Established in 1966, in collaboration with GONTERMANN PEIPERS GmbH, SIEGEN, GERMANY a leader in roll making since 1825

Started production in 1968 & collaboration continued upto 1980, leaving behind a team of well trained technocrats.

Taken over by ISPAT Group in 1981

Large scale modernization & expansion of facilities undertaken including installation of LRF, CCM, mechanized Sand Plant and CNC Machines.

Thus having the capability to customize its products to suit specific customer requirements

GPI is now a company with more than 40 years of rich experience in roll manufacturing.

GPI’s product range includes 0.5 T – 50 T of Rolls cater to all types of Steel Mills. The company is developing high quality HSS Rolls for finishing stands.
Exporting rolls to around 23 countries all around the world including highly quality conscious markets like, USA, Europe etc.
Plant & Equipment

- **M**elting Shop with three Induction furnaces 12T, 8T & 6T & a twin station LRF - 22T each, in combination having a melting capacity of 70T

- **O**nly Indian roll manufacturer with Vertical Centrifugal Casting (600 to 825 mm dia.) & Horizontal (600 to 1400 mm dia.) Centrifugal Casting facility in India.

- **A** mechanized foundry equipped with a modern fully automated Sand Plant & other equipments

- **S**ufficient Heat Treatment capacity with PLC controlled furnaces of 30-80 T capacity with dual fuel facilities ensuring accurate temperature control.

- **C**ompany maintain transparency in production, marketing, supply chain activities & adopted SAP since 2008
Facilities at GPI

- **Low** frequency Induction Hardening with modern pulse fired annealing furnace, polymer quenching and sub zero treatment for manufacture of High Quality Forged Rolls.
- **R&D** Set up recognized by the Govt. of India, with state of art equipments like INSTRON Universal Testing Machine, LEICA Image Analyzer, LECO C-S Analyzer, ARL Spectrometer, MAGMA simulation software and a wide range of metallographic testing equipment.
- **Only** Indian roll manufacturer with Horizontal Casting in India for rolls 600 to 1400 mm dia. as in GP, SIEGEN.
- **An** integrated computer information system network to record and archive Product and Process Information
- **Machine** shop with state of the art turning lathes capable of handling jobs up to 1600 mm dia with weight upto60T,CNC, Duplex & Grinding Machines.
Technical Services

• GPI has a Technical Team of trained roll application engineers who are well conversant with the roll manufacturing process as well as the product application in rolling mills.

• On line product complaint registration and redressal system

• An Account Management Team analyzes information & decides on the future course of action at the account

• With a long term agreement with Arcelor Mittal Europe, GPI has the advantage of developing and sharing roll and rolling mill technology with the most sophisticated R&D facilities in Europe.
First Indian company

- To export HiCr Iron Rolls in bulk quantities
- To manufacture 42T Plate Mill Work Roll for Bhilai Steel Plant - an import substitute product
- To standardize ICDP & HiCr Iron rolls for CSP plants
- To produce cast Back-Up rolls for CSP plants & Hot Strip Mills
- To produce Induction Hardened Forged Steel Rolls
Product Range at GPI

- Alloy Cast Steel Rolls
- Indefinite Chilled Double Poured Cast Iron Rolls in both Normal & Enhanced Carbide quality
- SG Iron Pearlitic Rolls & Bainitic Acicular Rolls
- Hi Cr Iron Double Poured Rolls in both Regular & Anti Peel quality
- Hi Cr Steel Rolls for Roughing Stands
- HSS Rolls for Finishing Stands
- Plate Mill Work Rolls
- Cast & Forged Steel Back up Rolls
- Induction Hardened Forge Steel Rolls for CRMs
## Product Range – Cast Rolls

<table>
<thead>
<tr>
<th>Quality</th>
<th>Usage Area</th>
<th>Barrel Dia (mm)</th>
<th>Barrel Length (mm)</th>
<th>Total Length (mm)</th>
<th>Hardness Sh C</th>
<th>Weight (Max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiCr Iron</td>
<td>Pre Finish HSM</td>
<td>570 - 1200</td>
<td>2700 (max)</td>
<td>6000 (max)</td>
<td>65 – 85</td>
<td>22.0 MT</td>
</tr>
<tr>
<td>ICDP - CC</td>
<td>Finish HSM</td>
<td>570 - 1200</td>
<td>2700 (max)</td>
<td>6000 (max)</td>
<td>65 - 85</td>
<td>22.0 MT</td>
</tr>
<tr>
<td>Steel</td>
<td>Roughing / Inter / Finishing</td>
<td>1500 (max)</td>
<td>2700 (max)</td>
<td>7000 (max)</td>
<td>30 – 55</td>
<td>30.0 MT</td>
</tr>
<tr>
<td>Cast Steel BUR</td>
<td>Back Up Roll</td>
<td>1275 (max)</td>
<td>1800 (max)</td>
<td>5800 (max)</td>
<td>58 - 68</td>
<td>25.0 MT</td>
</tr>
<tr>
<td>SG Iron</td>
<td>Section / WR / Rail Mill</td>
<td>1400 (max)</td>
<td>3000 (max)</td>
<td>6000 (max)</td>
<td>40 – 75</td>
<td>25.0 MT</td>
</tr>
<tr>
<td>HiCr Steel</td>
<td>Roughing</td>
<td>1400 (max)</td>
<td>3000 (max)</td>
<td>8000 (max)</td>
<td>65 - 80</td>
<td>42.0 MT</td>
</tr>
<tr>
<td>ICDP Static</td>
<td>Plate Mill</td>
<td>1200 (max)</td>
<td>3750 (max)</td>
<td>8000 (max)</td>
<td>65 - 80</td>
<td>44.0 MT</td>
</tr>
<tr>
<td>HSS</td>
<td>Pre Finish</td>
<td>1200 (max)</td>
<td>3000 (max)</td>
<td>8000 (max)</td>
<td>70 - 85</td>
<td>25.0 MT</td>
</tr>
</tbody>
</table>
Anti Peel Hi Cr Iron Rolls

Micro Structure & Nominal Chemistry

- Fine radial eutectic carbides $M_7C_3$
- Matrix of tempered martensite with increased globular CrC for more effective wear resistance.
- Higher level of Cr in solid solution. Carbide content designed about 20-25%
- Matrix hardness designed at 600-650Hv. Finer grain structure

<table>
<thead>
<tr>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Cr</th>
<th>Ni</th>
<th>Mo</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2/2.8</td>
<td>0.4/0.8</td>
<td>0.7/1.2</td>
<td>&lt;0.06</td>
<td>&lt;0.04</td>
<td>13.0/17.0</td>
<td>0.8/1.5</td>
<td>0.9/1.6</td>
<td>0.3max</td>
</tr>
</tbody>
</table>
ICDP (EC) Rolls

Micro Structure & Nominal Chemistry

- Globular Graphite along with Ledeburite in a matrix of tempered martensite reinforced by well distributed globular MC Carbides
- Graphite (%) – 3-5
- Eutectic Carbide (%) – 28 – 32
- Micro hardness of matrix – 600 – 630 HV

<table>
<thead>
<tr>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Cr</th>
<th>Ni</th>
<th>Mo</th>
<th>Ti +W +V + Nb</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 / 3.5</td>
<td>0.8 / 1.40</td>
<td>0.5 / 1</td>
<td>0.08 max</td>
<td>0.02 max</td>
<td>1.5 / 1.8</td>
<td>4.1 / 4.5</td>
<td>0.2 / 0.5</td>
<td>0.6 / 2</td>
</tr>
</tbody>
</table>
Forge Rolls – A Brief History

- GPI made a foray into the Forged Rolls market in 1998
- Set up facility with modern heat treatment furnaces to meet stringent quality requirements and ensure an efficient product delivery
- Plant set up under the guidance of Japanese experts from Toshiba, Sangken Sangyo and Mitsubishi
- Trial production commenced from 1998
- Forged Roll Shop got ISO 9002 Certification within six months of commencement of first despatch
Forge Rolls – Process Details

- Preliminary Homogenization of the blank is followed by normalizing, spherodizing annealing.

- Heat Treatment furnaces with modern pulse firing system and high speed burners with automatic zone & individual burner control systems ensure high precision heat treatment.

- Austenitizing followed by volume hardening using Polymer quenching with UCON to provide a hardened microstructure.

- Tempering the blank in electric furnaces brings the desired microstructure and makes the blank more conducive to Induction Hardening & getting the desired journal hardness.
### Forged Steel Rolls – Product Range

<table>
<thead>
<tr>
<th>Quality</th>
<th>Usage Area</th>
<th>Barrel Dia (mm)</th>
<th>Barrel Length (mm)</th>
<th>Total Length (mm)</th>
<th>Hardness Sh C</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forged Rolls</td>
<td>CRM – WR / IMR</td>
<td>240 - 610</td>
<td>2000 (max)</td>
<td>5000 (max)</td>
<td>90 - 100</td>
<td>0.6 – 4.8 MT</td>
</tr>
<tr>
<td>Forged BUR</td>
<td>Back Up Roll</td>
<td>1450 (max)</td>
<td>1800 (max)</td>
<td>5800 (max)</td>
<td>58 - 68</td>
<td>35.0 MT (max)</td>
</tr>
</tbody>
</table>

Alloy Forged Rolls are generally used as Work Rolls for 4 High Tandem Cold Rolling Mills, Work Rolls & Intermediate Rolls for 6 High Reversing & Tandem Cold Rolling Mills.
Forged Steel Rolls

Micro Structure & Nominal Chemistry

<table>
<thead>
<tr>
<th></th>
<th>C %</th>
<th>Si%</th>
<th>Mn%</th>
<th>P%</th>
<th>S%</th>
<th>Cr%</th>
<th>Ni%</th>
<th>Mo%</th>
<th>V%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>0.7</td>
<td>0.25</td>
<td>0.3</td>
<td>0.025</td>
<td>0.008</td>
<td>1.7</td>
<td>1.0</td>
<td>1.0</td>
<td>0.01</td>
</tr>
<tr>
<td>Max</td>
<td>1.0</td>
<td>0.80</td>
<td>0.8</td>
<td>Max</td>
<td>Max</td>
<td>5.5</td>
<td>Max</td>
<td>Max</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Mechanical Properties [1 Mpa = 1 N/mm²]

<table>
<thead>
<tr>
<th>Tensile Strength of Journal (MPa)</th>
<th>Bending Strength of Journal (Mpa)</th>
<th>% Elongation of Journal</th>
<th>Work Roll Barrel Hardness in ShD, JIS</th>
<th>Intermediate Roll Barrel Harness in ShD, JIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>1350</td>
<td>10.0</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>1000</td>
<td>1700</td>
<td>18.0</td>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>
Quality Plan for Cast Rolls

Quotation → Customer Enquiry → Quality Checks & Confirmation → Melting → Casting → Moulding & Chiller Preparation

Raw Materials → Quality Checks & Confirmation → Melting → Casting

Pre Finishing Machining → Heat Treatment → Rough Machining

Chemical Testing, Checking properties Of additives etc → Sand Testing Moisture Permeability

Visual, UT, Hardness, Microstructure, Tensile

UT, Hardness, Microstructure, Dimension → Hardness, UT, Dimensional Check

Checking Drawing, Physical & Chemical Properties, seeking clarifications

Despatch to Customers → Final Inspection & Packing → Final Machining

Checking Drawing, Physical & Chemical Properties, seeking clarifications
Quality Plans for Forge Rolls

Forged Blank → Inspection Checks Prior to Initial Heat Treatment → Homogenizing Annealing

Polymer Quenching → Volume Heating → Rough Turning

High Temperature Tempering in Vertical Electric Furnace → Hardness Checking → Non Destructive Testing (Microstructure, ultrasonic Hardness)

Semi finished machining → Non Destructive Testing (Hardness, ultrasonic, Dimensional Checking)

Low Temperature Tempering → Sub zero Treatment → Low Frequency Induction Hardening

Ready for Delivery To Customers

Final Machining
GPI - Strengths

- **GPI** has a strong QA system and is the first roll foundry to get the ISO 9002 Certification, currently holding the ISO 14001:2004 Certificate & OHSAS 18001:2007.

- **P**rocess traceability maintained through latest generation SAP.

- **A** highly competent team of 105 engineers to ensure conformance to the contract specifications.

- **A** technically competent well trained Marketing Sales Team to cover the world steel market.

- **C**ompatible technology & equipment to produce full range of Plate Mill Work Rolls, Cast Steel Rolls and New Generation Work & Back up rolls.
Rapid Heat Treatment Furnaces for Back Up Rolls

- Latest design Split Body furnace
- ADVANT ECH Industrial computer IPC610 operating system controls the whole operation
- Effective heat treatment dimensions – 2200mm dia X 2250mm length
- Maximum heating temperature – 1100°C.
- High Speed automated burners to achieve high surface temperature in shortest time
- Impulse Control Burners designed for efficient heat distribution
- Initial Roll temperature - 500°C. Heating time <= 120mins
- Temperature variation on roll body +/- 5°C
- Furnace Loading capacity – 50T
- Collapsible quenching facility to suit roll dimensions
Back Up Rolls

**Cast Steel**
- Latest casting technology being implemented
- Shakeout and cooling technology comparable with the best in the world
- Specific Depth Hardened Rolls
- Depth of Hardness 100mm
- Supporting layer up to 120mm
- Wide range of hardness possible – 55 to 70°Sh C
- Drop in Hardness 5 - 7°Sh C across working diameter

**Forge Steel**
- Blanks sourced from reputed forging manufacturers
- Available in 3% & 5% Cr levels
- Specific Depth Hardened Rolls
- Customized Heat Treatment to meet Specific Depth Hardness
- Depth of Hardness 100mm
- Supporting layer up to 120mm
- Wide range of hardness possible – 55 to 70°Sh C
- Drop in Hardness 5 - 7°Sh C across working diameter
Safety in GPI

ZERO ACCIDENT

- Improvement/Awareness on Safety, Health & Environment
- Identification & Elimination of NMS, Unsafe Area & Unsafe Practices
- Safety Patrol & Fire drill
- Analysis & Countermeasure of Each Accident

Analysis-Countermeasure-Evaluation-Review-Standardization - Training

LEGEND
<table>
<thead>
<tr>
<th></th>
<th>Before TPM</th>
<th>After TPM Part 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce HIRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduce MSDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activation of Safety Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider Safety For All Stakeholders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensive Safety Patrols</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident Analysis &amp; Countermeasure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPE Compliance Audit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issuance of Work Permit To Control Safe Working of Contractors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral Safety Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Training/ Fire Drill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mock Drill On DMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contractors Training</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Safety Program

WITH LOSSES
- LONG TERM
  - OCCUPATIONAL ILLNESS
    - PERSONNEL
      - INJURY
        - MAJOR (Fatal/Permanent Disability)
          - REPORTABLE (More than 48 hours)
  - PROPERTY
    - PROPERTY DAMAGE
      - MINOR (Lost Time Injury)
        - NON-REPORTABLE (Less than 48 hours)

NO LOSSES
- NMS
  - FIRST AID

INCIDENT

**PROACTIVE**
- NMS Identification & Rectification
- Behavior Based Program (Quarterly).
- Training for SHE awareness & Fire Drill (Monthly).
- Safety Audit (weekly).
- Hazard Identification & Risk Assessments
- Hazard mapping
- Emergency Preparedness & Response
- Permit to Work System
- Visitor Protocol / Vehicle protocol
- Contractor Management
- Incident Register.

**REACTIVE**
- Accident Investigation & Immediate Implementation of Recommendations.
- Accident Analysis
- Rectification of unsafe condition (Ref: Fugai Tagging)
- Kaizen
GPI values technology and has been actively involved in providing computers and computer education & training at schools in near by villages in West Bengal.

GPI cares for environment and has pioneered tree plantation in its works making it a truly green company.
GPI is geared to meet future state of the art rolling mill requirements and provide world class rolling solutions to Iron & Steel Plants spread throughout the globe.

With our commitment to provide the highest standards of technical services, we look forward to your participation as a business partner in our progress.
We are committed to R&D on rolls at a continual basis and our new product development is based on customer needs.

Armed with a 24x7 account management team to arrest Ultrasonic, Spalling and Debonding problems in Cast Rolls for Hot Rolling Mills.
TPM and Six Sigma – Relaunched

GPI Received Prestigious TPM Excellence Award in 2007 & TPM Consistency Award from JIPM, Japan in 2010

- With 5 Black belts and 20 Green Belts working on key projects in Process Control, Marketing, Supply Chain and Production. GPI aspires to be among the top 10 roll manufacturers globally.
- All process losses monitored through TPM Methodology
- Continual reduction of losses through Kaizen projects.
- Various quality circle initiatives as per TPM methodology are in place to boost employee’s morale.
- Continual skill upgradation through skill mapping and training.
Cast Rolls – Export Customers

Nucor Crawfordsville, USA
Nucor Berkeley, USA
Nucor Dekatore, USA
Nucor Hickman, USA
Steel Dynamics, USA
Northstar Bluescope, USA
Mega Steels, Malaysia
China Metallurgical Company, China
Manshaan Iron & Steel
Shanghai Baosteel
Meishan, China
Tong Hua Iron & Steel
Company, China
Arcelor Mittal Steel, Gijon
NLMK Russia
WCI Steel, USA
AM - Ekostahl

Severastal Dearborn
China Steel, Taiwan
POSCO, Korea
ArcelorMittal, Sidmar,
Accereria Arvedi, Italy
ArcelorMittal
Temirtau, Kazakhstan
AM, Avilles, Spain
OMK Vyasa

Sahaviriya Plate Mill
LPN Thailand
Libya Iron & Steel Co.
AM – Seremange
Celsa Channel Mill,
Barcelona, Spain
Balboa Alfanso Gallardo
Dongbu Steel, Korea
NLMK Dufarco
Cast Rolls – Domestic Customers

Domestic Customers
- Forge Rolls
- Cast Rolls

SAIL
- Bokaro Steel Plant
- Rourkela Steel Plant
- Bhilai Steel Plant
- Durgapur Steel Plant
- IISCO Steel Plant
- Salem Steel Plant

JSPL
- Patratu
- Angul
- Raigarh
- Tata Steel

RINL
- Vizag Steel Plant

JSW
- Bellary
- Tarapur
- Salem
- Ispat Dolvi
- Salem Value Steel

Uttam Value Steel
- Essar Steel Hazira
- Kalyani Steel
- Well Spun
Forge Rolls – Export Customers

Steel Dynamics, USA
Nucor Crawfordsville, USA
Nucor Berkley, USA
KYCR, PHP, S. Alam, Bangladesh
Orna Steels, Malaysia

Mycron Steels, Malaysia
PT Essar, Indonesia
Libyan Iron & Steel Co.
Steel Corp, Philippines
Yung Kong Steel

Safal Group, Africa
Yesu PLC, Ethiopia

Mabati Steel, Kenya
Domestic Customers

Forge Rolls

- SAIL - Bokaro Steel Plant
- SAIL - Rourkela Steel Plant
- SAIL - Alloy Steel Plant
- Tata Tin plate
- Bhusan Angul
- Manksia, Bhusan Power & Steel

- Tube Products of India

- Steelco Gujarat
- National Steel

- JSW Bellary
- JSW - Ispat Ltd.
- Kalmeshwar, Uttam
- Galva, Uttam Strips
- JSW Tarapur, Vasind
- Essar, Bhusan Khopoli

- Bhusan Sahibabad
- Hero Cycle
- Avon Ispat
- JSL Hisar
Certifications & Accreditations

- First Roll Foundry to get ISO 9002 Certifications
- Certified with ISO 14001:2004
- Certified with OHSAS 18001:2007
- Quality systems approved by Arcelor Mittal
- Long term agreement with Arcelor Mittal on quality upgradation and advanced rolling mill products
- TPM Level II certified organization – Audit Pending
Thank You