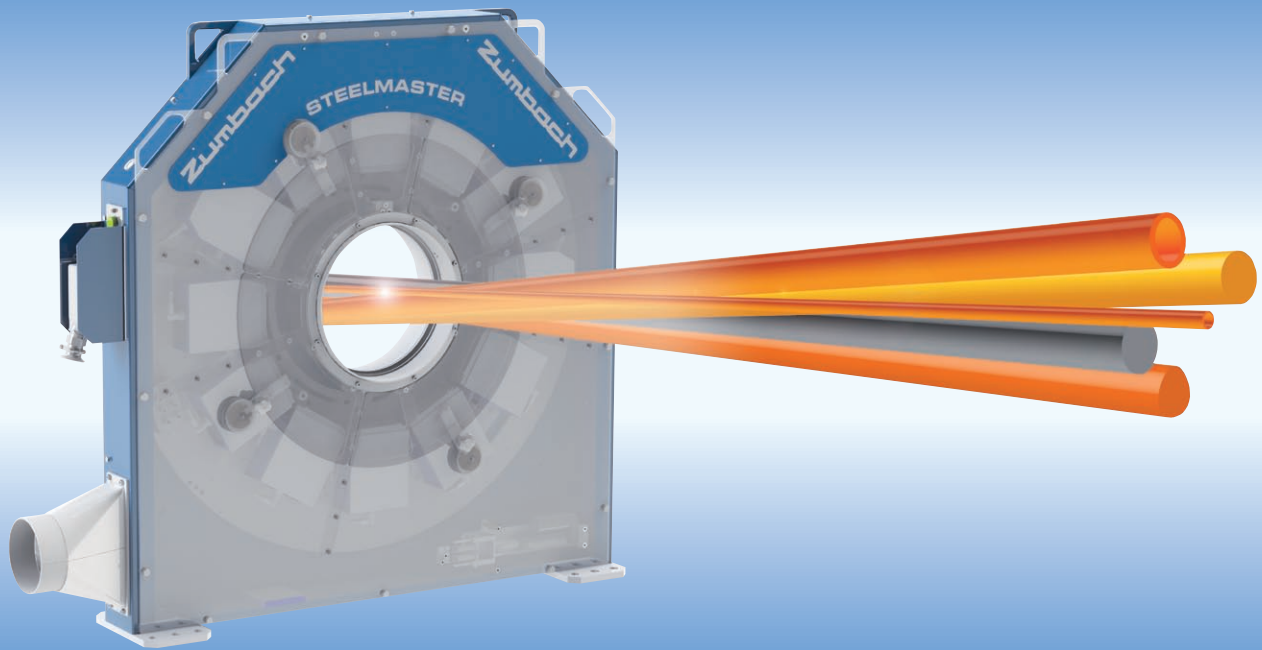


# STEELMASTER SMS



**Static Diameter Gauges for Hot Rolling of Rod,  
Bar, Tube and for Quality Control**

SMS is part of the STEELMASTER family with SMO & SMR

## GENERAL

Static gauges STEELMASTER SMS from ZUMBACH are a well-proven line of precision gauges for hot rolling mills and for cold Q.C. systems. They are specially suited for round products and available for various measuring ranges and various numbers of measuring axes. For Q.C. (NDT) lines a special version "B" which can also measure cold and bright bar was developed. Over 100 systems are in operation worldwide. SMS gauges are extremely simple, compact and reliable.

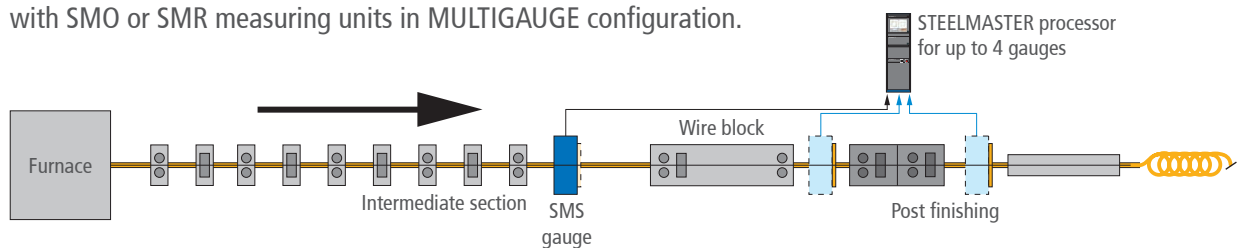
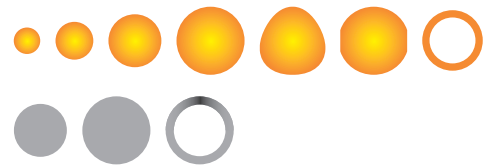
### Outstanding Advantages

- Latest technology and highest accuracy
  - up to 2000 measurements/s/axis
  - up to 12'000 measurements/s (with 6 axes)
- Very short distance between measurements
- Automatic shutter
- Extremely compact, only 125 mm (5 in.) thick
- Special versions for 3-roll mills incl. EPM and FPS software
- Special versions for cold/bright bar with anti-reflex system
- Reliable, thanks to unique protection system
- Uncritical guiding
- Unique STEELMASTER hard- and software
- Fibre optics cable between local processing unit and central control unit
- No wear and close-to-zero maintenance

## APPLICATIONS

### SMS: The Solution for Many Cases!

- Hot rolling of round rod, bar, tubes
- Q.C. lines (NDT) cold bar, black, peeled, ground etc.
- Cold processes peeling, grinding, polishing
- SMS is the ideal or best solution for cases where basically round products must be measured at high speeds and short lengths.
- SMS gauges are often used in the intermediate section, in combination with SMO or SMR measuring units in MULTIGAUGE configuration.



## GAUGE VERSIONS

### SMS 100/160



In a rod mill, after finishing.

### SMS 100/160



In a QC line for cold/bright bar.

### SMS 550



In a large seamless tube mill.

## BASIC CONCEPT

The combination of up to 6 measuring axes (lasers) with up to 2000 measurements for each axis offers an extremely dense information for both longitudinal and radial direction. This means an extremely short distance between measurements.

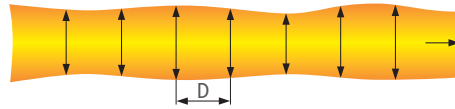
Fast or periodic variations in diameter and section can be detected and measured. This can be used for quality control, documentation and for detection of process problems respectively corrections (e.g. Bamboo or Boa effects). STEELMASTER SMS gauges are extremely compact and easy to integrate into existing mills and need close-to-zero maintenance.

Examples:

At 100 m/s → D = 50 mm

At 10 m/s → D = 5 mm

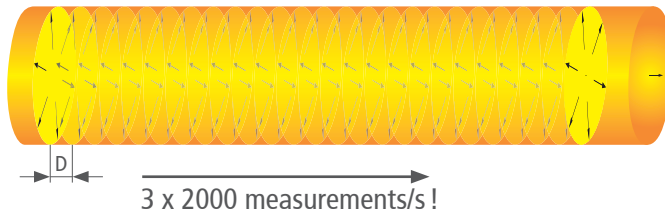
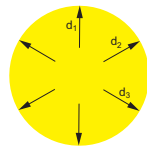
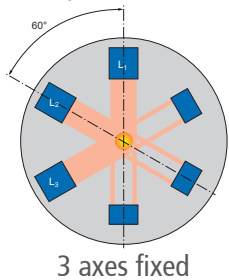
Short distance between measurements



Up to 1000 measurements/s (optionally 2000 measurements/s)

At 100 m/s → D = 100 mm / 4 in. (optionally 50 mm / 2 in.)

Examples with 3 axes:



### Head and Tail Measurement

By principle, the complete billet is scanned 100% from the very start to the end. The head and the tail data can be processed and utilised depending the need:

- Its possible to suppress programmable lengths at the head and the tail separately.
- Or to calculate the out-of-tolerance (scrap) lengths for head and tail.
- A fast signal for control functions is available.

### Longitudinal Faults

When small, longitudinal faults occur, such as seams, overrollings, overfills, flat spots etc., an SMS gauge cannot see the fault when it is located between 2 axes (in case of a 6 axes gauge the dead angle is 30°). If this is of importance, an oscillating SMO or a rotating SMR gauge is the right solution.

### Calculation of Cross Section

The approx. cross section or area in mm<sup>2</sup> (in<sup>2</sup>.) can be calculated based on the particular diameter values  $d_1$ ,  $d_2$ ,  $d_3$ ,  $d_n$ . However, if an accurate section is required, SMO or SMR gauges are the better solution because they capture a indefinite no of diameters over the full circumference.

### Single Axis Systems

In many cases for hot or cold processes, a single axis system is the right solution, e.g.:

- Round bar, billets or tubes, where ovality is not important
- With of flat bar or strip
- When a large distance between emitter and receiver is required

For all such cases ZUMBACH offers the ECOGAUGE line of single axis instruments in various configurations with simple processors/displays. When combined with STEELMASTER electronics it is often referred to as SMS xx-S1, for dimensions up to 550 mm (21.65 in.) or more.

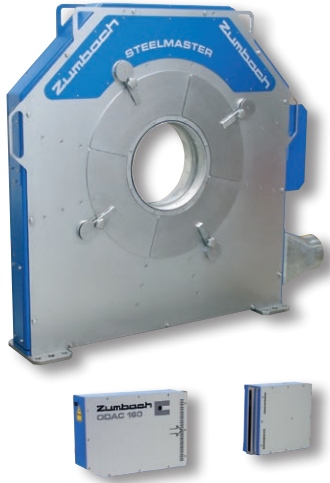
- See also: – Technical notes on detailed hardware and software functions, EPM, FPS  
 – Brochure ECOGAUGE single axis systems  
 – For true profile measurement brochure PROFILEMASTER series



ECOGAUGE 310 in seamless tube extrusion.

## BASIC SYSTEM COMPONENTS

### Measuring Unit with ODAC® Diameter Measuring Heads



A robust, welded structure ensures protection of the laser heads against dust, scale, splashes and heat.

- Easy exchangeable protection glasses
- Temperature control system
- Diagnostic outputs for checking the video signals
- Cooling for OD's up to approx. 30 mm (1.18 in.) by air only. Over 30 mm (1.18 in.) additional water cooling is required.

ODAC® 100/160 high-tech laser measuring heads (inside the measuring unit)

- 1 emitter + 1 receiver for each head
- Fully synchronized scanning between the heads
- Principle: Laser scanning, 2000 measurements/s
- Calibrated Single Scan (CSS)
- Light source: Solid state laser, class II

### Filter/Blower Unit GE 5-2



Providing filtered air at high volume to purge the laser shutter and for general cooling of the measuring unit.

3 kW, 1350 m<sup>3</sup>/h (47,600 cu. ft./h).

### Local Processing and Operation Unit LPO



It forwards all pre-filtered measured values and transmits the data via a single fibre optic cable to the main control unit CPO.

- Inputs for mains supply, measuring unit, pyrometer (optional)
- PLC controller
- Built-in cooling unit

### Central Control and Operating Unit CPO



For up to 4 measuring units of the SMR (rotating), SMO (oscillating) or SMS (static) models.

- Industrial embedded PC without fan in a 19" drawer (height = 8HU). Operating system on solid state disk, i.e no need for UPS unit (fail safe).
- Inputs/outputs: VGA for screen/keyboard/mouse, fibre optic connection to LPO unit, ETHERNET for customer (TCP/IP), USB for printer or other peripherals, RS-422 for giant displays, relay outputs for alarm etc., digital inputs (8) and outputs (4)

### Software – Basic & Optional Packages



The sophisticated STEELMASTER software packages guarantee high flexibility in general, future safe upgrading, case specific solutions, personalized configurations, connectivity, process transparency.

## ACCESSORIES

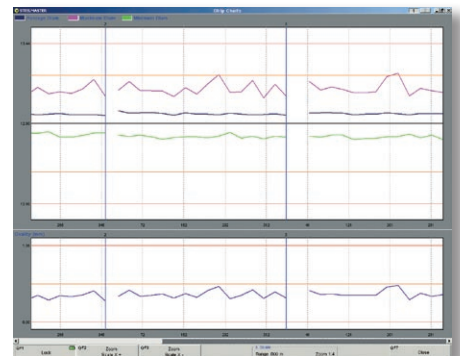
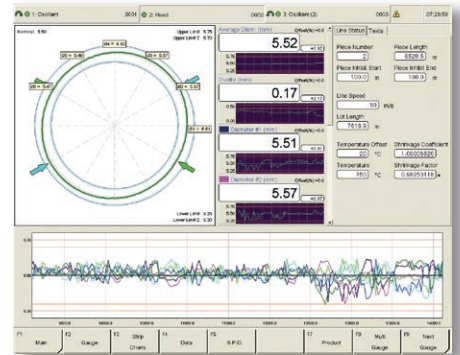
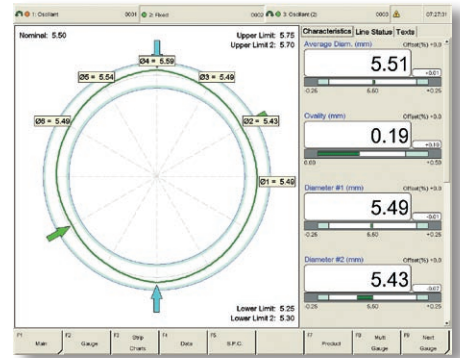
**Remote repeater screen** for mounting and operation up to 150 m (490 ft.) • **Remote giant display** (2, 3 or 4 groups of 5 digits) • **Pyrometer** for conversion to cold values (20°C / 68°F) • **Traversing system** for positioning or withdrawing of the measuring unit • **Air cooler or heater** for cooling and/or heating of blower air • **Water cooling system** (heat shield with circulating water) for product diameters exceeding 30 mm (1.2 in.)

# STEELMASTER SOFTWARE

## Basic Software Package

The basic package features all functions for round products:

- Start and end suppression
- Calculation of diameters, height, width, diagonals
- Display of mean value, min., max., ovality
- Hot and/or cold values
- Min./max. alarms
- Head and tail scrap length indication
- Personalized screens
- Statistics, printed reports
- Optional software extensions
- 10 major languages; others on request
- Section, trend screens
- Split screens (MULTIGAUGE)
- Configuration, calibration screens



## Optional Software Packages

Besides the basic package, STEELMASTER systems offer many additional modules and extensions such as:

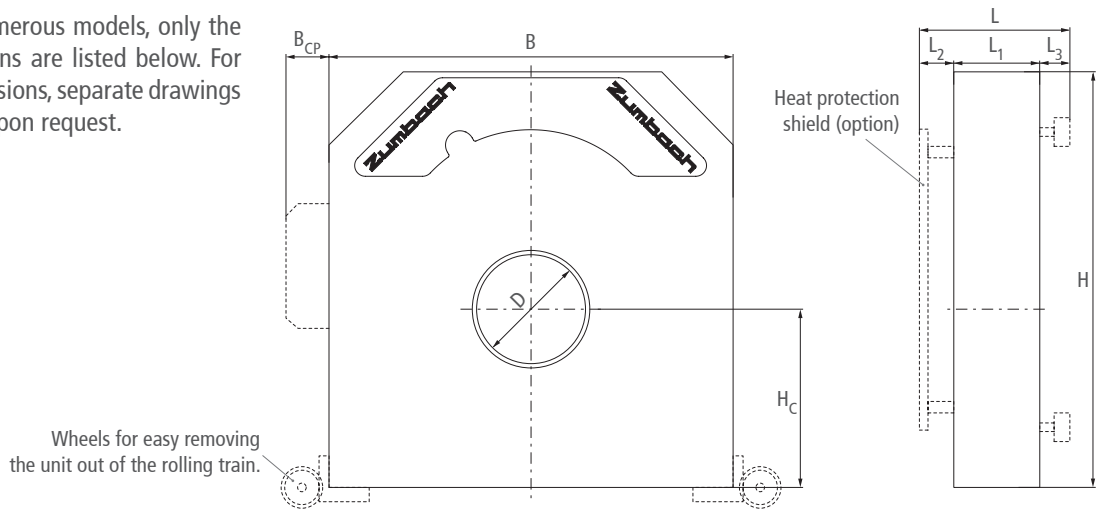
- **STEELDATA**  
Data filtering, pre-processing, computation
- **STEELGAUGE**  
System configuration (1...4 gauges)
- **SPC**  
For SPC statistics, configurable
- **STEELHOST**  
Standard protocol for ETHERNET TCP/IP
- **STEELDATABASE**  
For post production viewing and archiving (to be installed on external PC's)
- **REMOTE STEELMASTER**  
For networking via ETHERNET TCP/IP, with up to 10 independent PC workstations
- **POLYGON / EPM / FPS**  
**EPM** and **FPS** method and software (with 6 axes only).  
ZUMBACH's EPM and FPS algorithms and software (pat. pend.) solve many problems.

**EPM** (Enhanced Profile Measurement) can measure and calculate non-symmetrical polygonal or any irregular product. The screen presents the product in an almost 1:1 real shape on the operator screen. The effective roundness  $RON_t$  (by ISO definition) gets calculated for any deviation from round.

**FPS** (Full Profile Synthesis) is an optional module, especially important for round or hexagonal bars rolled in 3-roll blocks. It provides 2-point and 3-point diameter values and in particular the DT and GT values which are essential for quick setting of 3-roll blocks.

## DIMENSIONS

Due to the numerous models, only the main dimensions are listed below. For detailed dimensions, separate drawings are available upon request.



Model mm (inch)	B	B <sub>CP</sub> <sup>1)</sup>	D	H	H <sub>C</sub>	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	Heat protection shield	Wheels (option)
SMS 100-Sx	1150 (45.28)	105 (4.13)	270 (10.63)	1200 (47.24)	630 (24.80)	258 (10.16)	125 (4.92)	95 (3.74)	38 (1.50)	✓ <sup>2)</sup>	✓
SMS 160-S2/3	1150 (45.28)	105 (4.13)	270 (10.63)	1200 (47.24)	630 (24.80)	383 (15.08)	250 (9.84)	95 (3.74)	38 (1.50)	✓	✓
SMS 160-S4/6	1670 (65.75)	105 (4.13)	284 (11.18)	1690 (66.54)	855 (33.66)	385 (15.16)	252 (9.92)	95 (3.74)	38 (1.50)	✓	✓
SMS 310-S3	2180 (85.82)	150 (5.90)	500 (19.68)	2210 (87.00)	1100 (43.30)	480 (18.89)	373 (14.68)	50 (1.96)	57 (2.24)	✓	✓
SMS 550-S3	2500 (98.42)	150 (5.90)	700 (27.55)	2520 (99.21)	1270 (50.00)	505 (19.88)	397 (15.62)	48 (1.88)	60 (2.36)	✓	✓

<sup>1)</sup> Space requirement for connection panel; the panel can be on either on the left or on the right side of the measuring unit.

<sup>2)</sup> For products till 30 mm (1.18 in.) = option; for bigger products = obligatory.

## MAIN DATA

Measuring principle	Tangential laser scanning
Laser	Visible red laser, class 2
Measuring rate	1000 measurements/s, each axis (optional 2000)
No. of axes	2 up to 6 (see overview above)
Resolution	+/- 0.001 mm (.00004 in.)
Accuracy	Up to +/- 0.1 mm (.0004 in.) depending model
Power consumption	3 x 400 V~ and 1 x 110...230 V~, 50/60 Hz, approx. 4.1 kVA

Basic models	Measuring range/field <sup>1)</sup>	Versions	No. of meas. axes
SMS 100-Sx	100 mm (4 in.)	SMS 100-S4 SMS 100-S6	4 6
SMS 160-Sx	160 mm (6.3 in.)	SMS 160-S4 SMS 160-S6	4 6
SMS 310-Sx	310 mm (12.20 in.)	SMS 310-S2 SMS 310-S3	2 3
SMS 550-Sx	550 mm (21.65 in.)	SMS 550-S2 SMS 550-S3	2 3
SMS 100-Bx (cold)	100 mm (4 in.)	SMS 100-B6	6
SMS 160-Bx (cold) <sup>2)</sup>	160 mm (6.3 in.)	SMS 160-B6 <sup>2)</sup>	6
SMS XXX-Xx	Any	Customised <sup>2)</sup>	Any

<sup>1)</sup> Max. product dimension depends on worst case out-of-center position.

<sup>2)</sup> Upon request.

All units, which are equipped with lasers, were designed to meet the regulations CDRH (USA), BS 4803, EN 60825-1:2007, DIN/FDE 0837 and SEV TP 76/1A-D. They hold the warning and explanatory labels prescribed by EN 60825-1:2007.

• All technical data are subject to change without notice.

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