

**Photographic Representation
of
REPAIRS & RECONDITIONING OF
ATOX 42.5 MILL
GEAR BOX INTERNALS
[II ND STAGE]**

GEAR DIMENSIONS:

2400 MM O.D. X 430 MM FACE WIDTH WT: 6000 KGS

PINION SHAFT DIMENSIONS :

890 MM O.D. X 2000 MM LONG WT: 4200 KGS

**CLIENT:
M/s BINANI CEMENT LTD. (SIROHI)**

INSPECTION BY:

**CLIENT
&
REPRESENTATIVE OF M/s F.L.SMIDTH [DENMARK]**

JOB COMPLETED IN 4 1/2 DAYS

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For Breakdown / Maintenance Jobs /Spares Call us now : 022- 26840734 / 26823173 Fax: 26820853

ACKNOWLEDGEMENTS

It is often said that “Great men do not do different things but do things differently.”

We, at Sethi Heavy Engineering have **one motto** in line with the above which reads :

“What ever need be done, must be done well.” – We have lived each day with this philosophy in our pursuit towards excellence in the *Engineering Industry*.

When we undertook the task of **timely completion of Reconditioning and Repairing of the ATOX 42.5 Mill Gear Box Internals [IInd Stage] Gear & Pinion Shaft**, we had besides our **technical backup and our recourses** – *The “Will to succeed” and the “Moral responsibility to live up to our commitments.”*

We have, at our end tried our level best to give you a quality product to the best of Engineering standards. **It is our sincere hope and belief that we, did live up to the confidence reposed by the “Binani Cement Family” in us now and you have our word that we will live up to it in the future as well.**

Nothing in life is an individual effort and so has it been with this project too – **We are indeed grateful to the Executives of M/s. Binani Cement who have pooled all resources to help expedite decisions at all levels.**

Our most grateful thanks to :

- | | |
|---------------------------|------------------------------|
| ▪ Shri S. S. Khandekar ji | President |
| ▪ Shri R. C. Mittal ji | Advisor |
| ▪ Shri R. K. Vaishnavi ji | Sr. Vice President |
| ▪ Shri M. A. Bohra ji | Asst. Vice President |
| ▪ Shri S. S. Kothari ji | Asst. Vice President (Matl.) |
| ▪ Shri Mustansir ji | Sr. Manager |

For considering us for such a critical and time bound repair job.

- | | |
|--------------------------|----------------------|
| ▪ Shri Shyam B. Asawa ji | Asst. Vice President |
|--------------------------|----------------------|

For his continued encouragement, support, guidance and help.

- | | |
|-------------------------|-------------------------|
| ▪ Shri Rajesh Singhi ji | General Manager (Mech.) |
|-------------------------|-------------------------|

For his unqualified support, guidance, help, patience & round-the-clock availability – be it day or night.

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PERFECTION THROUGH CONTINUOUS AND CONSTANT IMPROVEMENT

ACKNOWLEDGEMENTS

A Special mention must be made to the Efforts of Mr. John Slot Pederson- Sr. Engineer – M/s F.L.Smith [Denmark] for his constant guidance , help and untiring assistance in Inspecting and overseeing the Job.-Day and Night.

Our thanks also to **Shri Abhay Singh ji** of M/s Binani Cement Ltd who undertook the mission of reaching the consignment to and fro from Plant and back.- and for arranging transport formalities

Our most profound thanks are also due to the following Executives of M/s Larsen & Toubro Ltd. [**CEMENT MACHINERY DIVISION**]

- **Mr P.R.V Pillai ji** [Jt. GM - Cement Machinery Div]
- **Mr M.L. Motwani ji** [Sr. Mgr- Cement Machinery Div]
- **Mr V.B. Samant ji** [Sr. Mgr – QA & Inspection]
- **Mr Vinay B. Rane ji** [QA & Inspection]

For Permitting us to explain each and every step of the operations, systems and procedure including the instrumentation and machine tool capability to achieve the required accuracy of the job & for their valuable advice on the finer aspects of the Gear Box.

Due gratitude need also be expressed to :

Mr. KV. Rangachari ji [Dy. General Manager-EWAC Alloys]

For his guidance regarding use of XUPER 22~~33~~3N Electrodes for welding the bore considering metal compatibility parameters*

To: **Mr Balwani ji** Area Sales Manager [EWAC Alloys]

For getting the store opened on a holiday and making the Eutectic Electrodes 22~~33~~3N available in the required size of 4 mm.*

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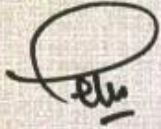
Lastly, a special mention to the cohesiveness, patience and untiring effort of our team at Sethi Heavy Engineering & our associates – for strength and success stems only from unity of thought and action.

Please find enclosed herewith a *graphic representation of your job reconstructed step by step for your perusal and record.*

We look forward to being of service to you in future.

Signed, Sealed and Delivered with heart within and God overhead.

Thanking you,
For Sethi Heavy Engineering,



Mr. P. C. Sethi
Executive Director.

Dated : 14.05.04.



Our Seal of Quality

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PERFECTION THROUGH CONTINUOUS AND CONSTANT IMPROVEMENT

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REPAIRS & RECONDITIONING OF ATOX 42.5 GEAR & PINION SHAFT

Inspection by : Client & Representative of M/s. F.L. Smidth [Denmark]

CLIENT: M/S BINANI CEMENTS LTD, [SIROHI].

PRE-HEATING OF GEAR BORE

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ATOX 42.5 Table II ND Stage
Intermediate Gear.

OD: 2400 MM
Face width: 430 MM
Weight :6000 KGS
Material :Cast Iron

Required to build up Approx
3 MM on I.D.(Bore of Gear)
& Machine Bore and Face in
one Setting on VTL.

Gear BORE being
pre-heated to
Approximately
150 degrees C prior to
welding.

Welding Electrodes:

Larsen & Toubro
Eutectic XUPER 22 *33 N
Size 4mm.



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WELDING OF BORE

USING L&T 'S

EUTECTIC

22*33N ELECTRODES

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Gear BORE being
WELDED using
Staggered welding
Method
(Not exceeding 2 inches
width at a time-Gear is
indexed by 90 degrees to
prevent distortion and
heat cracking)
Welding Electrodes:
Larsen & Toubro
Eutectic XUPER 22 33 N
Size 4mm.



Inspection of Gear Bore
after welded run to
ensure uniformity of
bead and proper fusion.

Certified Welders
Ex- L&T with over 20
years experience of TIG /
MIG / SMAW / MMAW
Welding in 6 G position.

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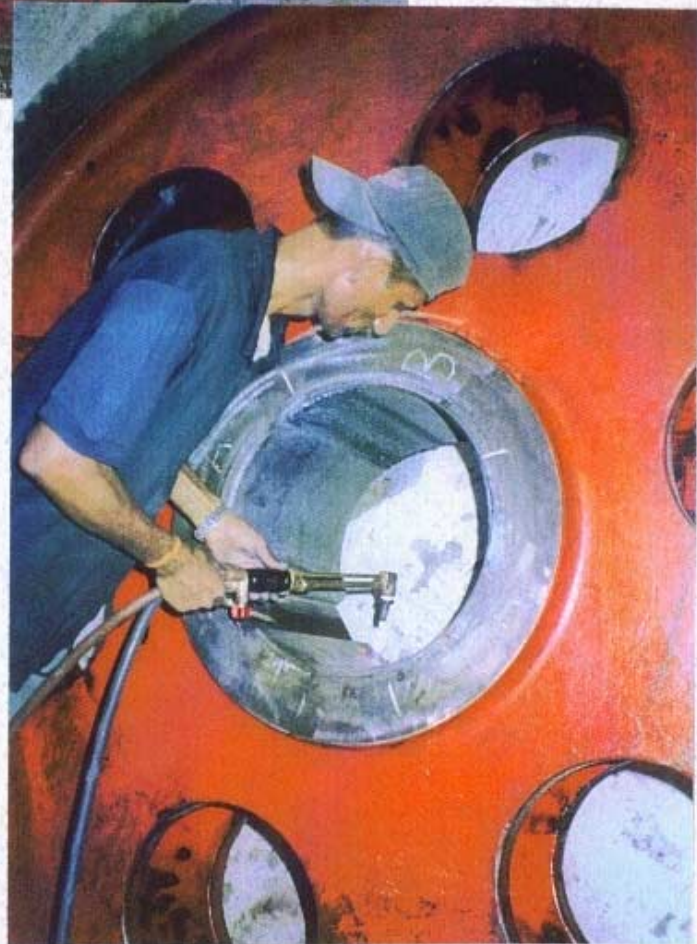
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Welding continues slowly and intermittently to ensure no crack formation.

(Please see Pinion shaft in background)

Once again pre-heating being carried out between welding runs to ensure that temperature does not drop below acceptable levels.



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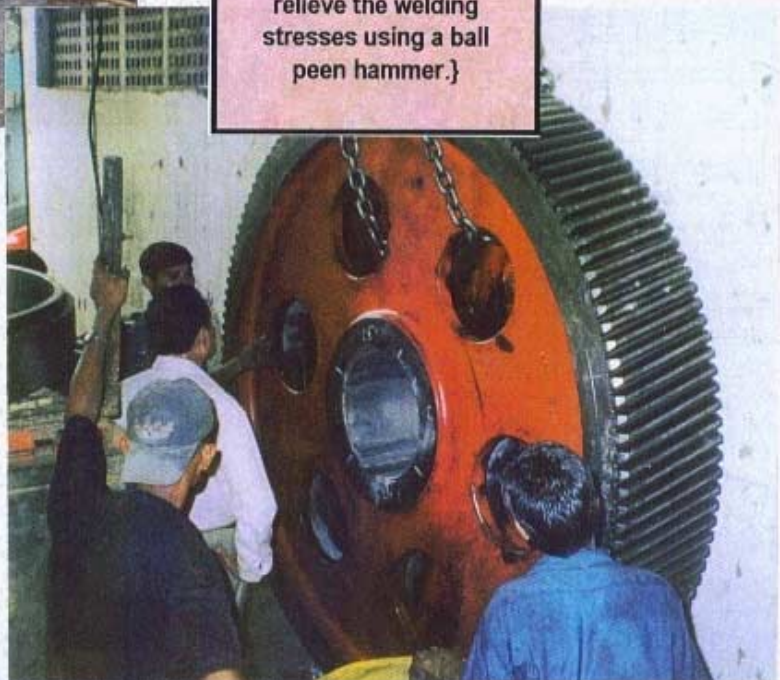


Gear BORE being Inspected for welding splatter, correctness of welding and uniformity of lay by our Inspector.

Gear needed to be rotated each time by 90 degrees.

Intermittent Welding to be done by turning the gear at 90 degrees as required.

{Please note that each run was peened to relieve the welding stresses using a ball peen hammer.}



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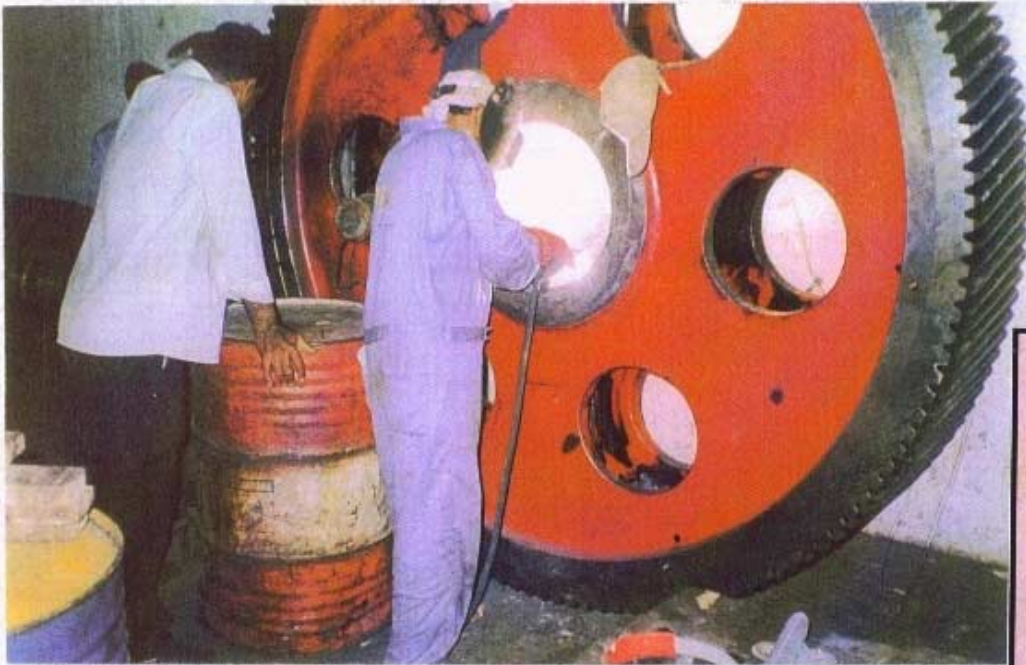
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Welding continues as build up of metal increases layer by layer.

(Time is of essence seeing the criticality of the Job- Raw mill has stopped in the plant due to repairs of Gear drive)



Team of two welders continuously stationed to weld bore.

Preheating the bore once again to prevent temperature drop.

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POST HEATING OF GEAR BORE

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Post Heating of the bore to be carried out so as to keep the temperature uniform and prevent cracking of the welded area.

(Approximately 2-3 hours of heating carried out to check heat input is uniform.)

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INSULATED SLOW COOLING OF GEAR BORE

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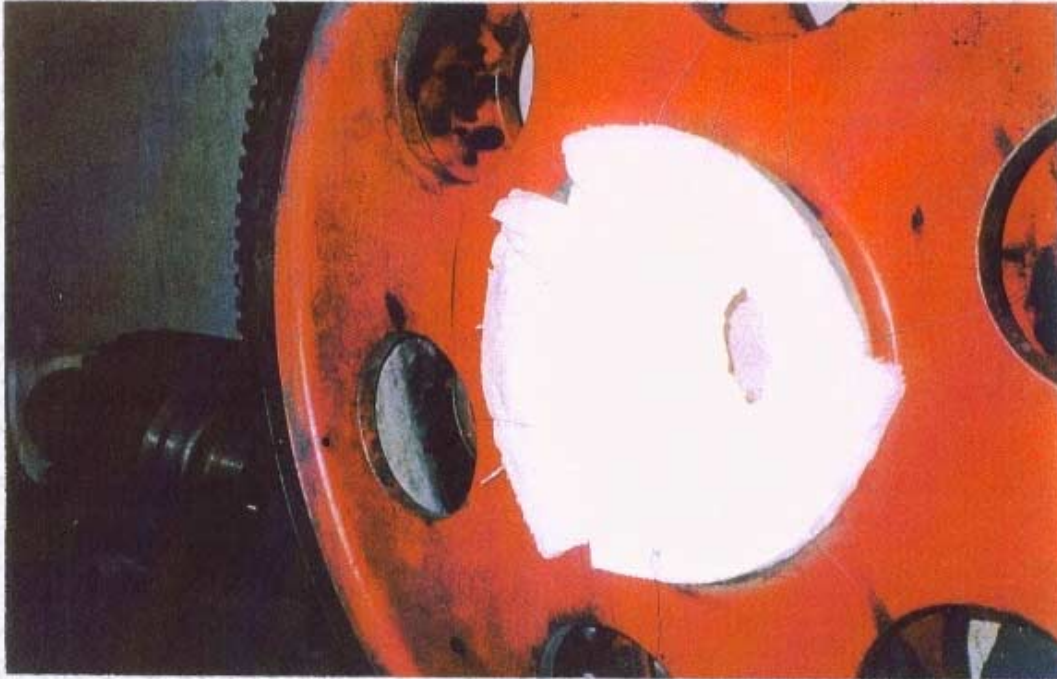
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Gear Bore:

Insulated with Glass wool to ensure heat is not allowed to escape and weld area is slowly cooled to ambient temperature before machining.

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After approximately 10-12 hours of cooling (under controlled conditions) .

Insulation is removed and grinding of splatter and welded area is being carried out.



Mr. John Pederson – representative of F.L.Smidth [Denmark] Checks the Gear and Teeth & Inspects the bore .

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F.L.Smidth's representative checking gear and seeing if any rectification of welding is required.



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MACHINING OF GEAR BORE ON 4.3 M V.T.L.

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Gear Wheel is being transported by E.O.T (30 T) to the V.T.L. for taking up machining of Bore.

Machine 4.3 m V.T.L.
WMW -Germany



Mr . Singhi
Mr. S Asawa of
M/s Binani Cement Ltd
& Mr. Sethi of M/s Sethi
Heavy Engg working
round the clock to see
that the job is completed
& dispatched at the
earliest.

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Machining of Job completed after truing the job Axially as well as Radially within required limits..

Bore has been fully machined in one setting.



Gear BORE fully machined.

Please note that face cut has been taken to ensure that bore and face are perpendicular

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GRINDING OF PINION SHAFT ON CENTRE TO CENTRE 6M GRINDING MACHINE

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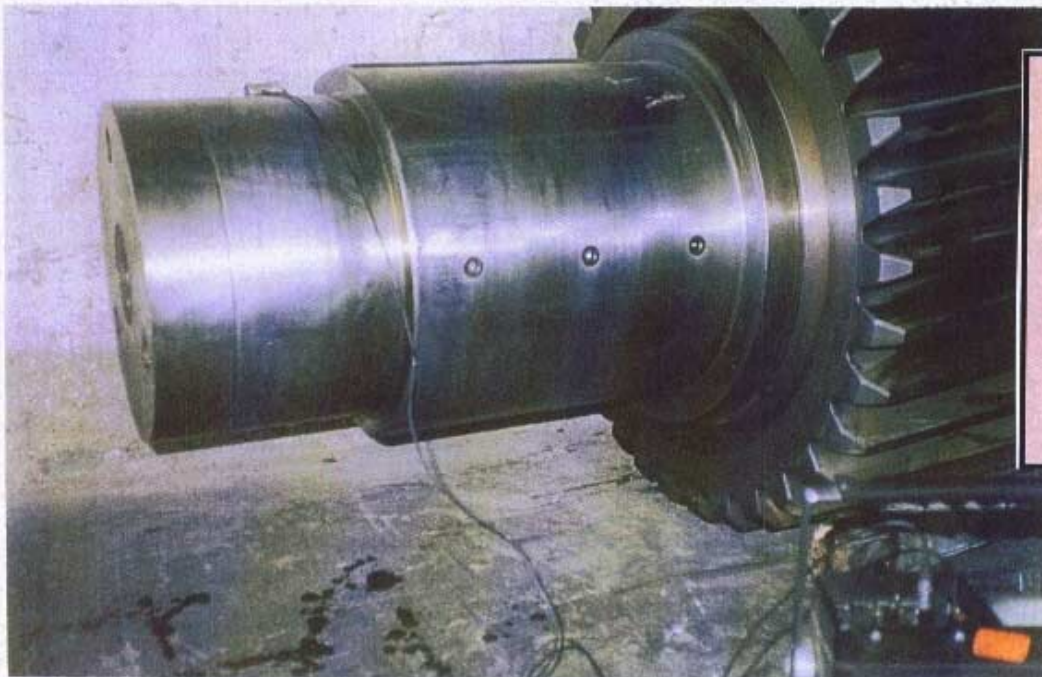
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Atox 42.5 II nd Intermediate Pinion Shaft GEAR Bore mating Area needs to be ground to match the Bore of the Gear keeping 100 microns interference .

Pinion : 890 mm O.D. X 2000 mm
WT: 4200 KGS.

Ultrasonic Testing of Shaft.



Please refer close up of Keyway.
Minute cracks have started developing in older keyway, hence it is plugged using dummy key and new keyway has been made.
(This is done to prevent propagation of crack)

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Mr. John Pederson of M/s F.L.Smidth and Shri Singhi of M/s Binani Cement Ltd. discussing aspects of grinding of Pinion shaft.

Pinion Shaft being ground center to center on 1000mm x 6000 mm WMW [Germany] Grinding machine.

[Please note that centers of shaft are 75 included V- Angle instead of std 60 degrees, hence special ground centers being used.]



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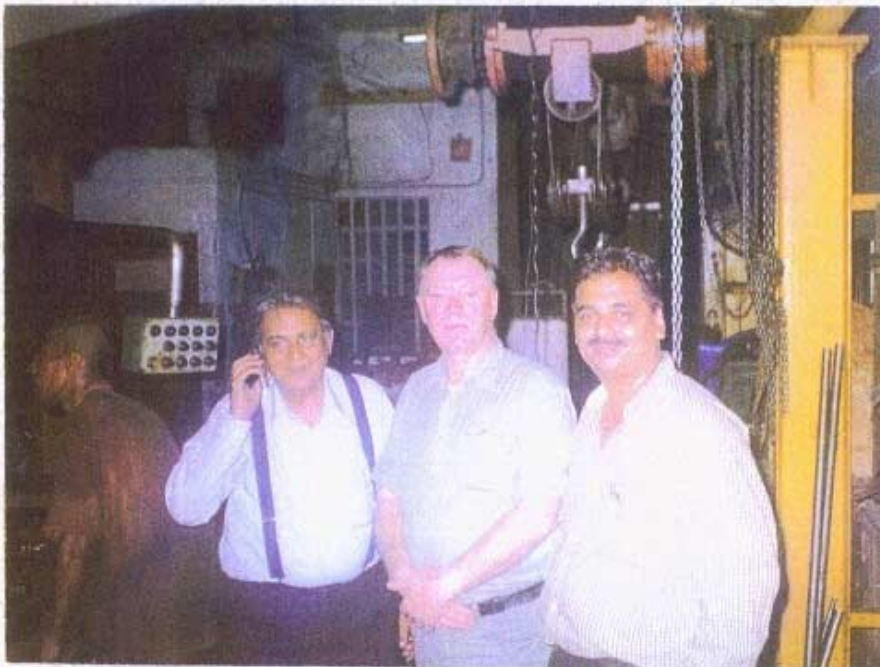
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Final Shaft diameter
being ground to size
using bluing paste.

Finish cut nearing
completion.



Executive Director of
M/s Sethi Heavy
Engineering talking on
phone along , adjacent
to him our associates
and next to him
Representative of M/s
F.L.Smidth. of
Denmark.

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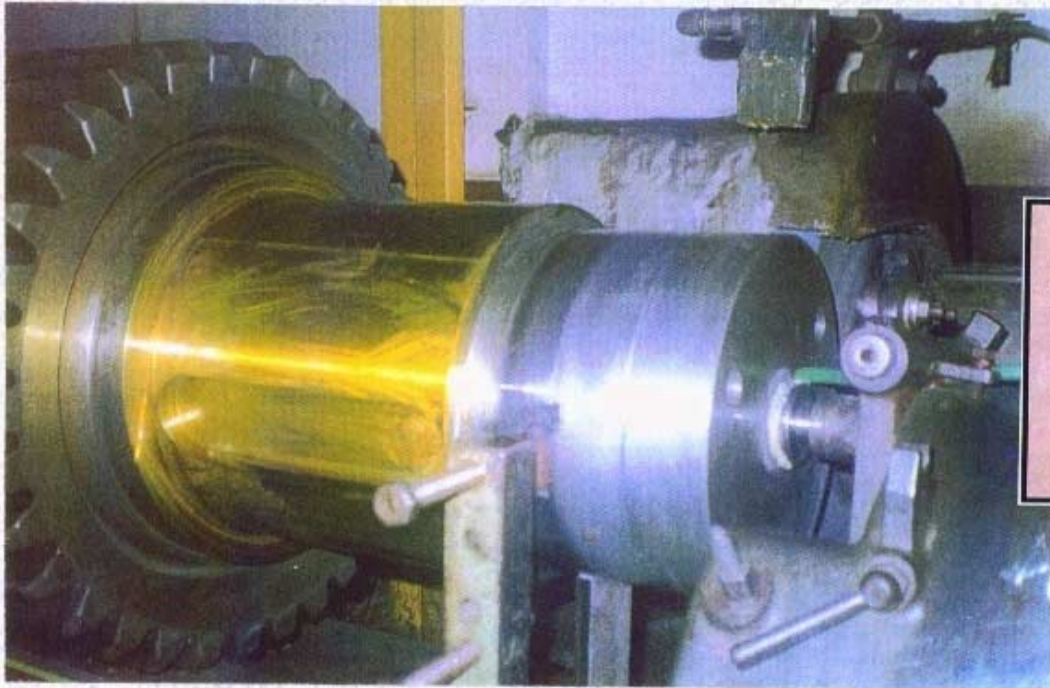
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Golden Antirust being applied on the ground area to prevent oxidation.
TIR reading of ground diameter within 10 microns.



Golden Antirust Lacquer being applied over entire surface of Pinion post loading it into the vehicle prior to dispatch.

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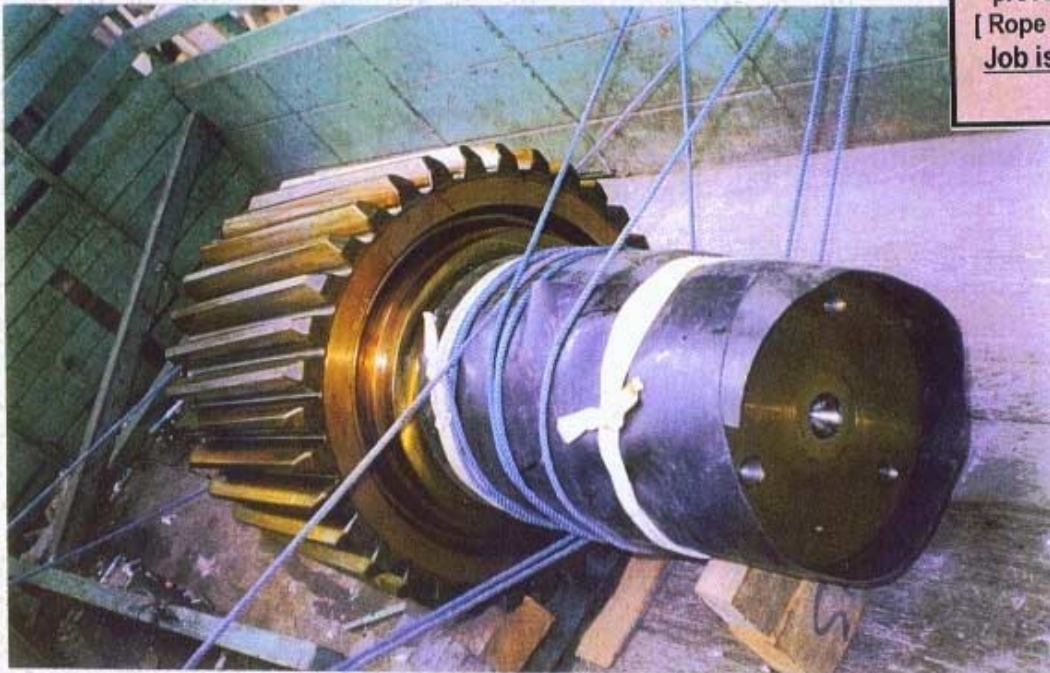
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Pinion Shaft is supported on wooden supports and bearing and ground areas are packed with rubber sheet to prevent damage in transit. [Rope tied to secure pinion.] Job is ready for Dispatch.



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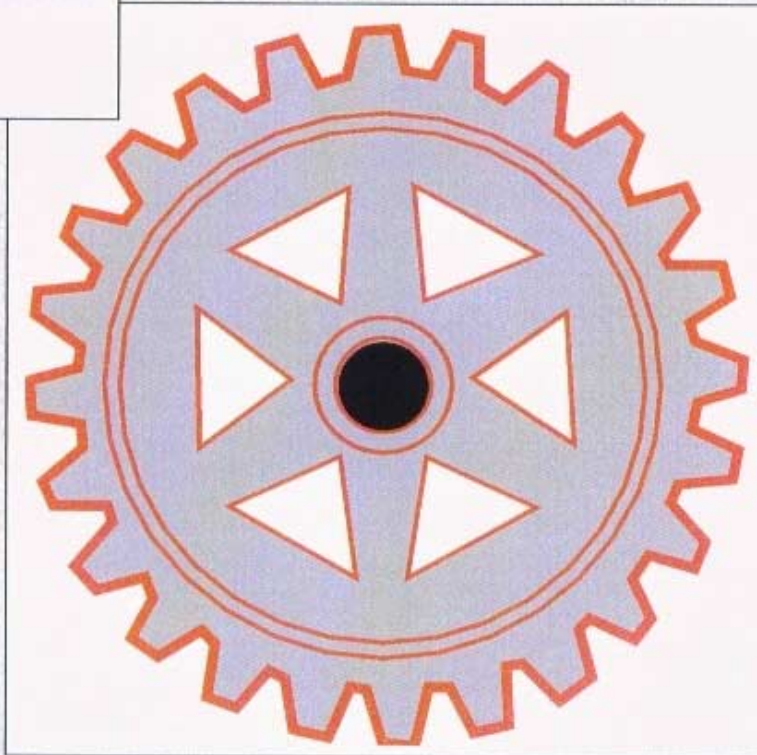
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INSPECTION REPORT

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REPAIRS & RECONDITIONING OF ATOX 42.5 GEAR & PINION SHAFT
CLIENT: M/S BINANI CEMENTS LTD, [SIROHI].
Inspection by: Client & Representative of M/s. F.L. Smidth [Denmark]

INSPECTION REPORT FOR GEAR BORE & PINION SHAFT DIAMETER

Sr	Bore Readings	Bore Readings (90 deg)	TIR	Remarks
1	457.70	457.70	10 microns	
2	457.70	457.70	10 microns	
3	457.70	457.70	10 microns	
4	457.70	457.70	10 microns	
5	457.70	457.70	10 microns	
6	457.70	457.69	10 microns	

Required TIR : 30 microns

Actual TIR Achieved: 10 microns

Interference of 80 microns to 100 microns required between Pinion Shaft and Gear Bore.

Sr	Shaft Readings	Shaft Readings (90 deg)	TIR	Remarks
1	457.79	457.79	10 microns	
2	457.79	457.79	10 microns	
3	457.79	457.79	10 microns	
4	457.79	457.79	10 microns	

Required TIR : 30 microns

Actual TIR Achieved: 10 microns

Required Interference: 80-100 microns

Actual Interference Achieved: 90 microns

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Off: 603, FLYOVER APARTMENTS, END OF FLYOVER, TELLI GALLI, ANDHERI-EAST, MUMBAI-400 069. Tel:- 022- 26840734 / 26823173 Fax: 26820853.

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Facilities at our disposal as under

Heavy Fabrication Rolling and X- Ray Quality Welding (Lifting over 450 Tons)

PLATE MATERIAL: IS 2062 / IS 2002 GR B / BQ ASTM A 515 / 516 GR 60/70
STAINLESS STEEL SS 304 / 316 / 316L
HARDOX 400 / 450 / 500 / 600 & SAILHARD / TISCRA
PLATE BENDING : UPTO 120MM THICKNESS COLD & UPTO 200 MM HOT
PLATE CUTTING : UPTO 200 MM CNC GAS CUTTING / PLASMA CUTTING
WELDING: CO2 / ARGON / MMAC / SAW- BOOM TYPE / TIG / MIG
STRESS RELIEVING FURNACE : 8M X 8M X 18M

FORGED & MACHINED SHAFTS

FORGED SHAFTS: MATERIALS EN 8 / EN 9 / EN 19 / EN 24 / EN 31
/ EN 40B / EN 353 ETC / C45 / 20 MN CR 5 / 42 CR MO4 V
STAINLESS STEEL SHAFTING: SS 304 / SS 310 / SS 316/L / SS 431
DIAMETERS: ROLLED : 60MM TO 180 MM X LENGTHS UPTO 5METRES
FORGED : 180 MM TO 1100 MM X LENGTHS UPTO 6METRES.
TURNING: 2000MM X UPTO 10 000 MM (LATHES)
HORIZONTAL BORING: 210MM SKODA / 160 MM TOS
VTL : FROM 1000MM TO 7000 MM

CENTRE TO CENTRE GRINDING ON 6 METRES MACHINE Diameters: 1000 mm x 6000 mm lengths

GEARS/ PINIONS: Forged /Cast & Fabricated Internal & External

SPUR / HELICAL / HERRINGBONE / BEVEL / SPIRAL BEVEL
HOBBED GEARS UPTO : 40 MODULE
FLAME HARDENED & THROUGH HARDENED

OUR STRENGTH

- ✓ A VISION TO DELIVER VALUE
- ✓ ENGINEERING EXCELLENCE WITH GLOBAL COMPETITIVENESS
- ✓ A PASSION TO EXCELL

WE STAND COMMITTED TO : Quality Workmanship Reliability & Timely Deliveries

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WITH
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- ⊕ CONVEYOR SPARES
- ⊕ BUCKET ELEVATOR SPARES
- ⊕ RAW MILL SPARES
- ⊕ GRINDING TABLE SPARES
- ⊕ PREHEATER & CALCINER SPARES
- ⊕ KILN SUPPORT ROLLERS
- ⊕ KILN SHELL SEGMENTS
- ⊕ KILN SUPPORT SHAFTS
- ⊕ TORSION SHAFTS
- ⊕ FAN SHAFTS
- ⊕ COOLAX/ FOLLAX GRATE COOLERS
- ⊕ DRAG CHAIN COMPONENTS
- ⊕ COAL SCREW CONVEYORS
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