Chilled Cast Iron Rolls & Shells
Superior Hardness:

- Standard chilled cast iron = 550 V hardness
- AISI 4100 Steel = Avg. 302 V hardness

> Hardness = > Wear Resistance = Longer Time Between Grinds + Better Roll Profile
Chilled Cast Iron Characteristics

Higher Beam Strength

• Greater Resistance to Deflection

More Uniform Heat Transfer

• Better Roll Profile & Paper Properties
Chilled Iron Rolls

- Iron prepared in furnaces
- Poured into a pit (similar to casting a dryer)
- Chills stacked on the outside
- Centrifugal forces force high quality material to the outside, displacing impurities to the center
- Difference in solidification
  - Chilled iron on outside, grey on inside
Foundry Workers Stacking Chills
Preparing for a Pour

“Runner” or “Gate” for molten iron

Stacked Chills
Casting Pit
Insulating Jacket

SHW
Casting Technologies
Pouring Chilled Iron Rolls

Molten iron

Poured into casting

Stacked chills surround the casting

Centrifugal forces push the heavier materials to the outside of the roll
Pouring of Molten Iron

Molten Iron poured from two ladles on opposite sides
Roll Body “As-Cast”

Roll is lifted from Casting Pit after one-to-two week cooling period
Chill Depth
## Chill Depth Chart

<table>
<thead>
<tr>
<th>NOMINAL DIAMETER</th>
<th>USABLE CHILL DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
</tr>
<tr>
<td>mm 150</td>
<td>300</td>
</tr>
<tr>
<td>inches 6</td>
<td>12</td>
</tr>
<tr>
<td>mm 300</td>
<td>600</td>
</tr>
<tr>
<td>inches 12</td>
<td>24</td>
</tr>
<tr>
<td>mm 600</td>
<td>1200</td>
</tr>
<tr>
<td>inches 24</td>
<td>47</td>
</tr>
</tbody>
</table>
Roll Shell
Heads are Inserted
And Bolted
#81 Roll Grinder
The Three Basic Roll Designs

- AQUITHERM-P, PERIPHERALLY DRILLED TYPE
- AQUITHERM-V, DISPLACER TYPE
- STANDARD (Non-Heated)
Journal Designs

Integral

Inserted

Bolted
Aquitherm-V Displacer Type

- Water Heated
- Chilled Cast Iron Body
- Shrunken Fit Steel Displacer Body/Can
- Operating Temperatures < 250 Degrees F
- Mass Centering
- Excellent S/C Application
- Great for High L/D Applications
Displacer Body
Gun drilled from each end
Holes generally 1.25” (32mm) diameter
Holes just below Chill Layer for maximum heat transfer
Higher operating temperatures
Heating Options
• Water Heated  250 Degrees F
• Oil Heated   400 Degrees F  (Typical)
• Steam Heated 340 Degrees F
• Steam/Water Combo
Peripheral-Bore Machine
Connecting Channels: Bores in Journals

- Journals more stable, compared to milled slot connections
- Avoids Weakening of Roll Body
- Allows Triple Seal System

Patent Protected
Patented Head Drilling
MonoPass Configuration

MonoFlow (Non Driven)

DuoFlow (Driven)
DuoPass Configuration

DuoFlow only (Driven or Non-Driven)
TriPass Configuration

MonoFlow (Non-Driven)

DuoFlow (Driven)
TriPass-PS/ W
Peripherally Drilled, Steam/Water Heated

TRIPASS, DuoFlow Configuration

Valve Open by Water Pressure
Water Flow
WATER INLET
WATER OUTLET

Valve Closed by Steam Pressure
Steam and Condensate Flow
STEAM INLET
CONDENSATE OUTLET