



MATERIAL MANAGEMENT
Blending | Control | Analytics

Gravimetrics



OPTIX

INNOVATION

EXTRUSION

CONTROL

OPTIMIX

ANALYTICS

INFORMATION

INDUSTRY 4.0

LINE VIEW

INDUSTRY 4.0

**MATERIAL
MANAGEMENT**

INSIGHT

INSIGHT

LINE VIEW



MATERIAL MANAGEMENT
Blending | Control | Analytics

TSM's reputation and prominence within the Plastics industry is gaining strength every year. We are now a critically important partner to some of the best known plastics producers in the world.



- *Regional Offices in Ireland, USA, Taiwan and China*
- *Global TSM Sales Network & Partners*

Intelligent Blenders from TSM

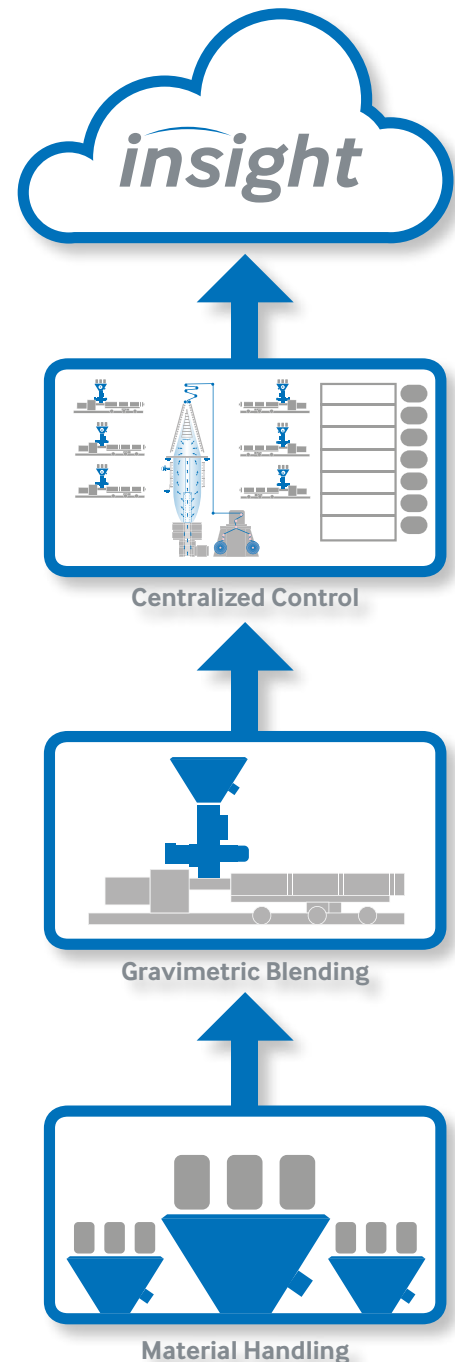
TSM has an enviable 40 year record of being the Blender provider of choice to Plastics processors all over the world. Continuous innovation resulting in unique patents and outstanding performance has ensured TSM maintains its status as world leader in this category.

Our 10,000 installations worldwide are backed up by local service and spare parts availability that guarantees our systems keep performing to the highest level 24 hours a day 365 days a year.

With five product ranges to choose from plus associated controls and options, all industry applications are catered for. Throughputs up to 3000kg/hr (6,600lbs/hr) and utilizing up to 12 components are available to cope with the increasing flexibility and complexity demanded by the industry today.

Our offices in Ireland, USA, Taiwan and China are backed up by a network of sales partners who are always available to support our customers wherever they may be.

Our new generation OPTIX range of Blenders transform this product category by incorporating, for the first time in the industry, IoT (Internet of Things) functionality that leverages critical data residing within the blender and converts this to valuable business information relating to materials, energy, downtime analysis and Overall Equipment Efficiency. (OEE)



Product Overview

TSM automation solutions assist plastic producers face challenges like stringent quality demands from customers and higher raw material, labour and maintenance costs. We leverage our extensive process knowledge and technological expertise to deliver the most reliable and accurate blending products in the industry.

Our Blenders and auxiliary equipment are the industry's strongest and smartest, providing a robust solution that works comfortably in plant environments yet delivers exceptional control and performance in all applications.

OPTIMIX

Multi Component Gravimetric Batch Blender



TSM's **OPTIMIX** range of Batch Blenders offer throughputs up to 3,000kg/hr (6,600lb/hr) and can accommodate up to 12 components. The **OPTIMIX** range utilizes TSM slide valve design and the patented reverse-flight mixing auger technology. This combination provides superior accuracies, blend ratios and mixing homogeneity that is not achievable by competitive systems.

OPTIX

Multi Component Gravimetric Batch Blender with Loss-in-Weight based Extrusion Control



TSM's **OPTIX** range of extrusion control blenders combine, in a unique way, accurate gravimetric batch blending together with integrated extrusion control using Loss-in-Weight principle. This results in exceptional ultra fast throughput measurement and control of the extrusion process. The **OPTIX** range can handle throughputs up to 800kg/hr (1,760lb/hr) and a maximum of 8 components of varying bulk densities.

OPTIBLEND

Multi Component Continuous Loss-in-Weight Blending



TSM's **OPTIBLEND** family of Continuous Blenders deliver perfect cascade mixing with the ability to blend extremely low material percentages. **OPTIBLEND** controls the blend percentages and can also maintain extruder throughput at a desired level i.e. kg/hr (lb/hr). Haul-off speed measurement can be added to ensure that the weight per length is controlled to the desired specification (Yield Control). The **OPTIBLEND** range offers throughputs up to 2,000kg/hr (4,400lb/hr) and can accommodate up to 7 components.

OPTIYIELD

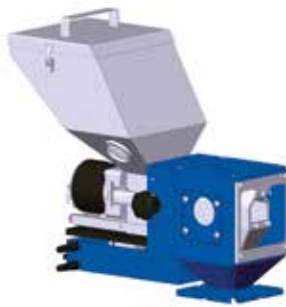
Single Component Continuous
Loss-in-Weight Measurement + Control



TSM's OPTIYIELD family of single component Loss-in-Weight Measurement feeders offers precise measurement, total reliability and advanced process control options to ensure consistent end product quality with optimized material usage. Throughputs from 50kg/hr (110lb/hr) to 2,000kg/hr (4,400lb/hr) are available.

OPTIFEED

Gravimetric Additive Feeder



TSM's OPTIFEED is an economical color and additive feeder delivering exact dosing rates and utilizing TSM's continuous Loss-in-Weight technology, with precise control of the feeding speed.

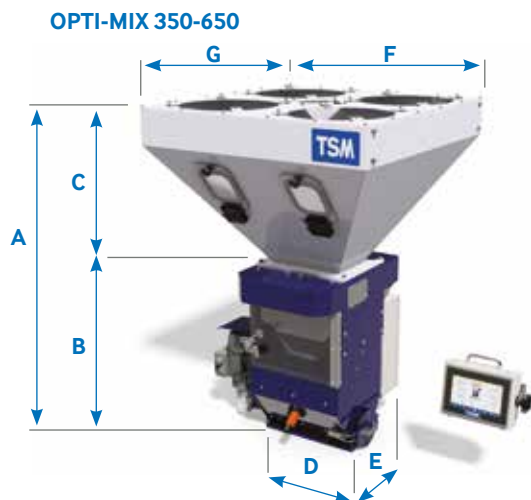
The product portfolio is designed to suit all applications and requirements and range from standard products to highly customized, bespoke solutions.

We leverage our extensive process knowledge and technical expertise to deliver the most reliable and accurate blending products in the industry.

OPTIMIX Range

insightready.com

The **OPTIMIX** range of blenders is the perfect solution where precise mixing, dosing, weighing and control is needed. Applicable across all process applications and throughput requirements, they are renowned for their reliability, performance and simplicity of operation. The **OPTIMIX** range provides the perfect choice for all your blending requirements and can be tailored to suit either simple or complex applications.



OPTIMIX Batch Blenders range can accommodate up to twelve components while providing throughput rates from 50kg/hr (110lb/hr) - 3000kg/hr (6600lb/hr). **OPTIMIX** utilizes **TSM** slide valve design and patented reverse-flight auger mixing technology. This combination provides superior accuracies, blend ratios and mixing homogeneity that is not achievable by competitive systems. All components are blended by weight, based on the preset blend ratios entered on the touch screen. Each component is metered separately into a single weigh hopper, which measures and controls their dosing percentage.

Benefits

- Faster Product Changes
- Continuous Homogeneous Mixing
- Increased Regrind Usage
- Product Consistency
- High Accuracy Dispensing up to 0.01% of batch

TSM Gravimetric Batch Blender Specification	OPTIMIX 50	OPTIMIX 150	OPTIMIX 250	OPTIMIX 350	OPTIMIX 650	OPTIMIX 1000	OPTIMIX 1500	OPTIMIX 3000
CHARACTERISTICS								
Reservoir Hopper Volume per comp. (LT)	12	12	12	35	35	32	32	110
Standard No. Material Components	4	4	4	4	4	4/6	4/6	6/8
Optional Additional Material Components	+2	+2	+2	+2	+2	+4	+4	+4
Standard Batch Weight Capacity (KG)	0.5	0.9	1.2	2	4	7.5	12	25
Mixing Motor	1 Ø	1 Ø	1 Ø	3 Ø	3 Ø	3 Ø	3 Ø	3 Ø
Motor (HP)	0.25	0.25	0.25	0.25	0.25	0.36	0.36	1
Motor (KW)	0.18	0.18	0.18	0.18	0.18	0.27	0.27	0.75
Blender Weight (KG)	50	50	50	75	80	115	125	225
Max Material Temp (°C)	70	70	70	70	70	70	70	70
* Max Optional Material Temp (°C)	130	130	130	130	130	130	130	130
* Contact TSM for more details on high temperature applications								
DIMENSIONS								
A Blender Height (mm)	737	737	737	1094	1159	1415	1465	1820
B Mixing Chamber Height (mm)	413	413	413	586	651	915	965	1010
C Reservoir Hopper Height (mm)	324	324	324	508	508	500	500	810
D Blender Front Width (mm)	205	205	205	562	562	470	470	894
E Blender Side Width (mm)	333	333	333	500	500	680	680	761
F Hopper Bin Front Width (mm)	652	652	652	750	750	760	760	1350
G Hopper Bin Side Width (mm)	652	652	652	750	750	760	760	1050

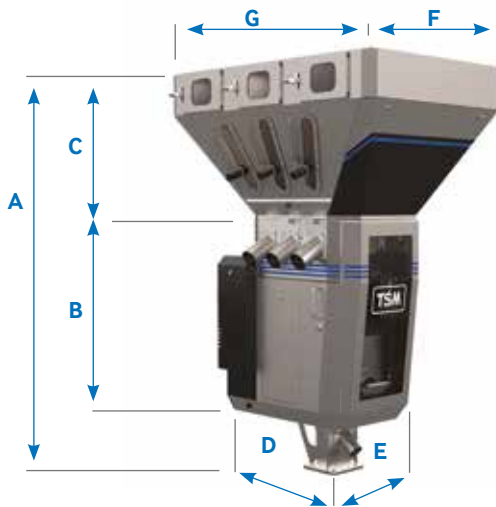
OPTIX Range

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TSM

TSM's new generation blender transforms the Blender category in an entirely new space. All the fundamental capabilities are enhanced in this new range and packaged in a sleek, robust, user friendly design. In addition TSM has incorporated TSM's patented **INSIGHT** ready functionality which allows the vast amount of critical data resident within the blender to be accessed by TSM's Industry 4.0 based Business Information System **INSIGHT**. Important business metrics relating to material usage, energy usage, downtime analysis and OEE (Operational Equipment Efficiency) are available across single or multiple lines and factories.

OPTIX 100-800



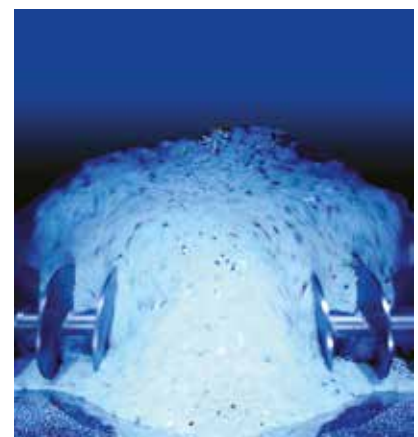
OPTIX range of blenders are specifically designed for Extrusion applications and incorporates patented Insight enabled technology based on Industry 4.0 platform. With enhanced functionality across all aspects providing superior accuracies, blend ratios and mixing homogeneity not achievable by competitive systems. **OPTIX** blenders utilize TSM slide valve design and patented reverse-flight auger mixing technology combined with continuous Loss-in-Weight measurement. TSM's extrusion control blenders combine, in a unique way, accurate gravimetric batch blending with integrated extrusion control using Loss-in-Weight techniques. This results in exceptional, ultra fast throughput measurement and control of the extrusion process. **OPTIX** range can accommodate up to eight components at throughputs up to 800kg/hr (1760 lbs/hr).

TSM Gravimetric Batch Blender Specification	OPTIX 100	OPTIX 200	OPTIX 400	OPTIX 800
CHARACTERISTICS				
Reservoir Hopper Volume per comp. (LT)	15	15	23	32
Standard No. Material Components	6	6	6	6
Optional Additional Material Components	0	+2	+2	+2
Standard Batch Weight Capacity (KG)	0.5	0.9	1.2	2
Mixing Motor	1 Ø	3 Ø	3 Ø	3 Ø
Motor (HP)	0.25	0.25	0.25	0.25
Motor (KW)	0.18	0.18	0.18	0.18
Blender Weight (KG)	60	70	75	90
Max Material Temp (°C)	70	70	70	70
* Max Optional Material Temp (°C)	130	130	130	130
* Contact TSM for more details on high temperature applications				
DIMENSIONS				
A Blender Height (mm)	1259	1328	1449	1553
B Mixing Chamber Height (mm)	695	765	765	765
C Hopper Bin Height (mm)	384	384	505	609
D Blender Side Width (mm)	616	616	616	616
E Blender Front Width (mm)	385	385	385	385
F Hopper Bin Front Width (mm)	610	610	610	750
G Hopper Bin Side Width (mm)	800	800	975	1129

Benefits

- Insight Ready
- Faster Product Changes
- Continuous Homogeneous Mixing
- Product Consistency
- High Accuracy Dispensing up to 0.01% of batch

Patented Mixing Technology
Reverse Flight Auger



Extrusion Control

TSM's extrusion control software is designed to ensure that productivity improvement and scrap reduction is achieved consistently during the production process. This is achieved by making high-speed adjustments to changes in extruder and/or take off speeds. The system also enables manufacturers to save costs by achieving tighter control tolerances over material consumption.

TSM Extrusion Control

Maximizing Savings By Reducing Setpoints To A Minimum !

TSM Gravimetric Blenders continuously monitor material throughput (kg/hr), (lb/hr) and will optimize yield (weight per length control) on extrusion lines. As part of a job recipe entry, the extrusion / haul-off control setpoints are entered via the remote operator panel. The **TSM** system monitors the line speed and extruder output to guarantee precise on-specification and consistent output quality, therefore reducing waste considerably while operating at optimum yields. The system also provides roll, order and shift summaries by component, allowing precise calculation of material costs and net profit margin analysis per order.

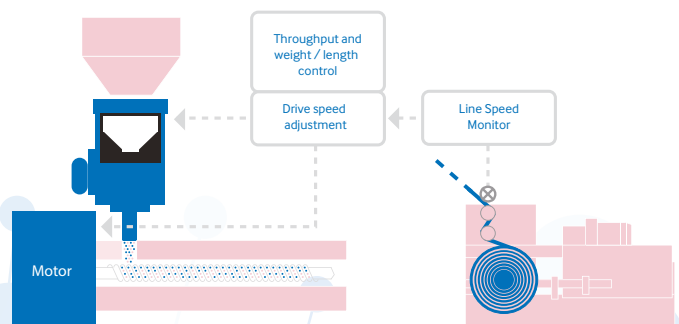
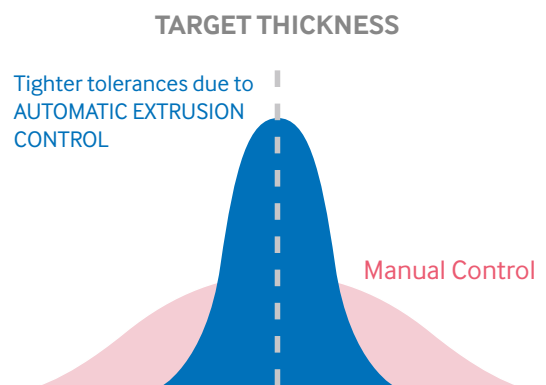
Material Down-Gauging

Normally extruder throughput is reduced gradually due to blocking at the screen filter. **TSM** blenders detect when the product weight per length (yield) or throughput varies from the target setpoint and automatically adjusts the extruder screw speed to bring the throughput back on target. Furthermore, the system allows the process to run at the lower tolerance values for the product while all the time monitoring the output and individual material dosing consistencies. This will result in real savings in production costs for producers who sell by length. If selling by weight your customers can benefit by increased length being offered at no additional cost giving you a significant competitive advantage.

DOWN-GAUGING CAN YIELD AN EXTRA 2% OR 3% ON THE ROLL

Automatic Extrusion Control can compensate for:

- ◆ Screen Packing
- ◆ Voltage Fluctuations
- ◆ Melt Flow Temperature Fluctuations
- ◆ Worn Screws and Barrels
- ◆ Material Mix, Geometry and Density Changes.



Options

TSM provides an extensive range of options that are designed to ensure full compatibility with the onsite requirements which can vary from site to site. The range of options are designed to adapt TSM products to customer's individual process and plant situation.

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Name	Description	Features	Benefits
High Accuracy Option	Additional option to achieve extremely low setpoint targets with repeatable accuracy.	<ul style="list-style-type: none"> Air pressure stabilization on units Material Flow restrictors High Accuracy dosing software 	<ul style="list-style-type: none"> High Accuracy dosing Material savings Consistent Quality Extremely low dosing setpoints achievable
Auto Clean	Allows virtually instant automatic order changes and remote cleaning of elevated TSM OPTI-MIX blenders using a simple touch screen.	<ul style="list-style-type: none"> Vacuum receiver filter clean Automatic Hopper Clean Automatic Easy-Drain Dosing & Mixing Chamber Cleaning Automatic Material Bypass 	<ul style="list-style-type: none"> Fast product changes Reduced downtime Reduced waste No contamination
Blender Necks	All TSM units can be fitted with additional necks below the blender, just above the extruder to provide maximum adaptability to customer process	<ul style="list-style-type: none"> Auto/manual Shutoff valve Material drain Chute Auto material bypass valve Built-in material level sensor Sight glass for system inspection 	<ul style="list-style-type: none"> Fast product changes No extruder stop for order changes Easy material Cleanout Offline Blending Applications
Powder Dosing	TSM powder dosing unit mounts directly onto the side of the blender. Integrated Control allows operator to easily adjust the percentage of powder needed by the recipe	<ul style="list-style-type: none"> High Torque AC motor Std. 4 litre powder hopper Dosing range between 0.1% up to 10% (Dependent on throughput required) Built in powder agitator 	<ul style="list-style-type: none"> High Accuracy dosing Consistent mixing Simple integrated control No over dosing Easy material change
Micradose Side Feeders	TSM's Micradose Side feeders provide accurate and repeatable blend control for low percentage additives on any TSM Gravimetric batch Blending system. They can easily be retro-fitted to your existing TSM equipment.	<ul style="list-style-type: none"> Patented TSM design Robust construction Several viewing windows Retrofittable 	<ul style="list-style-type: none"> High Accuracy Dosing High reliability Integrated Control No Over Dosing
High Temperature Kits	An upgrade on the standard system components to deal with dried materials that are required to be blended at a high temperature	<ul style="list-style-type: none"> High Temp Access Hatches High Temp Loadcells High Temp Bearings 	<ul style="list-style-type: none"> Enable processing of engineered polymers Enable pre heating / drying of materials in advance of the dosing and blending process
Material Flow Solutions	These are a selection of options designed to aid the dosing and blending of difficult materials	<ul style="list-style-type: none"> Material flow assist vibration units Material flow assist agitation units Material flow assist airtation units 	<ul style="list-style-type: none"> Enable effective processing of difficult flowing materials Enable effective processing of lower cost materials
High Throughput Flake Blending	An option design to enable the processing of low bulk density flake materials	<ul style="list-style-type: none"> Enlarged slide valves Increased blender discharge opening Material flow assist vibration units 	<ul style="list-style-type: none"> Enable processing of 100% flake material Reduce production costs Enable the processing of low bulk density materials
Floor Standing Blending Kit	Optional blender kit that enables each blender to be used on a floor stand	<ul style="list-style-type: none"> Floor stand Material flow control valve Offline blending software option 	<ul style="list-style-type: none"> Enables blending to take place beside machine Reduced operator interaction Easier clean down of machine for order changes

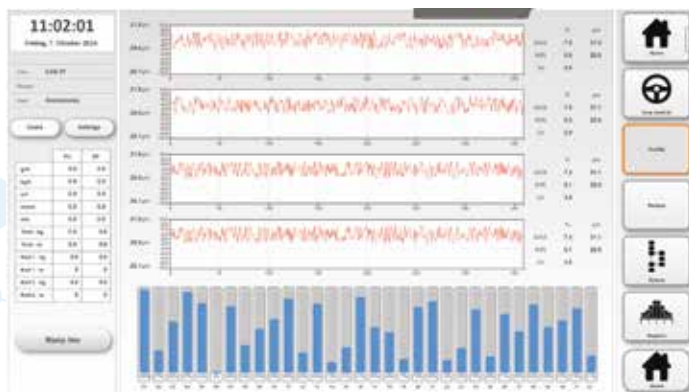
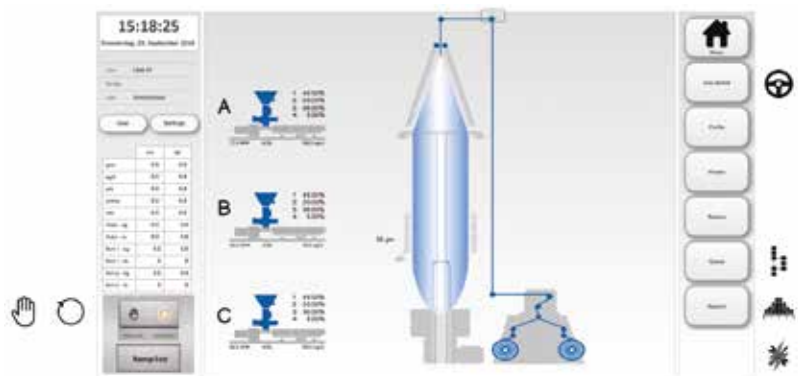
Line Management & Control

TSM's new Line Management and Control system provides a supervisory and single window to all key operating parameters associated with the extrusion production process. All information is presented in an intuitive interface allowing for easy operator navigation. Systems can be provided with core functionality and add-on configurable options.

TSM Line View hardware platform is 100% web-enabled, ethernet ready and is equipped with the latest "pinch and grab" graphic interface.

TSM Line View

- ◆ Layer Ratio Control (max 11 layers)
- ◆ Gravimetric Blending (max 12 components)
- ◆ Yield Control
- ◆ Job Queing / Order sequencing
- ◆ Roll, Order, Shift, Reporting
- ◆ Trending and History Management
- ◆ Start-up and Warm-up Sequence Control
- ◆ Alarm Monitoring
- ◆ Synchronised multi-drive Speed Control



TSM Line View - Configurable Options

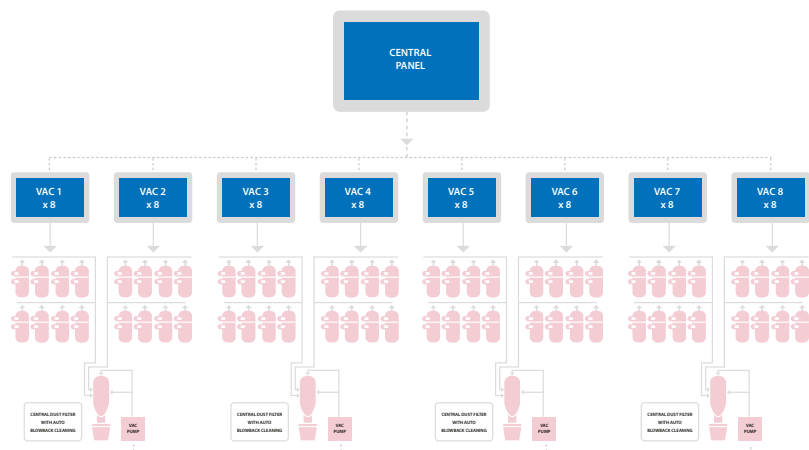
- ◆ Melt Temperature Monitoring
- ◆ Melt Pressure Monitoring
- ◆ Central Recipe Control
- ◆ Central Material Management
- ◆ Width Control
- ◆ Thickness Profiling
- ◆ Sizing Frame Positioning for IBC Lines
- ◆ Tension Monitoring
- ◆ Power Monitoring
- ◆ Insight Ready

Central Vacuum Loading System

The central control panel communicates to TSM VAC8 remote I/O modules that supervise up to eight vacuum receivers each and all associated pumps and controls. Additional VAC8 modules can be connected simply allowing multiples of 8 receivers to be connected to the system.

SYSTEM CAPABILITIES

	Min	Max
Pump(s)	1	4
Vacuum Breaker Valve(s)	1	4
Central Dust Filter(s)	1	4
Vacuum Receivers	1	64
Vacuum Receivers per pump	1	64
VAC8s per System	1	8



Global Support Services

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One of our highest priorities is ensuring that plastic producers achieve the greatest possible performance from their **TSM** investment. To do this, we work hard to understand your business and provide you with the products and support you need.

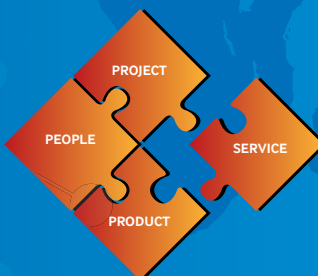
Our goal is to ensure you achieve the highest possible Return on your investment with **TSM**. We have the resources to help your plant increase productivity in a sustainable way. Because our entire company is focussed on the needs of plastics producers we can address the specific application demands and lifecycle requirements appropriate to your investment.

“TSM’s full portfolio of field services - from spare parts to installation and lifecycle management improves equipment productivity, minimizes equipment costs and extends useful life”.

Support for the life of your system.

TSM maintenance and field services help reduce costly downtime and maximise the performance of the blending system. Our service team is trained and certified in the latest diagnostic, repair and maintenance practises, ensuring you receive the maximum value for your maintenance investment. **TSM** Service portfolio offers the following value added options for our customers:

- Installation and Start Up Services
- Maintenance & Field Services
- Service Level Agreements (SLAs)
- Process Optimization Services
- Telephone Support
- Remote Services
- Spare Parts



Service...
... Completes the Picture



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