DOS (p.6) batch PRO-BATCH (p.7)
- Profile automation: Profile measurement PRO-FIL (p.12) Profile control PRO-CON u. PRO-JET (p.13-15)
- IBC with width measurement and control PRO-SONIC, PRO-WIDE (p.17-18)
- Laboratory measuring tools PRO-LAB (p.19)
- Systems for the central control PCC (p.11)
PLAST-CONTROL is the only company in our market which produces all critical components in-house. This in-depth knowledge of the principles and hardware gives you, the customer, the chance to use the process knowledge to the greatest effect.

Our position of being able to design and build complete control systems without using third-party devices and software is unique for the industry.

Complete responsibility of the control technology and the ability to produce custom made applications offers unrivalled experience and technical competence.

We can fully automate your extrusion line. Do not hesitate to contact us!

Advantages:
- Waste reduction and material savings
- Fast product changes
- Higher outputs
- Reproducible products
- Reduction of operator faults

AUTOMATION & QUALITY ASSURANCE

1. Central Operator Station
2. Material conveying (vacuum loading) with intelligent control
3. Gravimetric extrusion control systems, up to 7 dosing units per extruder or six batch feeders
4. Thickness profile control, patented air ring technology
5. PRO-SONIC internal bubble cooling control
6. PRO-CAGE sizing cage
7. IBC, internal bubble cooling hardware
8. On-line profile measurement
9. Haul-off measurement, haul-off control
10. Width measurement

BRO38-GB16-RZ 16.09.2016 22:18 Uhr Seite 4
The **GT3+** is an economic but yet powerful system for the gravimetric control of an extrusion line. It is designed for the control of up to 3 gravimetric weighing hoppers (e.g. a mono line with a main hopper and 2 dosing units, or a 3-layer co-ex line with 3 main hoppers without dosing units).

The **GT3+** could also be used when it comes to pure conveying, width or IBC control – requirements that do not require an extensive visualization.

The **GDC-N** is the compact specialist. The system handles up to 15 gravimetric weighing hoppers, temperature control or the profile measurement and control.

For a simple profile measurement and control system, the **GDC-N** is the economic solution. Production data is displayed on an easy to read 10.4" color TFT display with optional touch screen control for specific functions.

The complete range of profile representation and analyzer tools is customizable. The client can choose between a monitor with key buttons or with touch screen.

A powerful **GDC-N** computer grants a fast and efficient control, being the right choice for simple gravimetric, batch-blending systems or continuous gravimetric dosing systems with up to 15 components. Additional functions such as IBC and width measurement/control can be integrated.

**ACS** is the ultimate solution of the product range and can include all of the functions and features that PLAST-CONTROL offers in one package. The operation is simple and very easy to handle with the large 19"color TFT touch screen display.

And there are even more benefits. In addition, all PLAST-CONTROL systems can handle these functions:

**Advantages:**
- Capacitive online gauge measurement
- Width measurement and control
- IBC control
- Material flow control MFC (vacuum loading)
All our automation principles over the last 38 years have been based on gravimetric extrusion control. The “loss in weight” principle guarantees precise measurement of throughput and control designed for all types of extrusion processes.

This approach of control is the only suitable principle when it comes to mono- and co-extrusion applications. This concept works for all continuous extrusion processes. Needed in the process are a gravimetric weigh hopper frame, a slide valve and a PC System.

In case of co-extrusion lines, the control of layer thicknesses is done by the adjustment of the individual extruder throughput, matching the target entry. If the production level is increased through changing the haul off speed, all extruders will simultaneously react and the product parameters will remain constant even during the order change phase.

The systems are capable to control the film weight with a resolution of ± 0.1% from the average. The system will compensate for deviations even if the filter from the extruder gets clogged or a heater band fails. The deviation from the target value will be detected and accordingly corrected so that the film is still produced with the best quality.

Experience shows that commonly, up to 4% of the raw material can be saved. The return of investment is normally 6 to 12 months.

**Advantages:**
- Raw material savings
- No dependence on the bulk density
- Fast order change times
- Constant product quality
- Simple user interface
- Customized solutions
- Rugged, durable construction
- Easy cleaning through the removable hopper
- Fast return of investment
The new MICRO-DOSING units follow the trend to more components and smaller dosing amounts. The new units can cover a range from 100 g/h up to 8 kg/h.

Advantages:
- Considerable saving of aggregates
- Independent from bulk density
- Fast product change
- No pre-mixed material
- Precise dosing of small volumes
- Easy operation and simple target entry
- Up to 8 components per extruder
- No dosing screw changes necessary
- Easy cleaning due to removable hoppers

Optical, mechanical or functional requirements for the final product usually require the use of several types of material per extruder. Various additives ensure as for UV-stability, good printability, good weldability etc. All these additives are very expensive and must therefore be dosed as precisely as technically possible.

The best technical solution, is the gravimetric dosing. In this case, additives are dosed precisely into the main material stream. The assembly prevents demixing. The measuring is made following the “loss-in-weight” principle, and the accuracy is of 0.1%.

Fully modular construction allows up to 6 dosing units plus main material to be fitted to each extruder (including co-extruders). All dosing units outputs are synchronized with the main hopper output to guarantee an accurate product recipe.

The latest generation of dosing unit now incorporates a high torque motor delivering a wide speed range. This minimizes the need for dosing screw changes. Advanced software control guarantees accurate control from very low to high output rates.
Compared to the continuous dosing, the batch blender works according to the “gain-in-weight”-principle. The material gate opens for a pre-determined time and registers the gain in weight in the weighing chamber. When the batch is complete, the material is discharged and mixed in the mixing chamber. The accuracy is of ± 0.3%.

The PLAST-CONTROL batch blenders can be used off-line as a general purpose blender, online or on-line with extrusion control. The mixing hopper itself, works as a gravimetric weighing hopper in a “loss in weight” process.

The low-cost PRO-BATCH-devices are built for 4 to 6 materials and several types of throughputs.

<table>
<thead>
<tr>
<th>Model</th>
<th>PB4-180</th>
<th>PB4- 450</th>
<th>PB6- 150</th>
<th>PB6-300</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. comp.</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Max. output kg/h</td>
<td>180</td>
<td>450</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>Max. output lbs/h</td>
<td>400</td>
<td>990</td>
<td>330</td>
<td>660</td>
</tr>
</tbody>
</table>

For special requirements, a combination of both dosing principles (batch and continuous dosing principle) is also possible.

The new PRO-BATCH series combines many positive features and the experience of the recent decades. In the developing process, we especially paid attention to the compact construction, easy handling and operation, high precision and simple cleaning of the batch.

The new design of the slide valves, the effective helix mixer and transparent construction are meant to assist the user.

Advantages:
- More precise batch mixer
- Compact construction
- Usable in various situations
- Highly accessible
Every extrusion process starts with the feeding of the materials to the system. The right layout of the system is a warrant for a high availability, low dust contamination and energy efficiency with great flexibility.

In order to choose the right concept, talk to our experts right from the beginning phase of your planning.

We have the appropriate technical solution and the right vacuum system for both conveying of small amounts of a single material over a short distance or tons per hour through a huge production hall.

The standard decentralized principle of material conveying (see picture 3) is simple: Each component is equipped with a PCH material conveyor. When the conveyor requests a material, the system will connect the vacuum from the pump. The conveyor will start to transport the granule from the day bin or silo into the storage hopper. Once the storage hopper is full, the material is drained into the extruder’s weighing hopper.

In the central conveying principle, the main difference is that more conveyors will simultaneously transport material. A more powerful pump will be needed in the process, but in most cases smaller conveyors can be used.

Advantages:
- Layout for low abrasive wear
- High flexibility
- Centralized control
More and more extrusion companies are changing to a centralized vacuum supply (moving away from the system related vacuum production), needed for the feeding of the raw materials from silos to the machines.

Advantages like energy efficiency, noise reduction at the work station and a significant higher output at lower cost are only a few reasons. The uptime is increased while the maintenance effort is decreased.

For the central vacuum, more powerful vacuum pumps and pre-filters will be installed in a closed room. The whole production plant will be supplied with vacuum through this central air line. The conveyors can access the vacuum stream and supply themselves as needed.

In addition to the optional hardware solutions for vacuum supply, PLAST-CONTROL also offers many software solutions for this specific application.

Material Minimizing Control (MMC) has been developed to reduce the amount of scrap and waste due to changeover of products and recipes. The program makes sure that the material storage hoppers of the dosing units are empty when the changeover is initiated and that only a small amount of material is left in the weighing hoppers.

Advantages:

- Noticeable lower energy consumption
- High flexibility
- Centralized control
- No dust contamination in the production hall
- Less noise in the production hall
Coupling identification with **PIPE-IDENT**

**PIPE IDENT** was developed to eliminate the incorrect connection of material feed hoses.

**PIPE IDENT** uses a wireless sensor (RFID) on the removable flex hose which does not need a power source. The fixed pipe side is connected to the control system. The flex hose and the fixed pipe side are paired via the system software. If the hose is connected to the wrong pipe, then a visual indication is displayed on the coupling as well as on the operator display. In this case the start-up of the loading system is not allowed.

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**Advantages:**
- High transparency
- Energy efficiency
- Customized design
- High reliability
- Efficient filtering of dust and angel hair

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**Dust and contamination filtration with **PCH-E**

Dust and contamination of the virgin material often creates problems in the extrusion process. Long transport distances and many elbows between the silos and the machines produce angel dust and angel hair. These contaminates should be removed before entering the extruder by using filtration devices.

For this type of problems, there are many solutions available. Just ask our engineers.

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**PLASTCONTROL**
The PLAST-CONTROL Central **PCC** ensures plant-wide connection of your extrusion lines. The **PCC** is a powerful and convenient tool for accessing and storing all production data – in real time.

All production data is displayed centrally and optionally on Personal Computers integrated into your plant-wide network.

Precise material balance sheets, quality control, central data saving and production supervising are possible without the need of large Information Technology budgets. The basic software package includes a number of sophisticated data logging and order database applications. Custom screens can be implemented for a specific customer request.

Optionally, production specific data from your system network can be sent to the **PCC**.

**Advantages:**
- OEE (Overall Equipment Efficiency)
- Manufacturing transparency in real time
- Material balance sheet
- Central data storage and retrieval
- Online access to all production parameters
- Material database capability
- Scrap accountability
- Central logging of machine status and alarms
- PLAST-CONTROL remote support via modem
- Connection to plant network

**PLASTCONTROL**
New Non-contact AirCC sensor
PLAST-CONTROL’s experience in building and designing measurement sensors for the on-line gauge measurement of films has given rise to several new technologies. The new patented sensor AirCC was developed especially for sticky and surface sensitive films.

The AirCC has two parallel working sensors which create different capacitive fields. This combination allows calculation of film thickness regardless of gap to film. Even a constantly changing air gap (from 100 to 350 µm) doesn’t influence the result.

Capacitive Measurement sensor
Capacitive measurement sensors from PLAST-CONTROL in combination with direct driven scanner rings in low-weight aluminum design are the guarantee for low maintenance profile measurement without any slip (precise allocation).

New C-SCAN solutions for barrier and cast film
An effective capacitive alternative to radioactive sources is available with the new C-SCAN, mounted after the collapsing frame on blown film lines or after the chill rolls on cast lines and measures across the web.

Advantages:
- The right measurement solution for all applications
- Measurement of sticky (i.e. EVA) and soft film without damage with AirCC
- Integrated film temperature measurement
- Barrier film measurement with C-SCAN
- Non-contact measurement of overall thickness
PLAST-CONTROL, as one of the pioneers in the development of automatic systems for the reduction of transverse direction (TD) profile tolerances has continuously developed and refined its systems.

Functionally, the computer opening or closing of actuators within the **PRO-CON** air ring will increase or decrease the volume of air in each segment. This influences the melt temperature and in turn the film thickness during film blowing step.

The existing thin areas in the film are directly cooled when the melt comes out of the die and therefore can no longer expand as much. The film will remain thicker in this area.

**PRO-CON** has the same good response when it comes to thick areas in the film. Depending on the material and product, **PRO-CON** will correct thick spots by decreasing the cooling air in this area. Depending on the raw material and the product specifications, the film profile tolerances are reduced to a possible minimum.

The air rings are available in 6 sizes.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Model</th>
<th>Die £ mm/inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO-CON</td>
<td>C-200/32</td>
<td>80-200 3-8</td>
</tr>
<tr>
<td>PRO-CON</td>
<td>C-400/48</td>
<td>200-400 8-16</td>
</tr>
<tr>
<td>PRO-CON</td>
<td>C-750/64</td>
<td>400-750 16-30</td>
</tr>
<tr>
<td>PRO-CON</td>
<td>K-1100/80</td>
<td>750-1100 30-44</td>
</tr>
<tr>
<td>PRO-CON</td>
<td>K-1650/106</td>
<td>1100-1650 44-65</td>
</tr>
<tr>
<td>PRO-CON</td>
<td>K-2200/128</td>
<td>1650-2200 65-86</td>
</tr>
</tbody>
</table>

**Advantages:**
- 50% reduction of the base tolerances
- No additional energy input
- Output increase with MAGIC FLOW
- Simultaneous control of thin and thick film areas
- Easy retrofit
- Retrofits of rotating/oscillating dies possible
- Fast return on investment
- Auto profile shift compensation
MAGIC-FLOW is the result of extensive research in the increase of cooling capacity for blown film lines.

This has been achieved by improving the aero-dynamic flow path between the blower, manifold and cooling ring. Additionally, extensive developments in the internal geometries of the cooling ring and the complete redesigned lip shape allows higher air speeds and air volumes at the cooling interface. The net effect is that bubble stability is increased, transverse tolerances improved and higher machine outputs are achieved.

MAGIC-FLOW really does surpass all expectations: output increases of up to 40% are possible compared to standard double lip air rings.

An additional output increase becomes possible by using PLAST-CONTROL’s double air ring technology, PRO-CON DUO II. Mechanical properties will also be improved by using the DUO II. The electrical controlled upper air ring elevator allows for easy adjustment and accessibility.

The combination of “improved output – better mechanical properties” ensures a fast return on investment.

You can find more information about this product in our PRO-CON flyer.

Advantages:
- High bubble stability – fast return of investment
- Perfect basic tolerances
- Significant higher output, up to 40 % more than comparable cooling systems
- Better mechanical film properties possible
The PRO-JET profile control is achieved through the mounting of a segmented plate, underneath an existing air ring. Adjustable air valves located below the air ring, control the volume of airflow in each segment. The PRO-JET is suitable for stationary and moving dies and have diameters from 100 mm - 2500 mm (4"-100"). The basic tolerances are improved with up to 50%. PRO-JET does not affect output rates.

**Advantages:**
- Economic solution for retrofits
- Immediate response
- Low additional energy input
- Auto profile shift compensation
The NAVIGATOR operator allows a simple graphical touch screen control of your entire extrusion process, including extruder drives, temperatures, blower controls, calibration cage, collapsing frame, haul-off and treater. The NAVIGATOR can be easily adapted to new lines, upgraded or retrofitted, irrespective of the Original Equipment Manufacturer.

PLAST-CONTROL produces many electronic components and the software package in-house, which sets us apart from on-going technology obsolescence in the ever evolving computer world.

This enables us to provide our customers complete service and spare parts for all our products for many years along with a migration to the future product.

This flexible solution for existing extrusion lines as well as for new lines enables you to implement an identical operation philosophy throughout your entire company. NAVIGATOR is available in many languages.

The configuration, implementation and documentation of all work steps are part of our service.

Advantages:
- Modular
- Safety function
- Retrofit/exchange of the old components
- Long term availability of spare parts
- Operation through Touch Screen
- Implementation of clients’ individual wishes
- Safety assurance of E-Stop circuitry

Also included is a comprehensive technical and legal counseling during the installation and the security check in the working environment of the installed system.
**PRO-SONIC** can be integrated into all PLAST-CONTROL systems or can be supplied as a stand-alone system. For accurate control of the bubble diameter, speed is everything. **PRO-SONIC** incorporates non-contact high quality ultra-sonic sensors processed by ultra-fast signal processing hardware and software. Bubble diameter calculated within 100 ms per update.

Upgrading to **PRO-SONIC** offers full non-contact high resolution sensors and ultra-fast acting STV control valve, reducing edge trim width (decreased scrap) and reduction in order change time.

Stepper motor driven air Throttle Valve (STV) supplies instantaneous response to the control required by the system. Layflat width variations are reduced to a minimum. Startup requires minimal operator interaction.

**Ultra-sonic sensors**

We have achieved width tolerances of less than +/−2 mm (0.08 inches) on existing lines using the latest generation of ultra-sonic sensors combined with the newly developed air control valve.

You can find more information about this product in our **PRO-SONIC** flyer.

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**Advantages:**

- Fully integrated
- Cost effective solution
- Contact-free measurement
Width Control PRO-WIDE
A width measurement bar is installed between the collapsing frame and the winder. The measuring sleds precisely detects the edges of the film by means of infrared sensors. For film with gussets, the width measurement can optionally be made with ultra-sonic sensors on the calibration cage.

Width adjustments are made by automatically opening or closing the calibration cage on IBC systems or with a digital air valve on non-IBC lines.

Calibration Cages PRO-CAGE
The calibration cage is possibly one of the most overlooked items in regard to the influence it has on film quality and profile tolerance.

The PRO-CAGE range of cages offers an innovative design with a rigid construction and precise control of the cage position throughout the operational range. You can choose between two types of cages: the M series with high precision double pivot self centering, easily exchangeable rollers or the L series with single pivot operation.

Both devices feature a choice of roller surfaces for different applications.

Advantages:
- Precise width control
- Various roller surfaces
- Rigid construction
- Compact design with wide adjustment range
The PRO-LAB II has a touching sensor for the absolute, real thickness measurement of film profiles according to the norms DIN 533370/ISO 4593/ASTM-D 6988-08.

In addition to the touching sensor the system is available with a capacitive sensor for a continuous measurement mode or with a combination of both sensors.

To analyze the thickness distribution, a film strip is put into the holding device of the PRO-LAB II system. The measuring value is taken with the mechanical detection head at selectable distances or continuous with the capacitive sensor. The maintenance free stepper motor moves the film strip step by step by the mechanical detection sensor.

The PRO-LAB II basic system is equipped with a serial interface, so that the system can be connected to a customer PC. The software package is Windows based and has a user friendly environment allowing a professional profile analysis. Based on meaningful profile graphics, average values, min. and max. values, the tolerance of the pre-selected set points will be easily detected.

With the help of Windows, these measuring results can be documented with product or order numbers, archived or recorded.

Advantages:
- Measurement according to the norms DIN/ISO/ASTM
- Easy handling
- Automatic mode
- Easy calibration

You can find more information about this product in our PRO-LAB flyer.