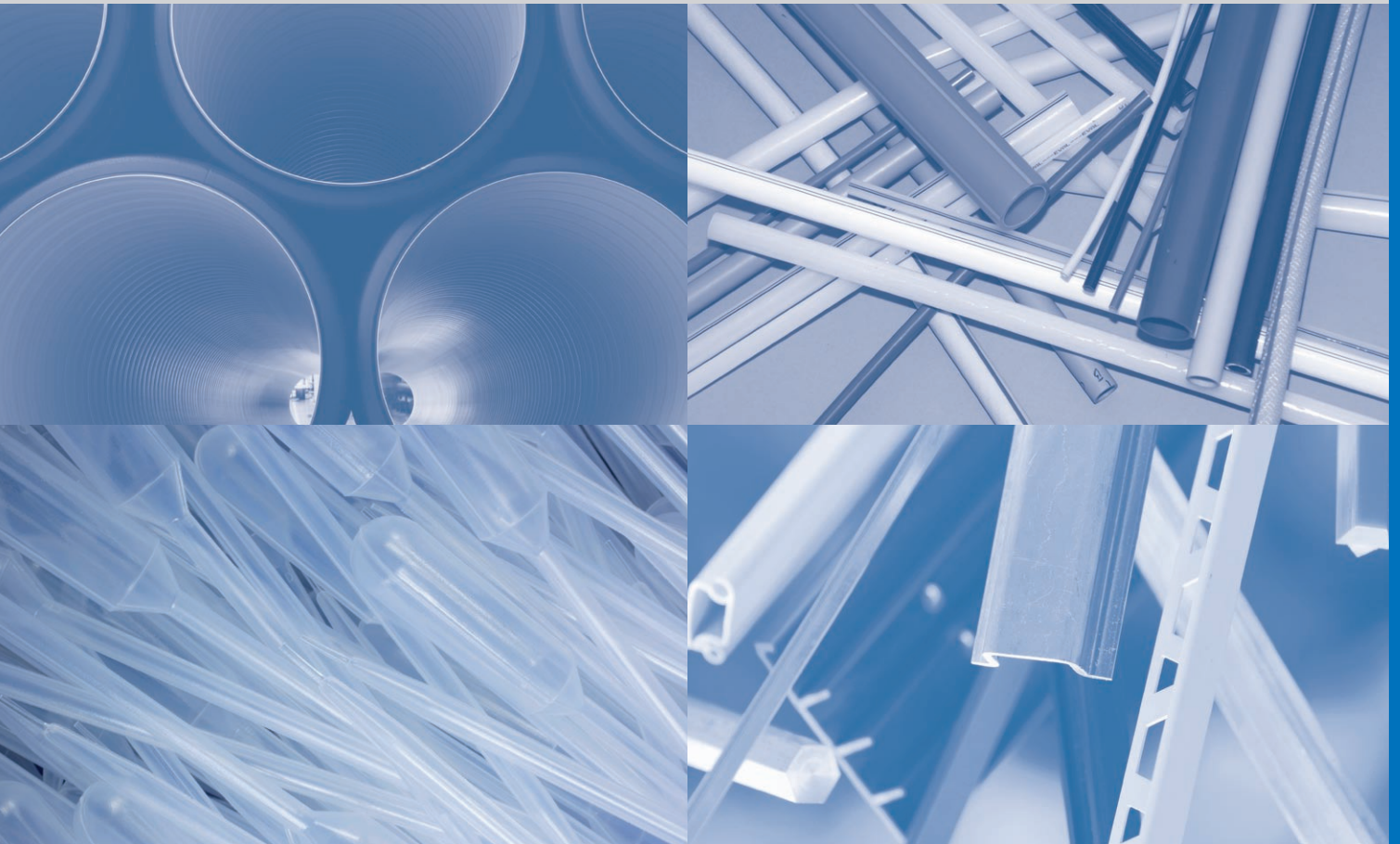
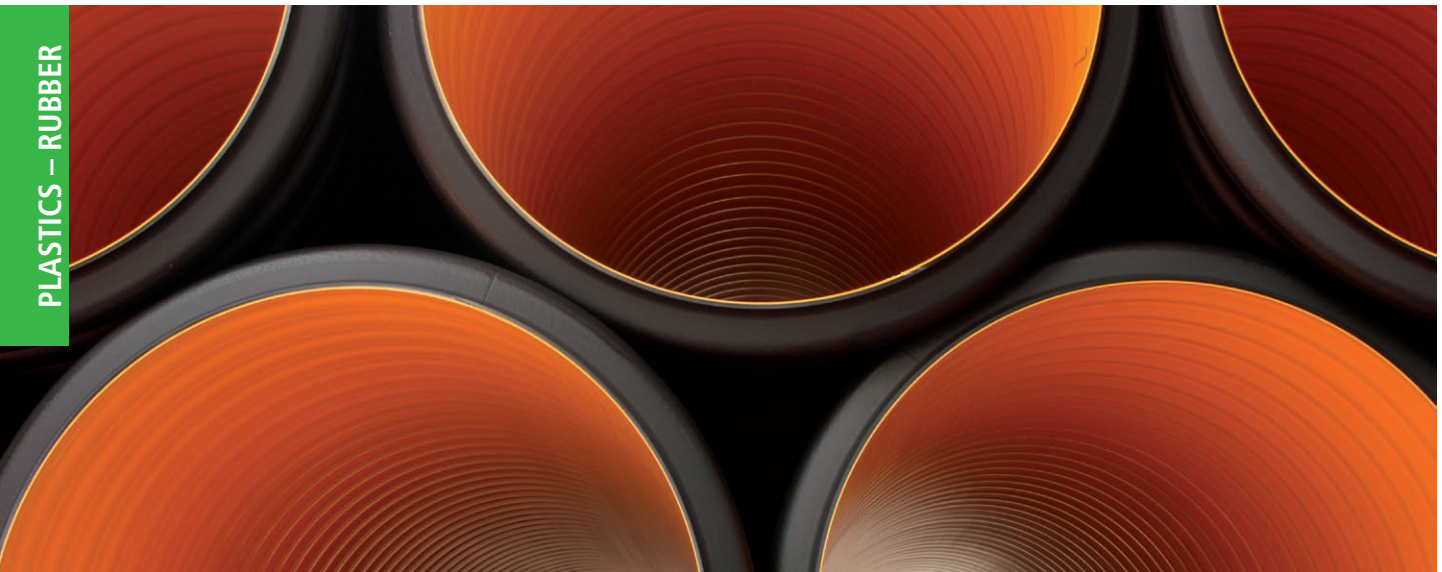


# Plastics – Rubber



**Complete Solutions for In-line Measurement  
& Process Control**



- Hot and cold water, drainage, construction, hydraulic, gas/oil, chemicals, conduits, under floor heating
- Any material, multi layer, sandwich, foam, composite

**Zumbach solutions and benefits**

- Reduced start-up time & scrap
- Precise wall thickness/eccentricity measurement at the hot end → substantial material savings
- Very cost effective → rapid payback
- Measures up to 8 points with ultrasonic
- No safety issues
- Closed loop extruder or line speed control → consistent quality
- Multi axes O.D. measurement → guarantees correct sizing for fittings
- Non-contact length/speed control → precise cutting
- 100% documented quality and networking with Q.C. systems

Plastic pipe extrusion requires reliable and accurate monitoring of wall thickness, eccentricity, diameter, ovality or roundness and length. The potential material savings and subsequent ROI are substantial for these applications.

With measurements being taken directly after the sizing sleeve (calibrator), the operator will get an immediate picture of the product's centring. This quick response becomes invaluable when considering the amount of start up scrap produced on a typical production run. Although this start up scrap can be recycled in some cases, the cost of this processing becomes very expensive.

Without the ability to measure in the first vacuum chamber, the only options would be to do so after the first vacuum trough or most typically at the end of the line. In both cases, there is a significant delay in obtaining readings after each centring adjustment is made.

Fortunately, systems from Zumbach deliver the performance and capability to enable pipe manufacturers to exceed their industry quality requirements, while offering a process tool to improve their production control.



Diameter, ovality



Wall thickness, eccentricity



Lumps, neckdowns



Surface quality



Length, speed



Process control & display



PLASTICS – RUBBER

- Aerospace, automotive, solar, chemical, hydraulic, food, cosmetic, irrigation, sanitary, heating
- All plastics, rubber and elastomers, silicon, multi layer, compound, plastics over metal

Many tube and hose products require severe and highly accurate monitoring of outside dimensions, such as diameter and ovality or roundness, as well as inner diameter, wall thickness and eccentricity. The roundness or the circumference is often critical when fittings are connected post-extrusion, and ZUMBACH pioneered the ideal solution with a series of 3-axis diameter laser scanners ODAC®-TRIO.

Wall thickness and inner diameter can be vital when exact flow rates must be guaranteed. Unique or special materials or tube designs, such as multi layer, may require combined measurement solutions, using ultrasonic and laser.

Additionally, the tube surface must be free from defects; for this inspection, ZUMBACH offers optical systems with image processing or photometry. Finally, the exact length of the delivered product is crucial.

Many hundreds of tube extrusion lines worldwide are equipped with ZUMBACH systems.

**Zumbach solutions and benefits**

- 3-axis O.D. measurement by ODAC®-TRIO → correct sizing for fittings
- Reduced start-up time & scrap
- Ultrasonic thickness/eccentricity at the hot end
- Very cost effective → rapid payback
- Measures up to 8 points with ultrasonic
- Combined OD/ID/Wall control → more precise flow rate
- Single, tandem or co-extrusion
- Inspection by SIMAC® vision system → guarantees surface quality
- Closed loop extruder or line speed control → consistent quality
- Non-contact length/speed control → precise cutting
- Optional pressure and/or vacuum control
- 100% documented quality and networking with S.P.C and data collection software



Diameter, ovality



Wall thickness, eccentricity



Lumps, neckdowns



Surface quality



Length, speed



Process control & display



- Medical, silicon products, multi lumen, catheters, automotive, aerospace, nanotechnology
- Any material, compounds, multi layer, plastics on metal, coatings

**Zumbach solutions and benefits**

- Diameters as small as 0.2 mm (.007 in.)
- Wall thickness as small as 0.01 mm (.0004 in.)
- 3-axis O.D. measurement by ODAC®-TRIO → correct sizing for fittings
- Ultrasonic thickness/eccentricity at the hot end
- Measures up to 8 points with ultrasonic
- Combined OD/ID/Wall control → Inner diameter, flow rate
- Single, tandem or co-extrusion
- Inspection by SIMAC® vision system → guarantees surface quality
- Closed loop extruder or line speed control → consistent quality
- Optional pressure and/or vacuum control
- Non-contact length/speed control → precise cutting
- 100% documented quality and networking with S.P.C and data collection software

Medical tubing and special tubing require the most stringent quality and dimensional control during the production process. Safety, dimensional consistency and quality control are crucial for such products. In particular for small dimensions and/or special materials the in-line measurement becomes specialized and challenging.

ZUMBACH has developed systems which can manage the most challenging conditions.

The roundness or the circumference is often critical when fittings are connected post-extrusion, and ZUMBACH pioneered the ideal solution with a series of 3-axis diameter laser scanners ODAC®-TRIO.

Wall thickness and inner diameter can be vital when exact flow rates must be guaranteed.

Additionally, the tube surface must be free from defects, such as gels, pinholes, blisters and the like.

Finally, the exact length of the delivered product is crucial. Thanks to the non-contact length and speed measuring system SPEEL, accurate lengths can be guaranteed.



Diameter, ovality



Wall thickness, eccentricity



Lumps, neckdowns



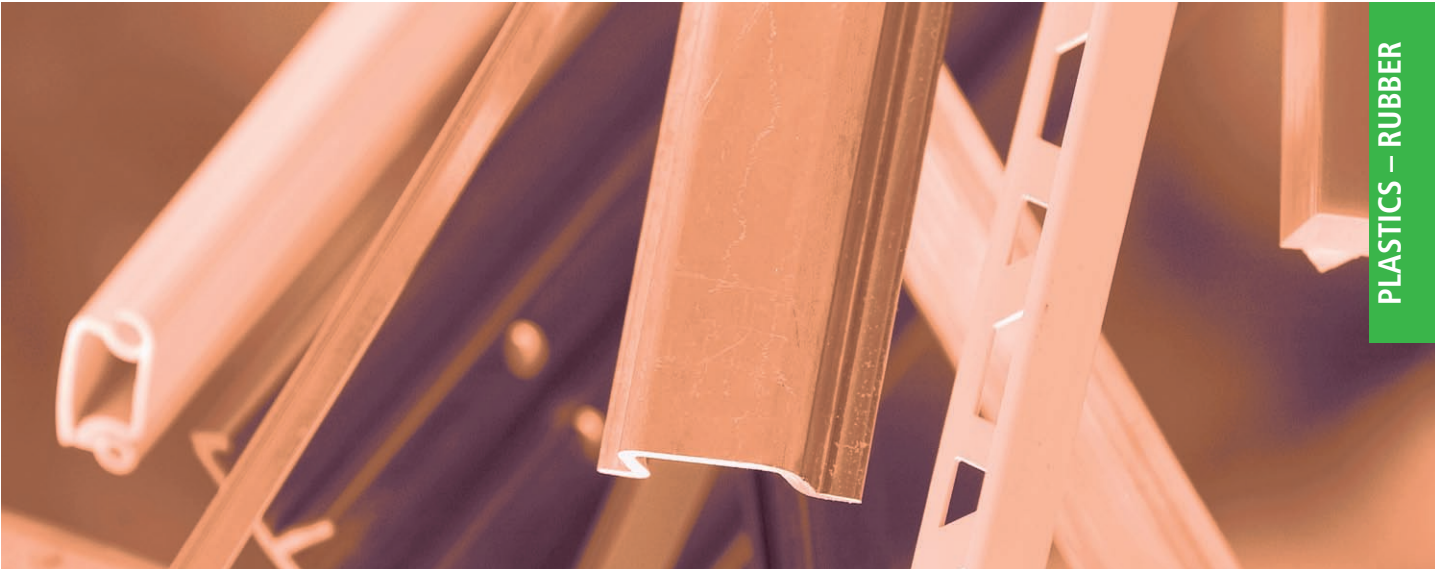
Surface quality



Length, speed



Process control & display



- Construction, automotive, decoration, indoor, outdoor, packaging, protection, single and multiple extrusion
- Any material, food, sausage casing, cosmetics, glass, coatings, foam, composite materials

There is a wide variety of plastic, rubber and composite profiles for many different applications.

High quality and technical profiles require stringent in-line dimensional and quality control to meet cost control and industry standards. The measurement problem is much different from that of round products, because the shapes may require measurement of width, height, angles or radii etc., they can also be in any orientation.

ZUMBACH developed ODAC® solutions for measurement of only 1 or 2 critical dimensions, including width and height, or for monitoring the full profile section, including radii, angles, n dimensions etc. the new PROFILEMASTER®.

In case of multiple extrusion or variable orientation there are special solutions. Special products, such as glass at high temperatures or extremely thin products, such as sausage casings, can be measured, thanks to ZUMBACH special technologies.

For profiles, the exact length of the delivered product is always important. The optical SPEEL sensor measures length and speed, even down to zero, with high accuracy.

#### Zumbach solutions and benefits

- Scrap reduction → Savings on raw material and post processing costs
- Width and/or height measurement with ODAC® laser scanners and DVW pivoting device
- Systems for single or multi extrusion
- Complete profile by PROFILEMASTER® → flexible programming of parameters of interest
- Inspection with SIMAC® vision system → guarantees surface quality
- Non-contact length/ speed control → precise cutting
- Closed loop extruder or line speed control → consistent quality
- 100% documented quality and networking with customer Q.C. systems
- USYS processors for integral monitoring, process control, data logging, etc.



Width, height



Profile, shape



Surface quality



Length, speed



Process control & display

ZUMBACH Electronics was founded in 1957 in Orpund, Switzerland, where remains as the headquarters. ZUMBACH is a high-tech, multi technology company with decades of expertise supplying systems with laser, ultrasonic, x-ray, eddy current, infrared, optical inspection and more. An optimal solution can be selected or tailored for even very specific requirements.

Zumbach has pioneered many achievements for the Plastics, Rubber and other industries, including:

- ODAC® laser scanners with HLF-High accuracy Large Field technology, CSS-Calibrated Single Scan technology, fast measurement rates and special beam geometry for contour measurement and surface fault detection.
- 3-axis ODAC® laser scanners for high-precision diameter and ovality measurement.
- UMAC® WALLMASTER systems have evolved to be suitable for complex geometric shapes such as multi layer products, concentric neutral cables, and more.



### ODAC® Laser Diameter and Ovality Measurement

- Individual scan calibration
- Integrated Lump & Neck detection on every ODAC®
- Extensive measurement features, including: Gap Penetration, Position etc.



### UMAC® Ultrasonic Wall Thickness Measurement

- Novel concentric transducer adjustment
- Super High Rate mode enables up to 15'000 measurements/s
- SmartWall algorithm



### KW Surface Fault Detection

- Immune to stray ambient light
- Highest detection accuracy thanks to unique measuring principle and complex optics solution
- All axes operate independently of each other



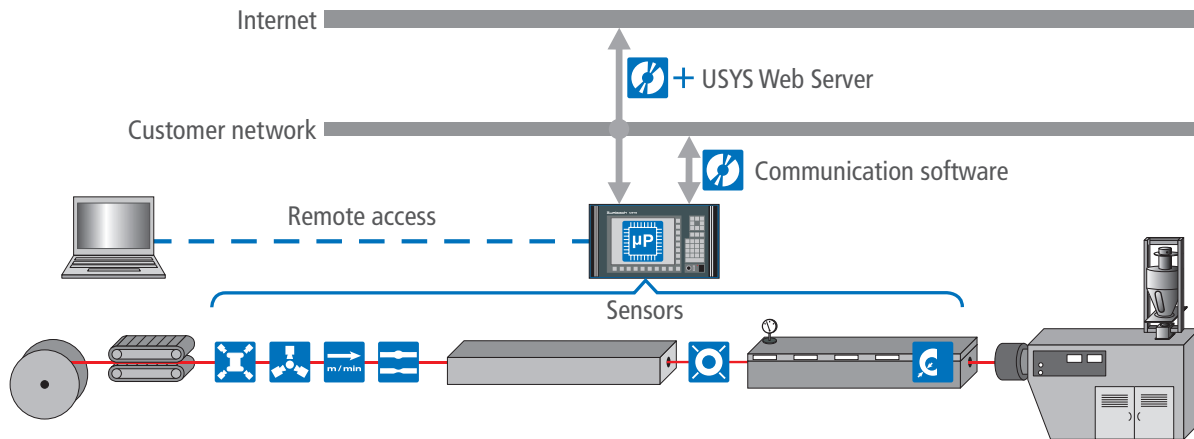
### SPEEL 3000 Optical Length & Speed Measurement

- Detection of standstill and direction
- Speed range up to 3000 m/min. (9850 ft/min.)
- Maintenance free



## THE COMPLETE SOLUTION FROM ZUMBACH

The goal of the Zumbach Group is to offer the Industry the most complete line of measuring, process control and data acquisition systems of the highest quality and technology, providing solutions for your entire process. With higher material costs and tighter tolerances, there is a need for documented quality reports and a high degree of process automation with total connectivity to the plant network.



### SIMAC®

#### Surface Inspection with Machine Vision

- Up to 35'000 scans/s
- Min. fault size = 0.1 x 0.1 mm (.004 x .004 in.)
- Length related scanning and fault detection



### PROFILEMASTER®

#### In-Line Profile & Shape Measurement

- Light section principle
- Direct import of nominal values from CAD design
- 100% geometry control



### DVW 1

#### Pivoting Measuring Device for 1 & 2 Axis Laser Gauges

- Economic solution for width and/or height measurement
- Very accurate readings, independent of position and twist
- Minimal value detection of the relevant dimension

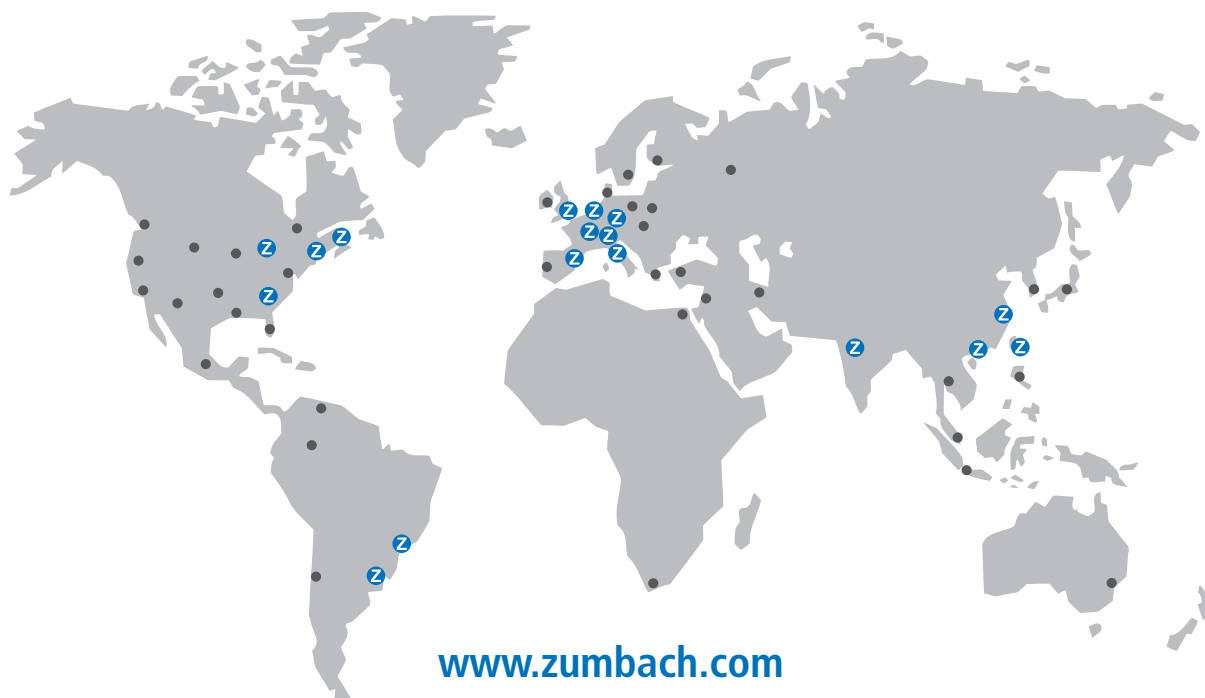


### USYS

#### Data Acquisition, Processing, Display & Process Control

- Extensive network integration capability (available also as black box)
- Data acquisition solutions
- Multiple sensor integration

# Worldwide Sales and Service Network



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