



# **BREITENBACH**

Der Walzenspezialist.

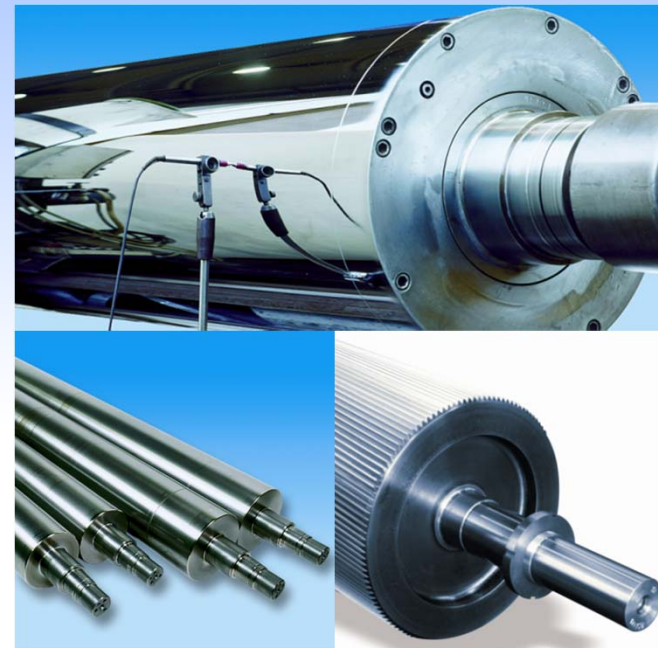
**MODERN CALENDAR ROLLS  
IN PAPER PRODUCTION**



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## Production Program

- Calendar and mixing rolls
- Coating and doctor rolls
- Heat transfer, chill and cooling rolls
- Polishing rolls
- Crushing rolls
- Roll service
- Pistons for hydraulic presses





## Content

- Application of Calendar and Mixing Rolls
- Roll Design
  - Roll Types
  - Sealing Methods
- Manufacture of Calendar Rolls
  - Casting
  - Pre-Machining
  - Finish Machining
- Advantages of Breitenbach Rolls



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## Application of Calendar and Mixing Rolls

- Paper industry
- PVC and rubber industry
- Tire production
- Film, foil and sheet production

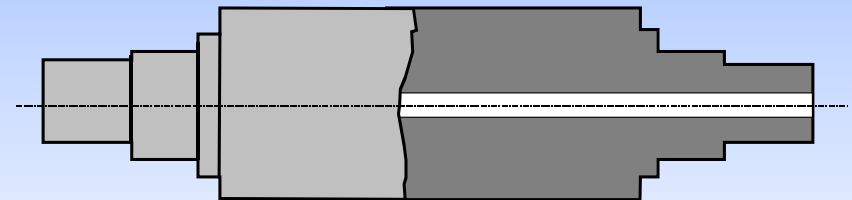




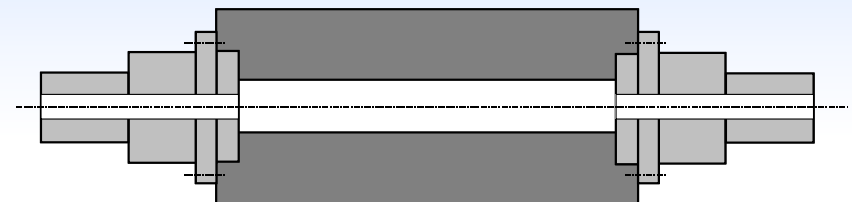
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## Roll Design

Integral journals



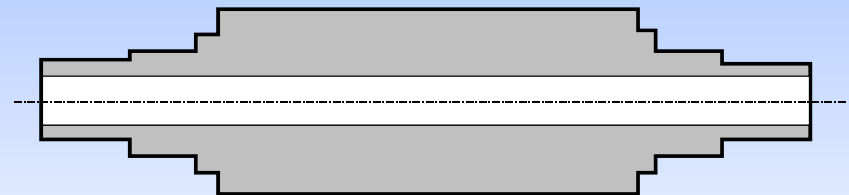
Bolted-on journals



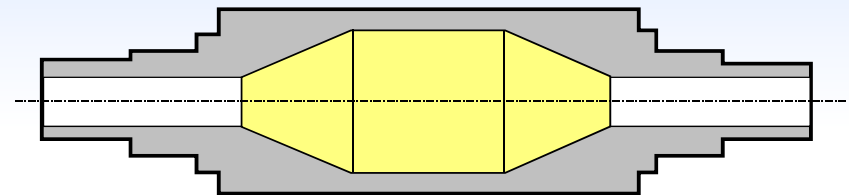


## Roll Design

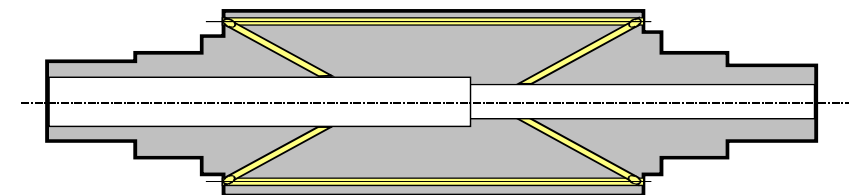
Centre bore



Cored



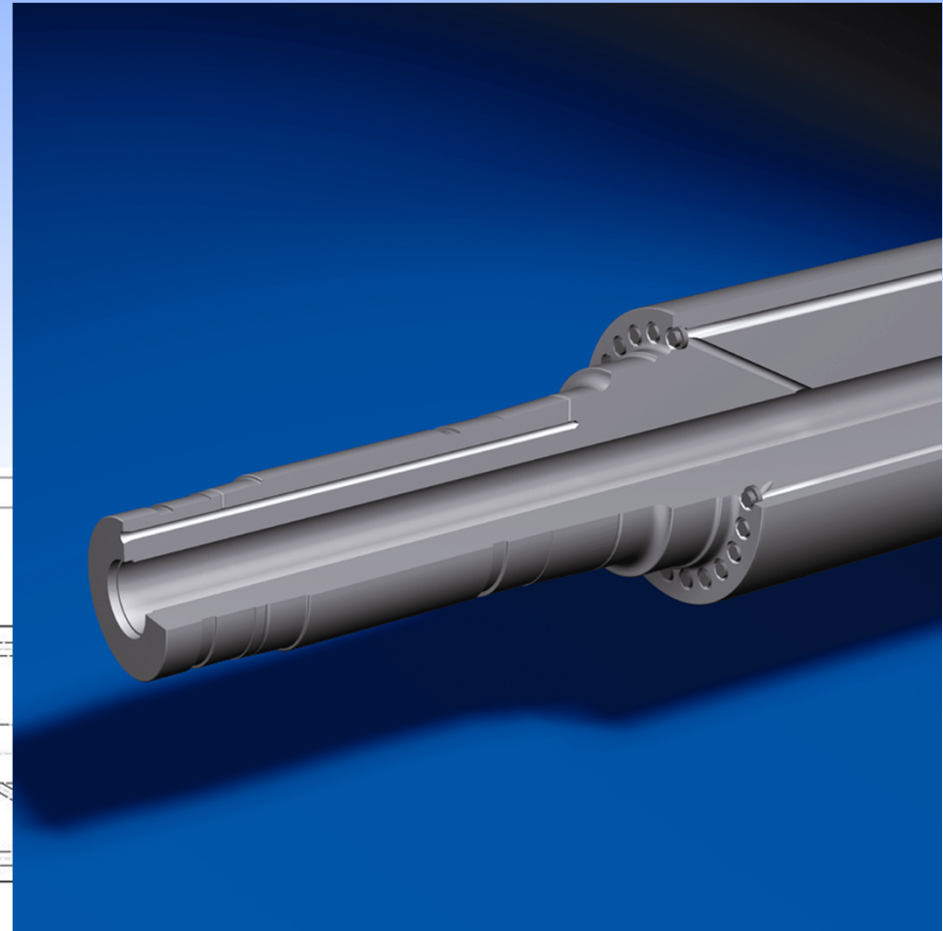
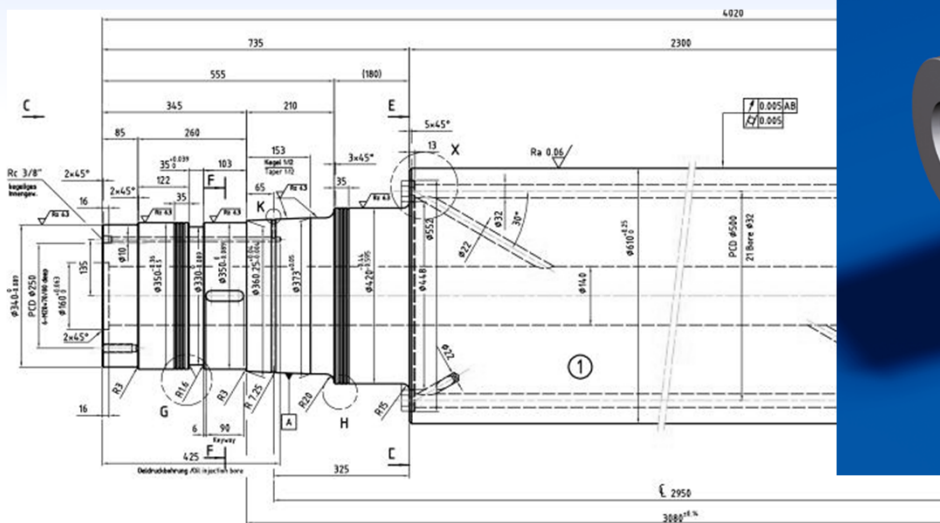
Peripherally drilled





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## Peripherally Drilled Roll





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## Sealing Systems

Ring sealing







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## Sealing Systems

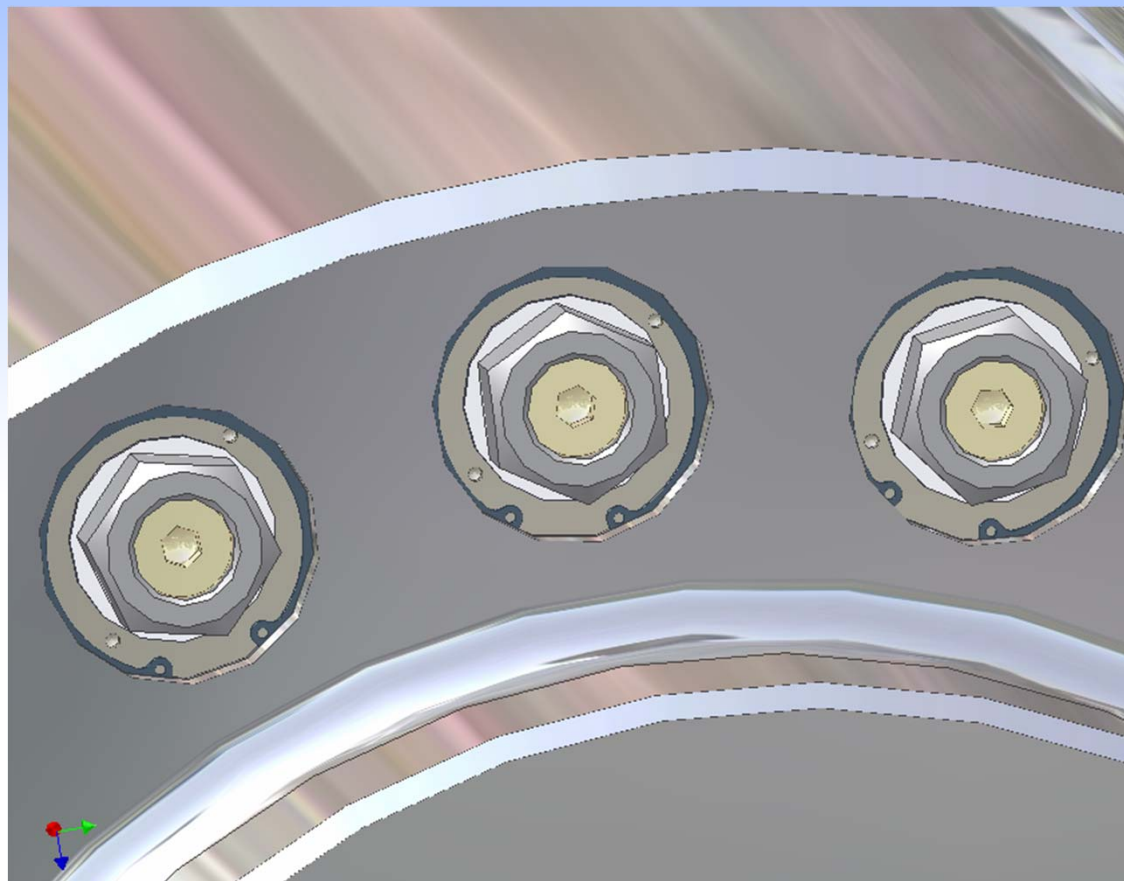
Plug sealing





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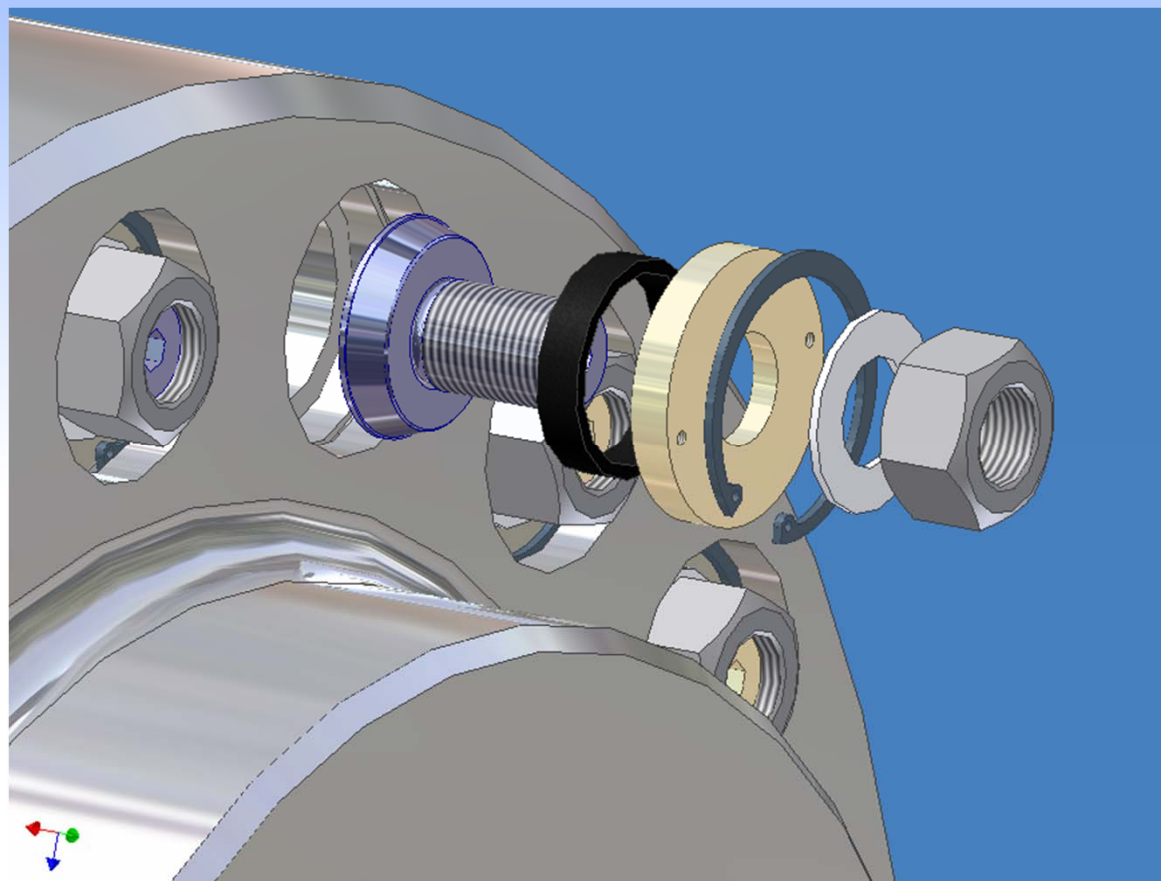
## Plug Sealing





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## Plug Sealing





## Advantages of Peripherally Drilled Rolls

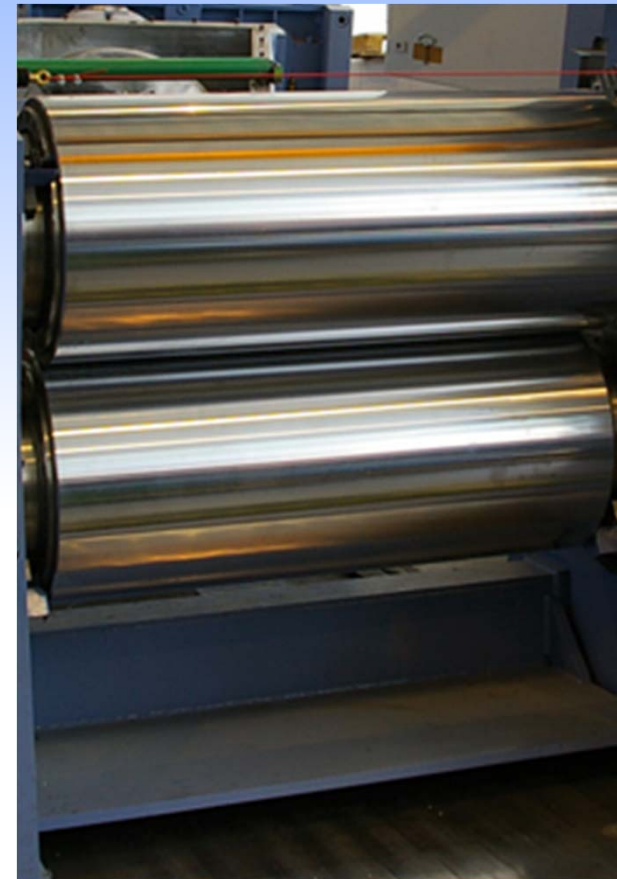
- Least possible temperature deviation across working width
- Reduced energy consumption along with optimum heating or cooling characteristics
- Minimum deformation of roll body
- Hot grinding at operating temperature easily possible
- Use of forged steel materials possible





## Advantages of Peripherally Drilled Rolls

- Made from chilled cast iron or forged steel
- Optional tungsten carbide plating
- Cylindricity: 2-5  $\mu\text{m}$   
TIR: 2-5  $\mu\text{m}$   
Surface roughness Ra:  $\leq 0,01-0,08 \mu\text{m}$
- Temperature controlled by means of Tri-Pass-Flow-System
- Dispenser systems, helical spirals or peripheral bores





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## Chilled Cast Iron

Material properties are adapted to specific demands of Calendaring or mixing

Our own grades, e.g.

TUK: Calendar rolls

TR: fluted rolls, mill rolls

TB: mild chilled cast iron

Depth of hardness up to 30 mm





## Advantages of Chilled Cast Iron

Very cost effective production

Surface hardness from “first heat”, no additional heat treatment necessary

Good thermal behaviour

Small deviation of TIR and cylindricity at operating temperature

Long lasting operation time

Multiple re-grinding allowance

Cored rolls or peripherally drilled rolls





## Forged Steel

According to international standards,  
e.g.

42 CrMo 4           (1.7225)

34 CrNiMo 6       (1.6582)

30 CrNiMo 8       (1.6580)

58 CrV 4           (1.8161)

Heat treatment necessary

Roll bodies hardened by induction

Depth of hardness up to 8 mm

Only peripherally drilled







## Advantages of Forged Steel

Less deformation of roll body and journals

Increased linear load possible

Less deviation of TIR and cylindricity at operating temperature (if roll is not hot ground)

Optical qualities to be achieved in rigid PVC production

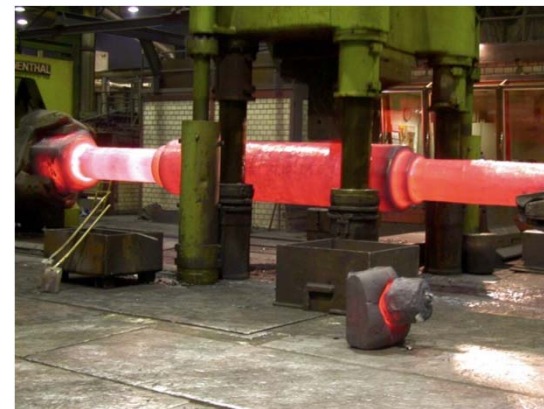




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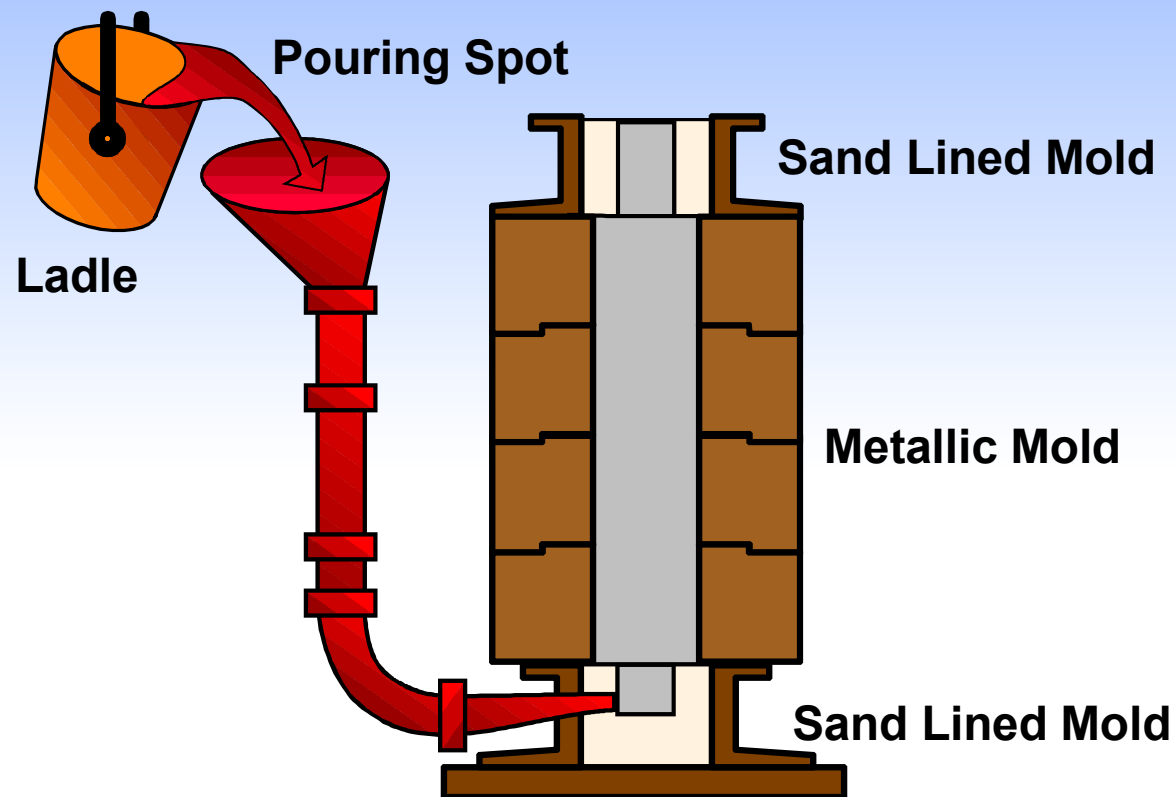
## Manufacture of Calendar Rolls

- Casting / Forging
- Pre-machining
- Drilling
- Finish machining
- Grinding
- Polishing
- Certification
- Packaging
- Dispatch





## Static Casting Process





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## Static Casting Process

Raw materials



Pig iron, scrap, coal



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## Static Casting Process

Preparation of bottom boxes



Molded in resin bound sand



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## Static Casting Process

Preparation of upper boxes





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## Static Casting Process

“Baking” of cores





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## Static Casting Process

Preparation of ingot molds



Inner lining of molds





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## Static Casting Process

Preparation of mold set up



Fixing of upper boxes



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## Static Casting Process

From pre-oven to ladle



Adding of alloy elements



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## Static Casting Process

Casting of material probe



Individually per batch



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## Static Casting Process

From ladle to mould...



...within less than one minute



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## Static Casting Process

Mold filled...



...with liquid iron



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## Static Casting Process

Taking off the moulds...



...after cooling down



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## Static Casting Process

“Lifting” the rolls...



...out of the pit



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## Static Casting Process

Cleaning, first inspection and...



...marking of roll bodies





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## Pre-Machining

Removal of casting residues...



...and rough turning process



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## Pre-Machining

Turning on heavy duty...



...special roll lathes



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## Pre-Machining

Rolls are getting...



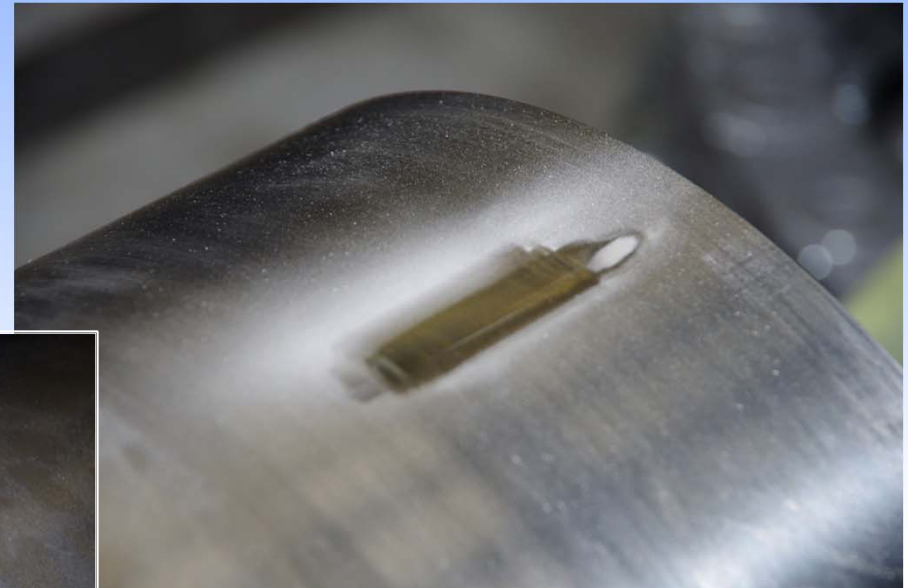
...shape and geometry



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## Quality Control

Preparation for ...



...hardness inspection



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## Quality Control

Control and inspection...



...with certified instruments



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## Roll Manufacture

Center bore...



...and peripheral drills



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## Roll Manufacture

Milling and...



...finish turning operations



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## Roll Manufacture

Pre- and...







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## Roll Manufacture



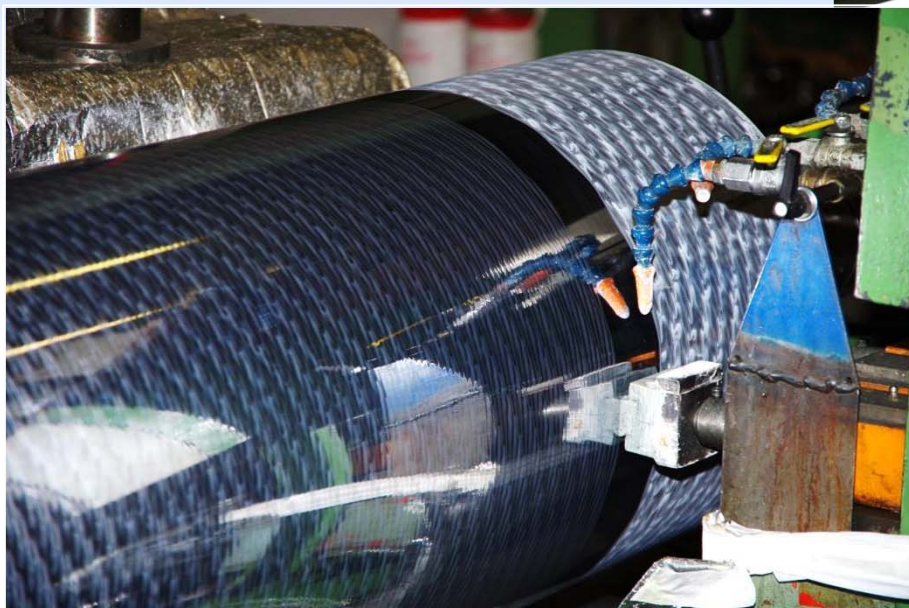
...finish grinding



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## Roll Manufacture

Polishing up to...



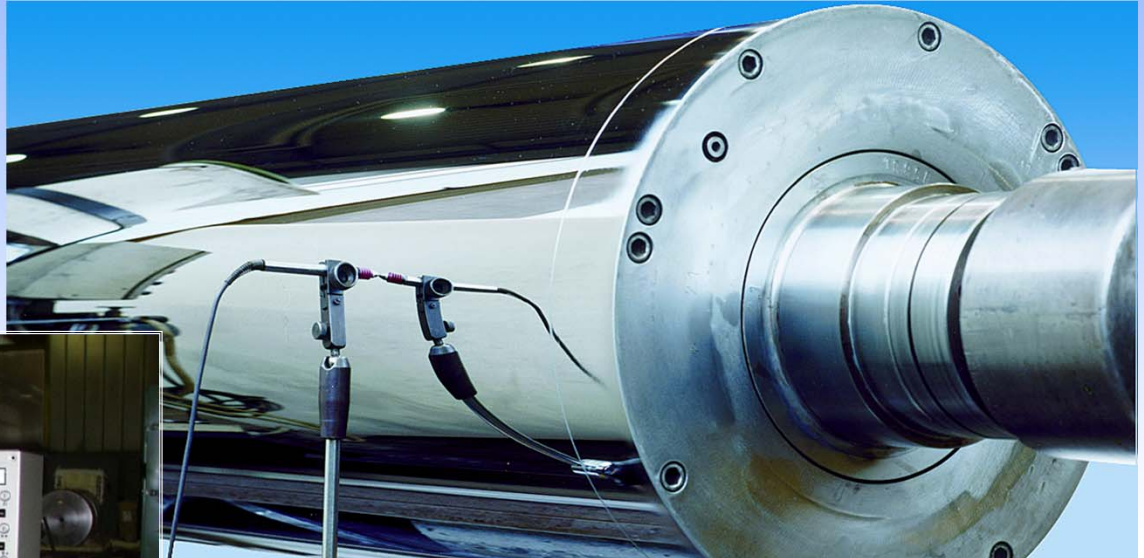
...perfect mirror finish



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## Quality Control

Control and inspection...



...after each step of manufacture



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## Roll Manufacture

Packaging with...



...seaworthy material



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## Roll Manufacture

Dispatch...



...and shipping



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## Modern Calendar Rolls

Materials: chilled cast iron or forged steel

Surface hardness: min. 500 HV

Design: peripherally drilled





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## Modern Calendar Rolls

Machining: body ground cylindrical or with crown, body surface polished up to mirror finish

Surface: Ground, polished, coated

Precision: **TIR** and **cylindricity** less than 0.005 mm, additional hot grinding for best precision at operating temperature





## Modern Calendar Roll Coatings

- Chrome
- Nickel  
(galvanic or chemical)
- Rubber
- Polyurethane
- PTFE
- Thermal spray coatings







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## Modern Mixing Rolls

Material: chilled cast iron

Surface hardness min. 500 HV as a standard, min. 580 HV for improved wear resistance (high alloyed chilled cast iron)

Design: peripherally drilled





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## Modern Mixing Rolls

Machining: body ground cylindrically,  
sometimes fluted

Coating: not useful

Precision: **TIR** and **cylindricity** less  
than 0,02 mm





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## Leonhard Breitenbach Company: Quality, Precision, Experience

More than 140 years of experience in  
roll manufacturing

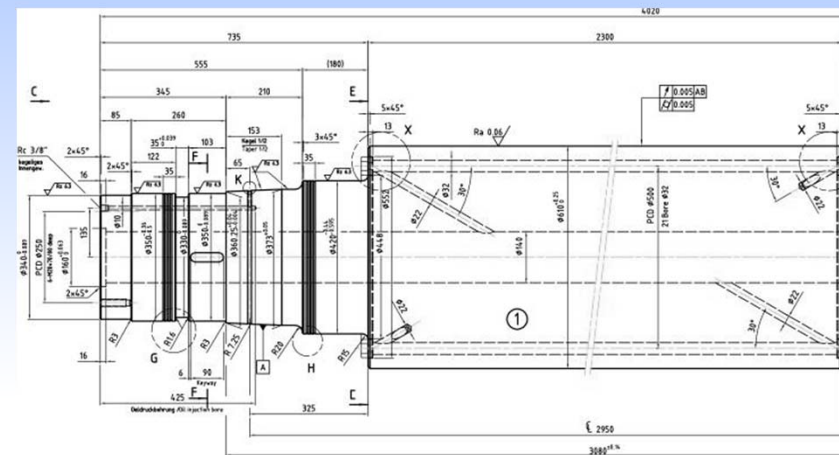
Wide range of production program

Various roll materials for different kinds  
of applications

Full service all around rolls

Most up-to-date CNC controlled  
machine tools for best precision values

Modern engineering





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**Thank you very much for your kind attention !**

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