PUNE CHAPTER

ASM International, Pune Chapter

Chapter News Letter

Issue No. : 08 | Editor - Louis Vaz | Chairman, News Letter Committee - Louis F Vaz | May 2013

EDITORIAL...

Welcome to the April 2013 issue of Newsletter.

We have a lot of news to convey. Firstly, our Gear Metallurgy Conference & Expo was a great success.

Metallurgy for non-Metallurgists was successfully conducted by Mr.Gogate and team at ARAI, Chakan.

Technical article on Advances in Surface Treatment Of Steels by Mr.Subhash Kulkarni is included in this issue.

A technical talk on Investment Casting was held at Sinhaghad Institute Of Technology on 11th March 2013 by Mr. D. Paranjpe.

Mr. Sesh Subramaniam, past Chairman of ASM Pune Chapter, has been included in "know our Member" section.

Thank you for your continuous support.

Louis Vaz
Editor

GME 2013 – Gear Metallurgy Conference & Expo was great success!

International Conference "GME 2013 : Going Global – Gear Metallurgy" & Gear Expo 2013 organised as a beginning of ASM Centenary Year celebrations in India was a great success. The conference was organized by ASM International Pune Chapter on 7th & 8th Feb 2013 at Hotel Pride Executive (Formerly known as – Hotel Best Western). In line with ASM Mission of Knowledge sharing, 20 National and International Speakers presented their work, this focused conference on Gear Metallurgy. While three case studies were presented by R G Argade, P M Kulkarni and S G Kulkarni in Special Session of Gear Failure Analysis. Dr P G Renavikar, immediate past chairman of India National Council, ASM International moderated this special session, while Mr B R Galgali, Chairman Pune Chapter, Mr S G Kulkarni, Shreed Metals and A S Raghavan, Bharat Gears were expert panelist.

The areas covered in this focused conference were – Gear Forming, Heat Treatment, Post Heat treatment operations and Vacuum Carburising. In the special session, three invited case studies were on Catastrophic Failure of Crown Wheels in Off Highway applications, Typical Transmission Gear Failures and remediation as well as on case study on Crankshaft failure & how six sigma methodology can be extended for holistic approach on failure analysis. Moderator Dr Renavikar explained how this six sigma methodology can be extended for finding gear failure solutions also.

Heat Treating Society & Indian Society of Non Destructive Testing were conceptual sponsors. Hard Castle Petrofer, Mumbai (India), I design Solutions, Pune (India) & Bharat Gears, Mumbai (India) were Gold Sponsors, while Tata Motors, Pune (India), Sanjiv Auto Parts, Aurangabad (India) and Punjab Bevel Gears, Gaziabad (India) supported this event as Silver Sponsor.

Gear expo housed 28 stalls from different companies covering wide areas of Gear Design Capabilities, Gear Heat Treatment Furnaces & Equipment supplies, Vacuum Furnaces, Heat Treatment Fixture, Testing Equipments, Gear Manufacturing. ASM Pune Chapter pavilion provided information about ASM activities – Globally, Locally & at India Levels, also Pune Chapter Newsletters and membership information booklet was given complimentary to all visitors. Past

Contact us

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publications of ASM Pune Chapter were also available as complimentary gift to ASM Members visiting stall. One of the attractions of the conference was display of Safari Strom – Newly Launched Vehicle by Tata Motors.

The conference & Expo was Inaugurated by Mr Anil Sinha, Plant Head – CVBU, Tata Motors, Pune. Mr Sudhir Panse delivered Key Note Speech. The Technical Volume was released by Mr Anil Sinha, while CD and Chapter News Letter by Sudhir Panse and B R Galgali respectively. Dr H M Mehta, founder of ASM Activities in India was specifically present for Inauguration function; INC members all over India were also graced the occasion. Jayant Jamuar, Chairman India National Council was chief guest in valedictory function. Delegates voted for Felss, ALD Vacuum Technology, Hardcastle Petrofer &, as three best stalls in exhibition.

More than 175 delegates participated in the conference while over 500 visitors visited the expo. Student volunteer ensured seamless registration at conference & exhibition venue as well as smooth and on time conducting of Technical Sessions. Organizing committee under Chairmanship of Chris Dias, Udayan Pathak as Convener, K C Gogte and Y S Gowaikar as Chairman of Technical Paper and Exhibition Committee respectively was well supported by L D Deshpande, Rahul Gupta, S G Kulkarni, Hemant Zaveri, L F Vaz, Vineet Marathe & S M Phansalkar.

This article is contributed by Mr.Udayan Pathak. ■

Inauguration by Mr Anil Sinha, Plant Head – CVBU, Tata Motors, Pune

Audience at GME Conference

At GME Exhibition Hall

Technical Session in Progress

At GME Exhibition

Student volunteers at GME

Audience at GME Conference

At GME Exhibition Hall

Volunteer yourself for your Chapter!

For more efficient working & expanding network of your ASM International Chapter, please support your chapter by offering your time. Lot of avenues to choose areas of your liking. Options are - Membership Development, Education Programs, Students Outreach, Member Service, Website, News Letter, Technical Program and Social Events. Contact ASM International Pune Chapter asm.pune@gmail.com

Launch of GME CD

ASM Chairman's Speech

Exhibition interaction

Unveiling of GME Souvenir

GME Audience

Chief Guest at one of the GME Exhibition stalls

Unveiling of ASM Newletter

Exhibition interaction

Share your knowledge through technical article

Share your technical knowledge across the world. Contribute technical articles for AM&P Please send your articles & enquiries to ED Kubel, Editor AM&P - *edkubel@asminternational.org* or Editor Chapter Newsletter - *editor.asm.pune@gmail.com*

Training Programme on Modern Heat Treatments including Vacuum Heat Treatment

For improved efficiency of Automotive as well as Engineering Components, it is necessary to make the components lighter at the same time improving their properties. The reliability of the components is also equally important as every component has to perform its duties unfailingly. This increases the importance of accurate Heat Treatment. The modern Methods of Heat treatment are improving the consistency and reliability of the process

Energy efficiency is also assuming the importance ,as the energy costs are going up day by day, making it imperative that minimum energy is used without affecting the quality of Heat Treatment. Various methods of Energy conservation will also be discussed in this Training programme on the Modern Methods including the Vacuum Heat Treating

The Training Course will be useful to the Managers, Supervisors of Heat Treatment Departments, as well as for the Designers, and Development Engineers, Vendor Development Engineers, Buyers, Furnace manufacturers, and Sales and service Engineers

The Progrmme is being arranged on 13th, and 14th June 2013 at Hotel Pride , Shivajinagar Pune 41105

The Topics covered are

1 Basics of Heat Treating.

2 Bulk Heat Treating and Case Hardening.

3 Advance Methods of Heat Treatments—Induction & Nitriding.

4 Heat Treatment of Tool Steels & Sp. Steels

5 Furnace types.

6 Methods of Energy saving during Heat Treating.

7 Vacuum Heat Treatments & Plasma

8 Inspection and Quality Assurance in Heat Treatments

K.C.Gogate
Education Committee

Advances in Surface Treatment Of Steels

The ever growing needs are:

1. Quality/Consistency/Reliability of process and products
2. Cost Reduction
3. Productivity /throughput increase
4. Equipment Uptime
5. Reducing chance of human error/better system design
6. Environment / Safety issues.

Advances or Improvements are result of :

-- Steady / continual improvements / Kaizan / Pokayoke
-- Breakthrough in technology

Advances typically can be in:

-- Process Technology
-- Equipment
-- Quenching Media
-- Instrumentation
-- Electronic Hardware and Software

More often the advances involve a combination of two or more factors given above.

Process Technology

1. Vacuum Treating
2. Plasma Treating
3. Thermal Spray Coating

-- Composites with cheaper substrate metal
-- Surface hardening on nano scale.
-- Processs capable of drastically reducing pollution/ carbon foot print and capable of producing parts not possible with previously used processes.

Vacuum Treating

- Initially developed for Tools/Dies
- now extended to mass produced automotive Gears
- Accurate control of the process
- Lower Cycle time due to higher process temperatures(higher diffusion rates)
- Clean process –no messy shot blasting
- Equipment can be put directly in the manufacturing line between pre- and post –machining machines
- Post HT operations may be eliminated/minimised

Plasma Treating

Plasma is the forth form of matter after Solid, Liquid and Gas.

1. Carburizing/Carbo-Nitriding/Nitriding
2. PVD
3. Multi-layer
4. Multi-component Alloying in random proportion
5. Capability for accurate process control
6. Can be done on finished parts –no post-HT machining.

Thermal Spray Coating

-- Thicker overlay possible compared with Plasma treatment
-- use of oxy-acetylene or other flame as carrier
-- good bonding with the base metal
-- wear-and/ or corrosion-resistant coatings can be given on cheaper substrate material
-- Metal mixtures of different compositions can be sprayed

Equipment

1. New Furnace Designs
2. Improved furnace Construction Materials
3. Improved Combustion Systems

Construction Materials

-- Ceramic Fibre blocks
-- Embedded Elecric Elements-Fibrothal
-- Graphite

Combustion System

In Gas Burners, the new self-recuperative burners have much better efficiency, and are compact. Also, with pulse firing system, UV flame sensors they give better uniformity and safety respectively.

Quenching Media

1. New generation quenching oils.

- Fast in 600-650 deg C for better core transformation and core hardness.
- Slower below 300 deg C for lower distortion
- Better base oil gives better oxidation resistance

2. Hot salt at 200 deg C

- Excellent distortion control.
- Fast heat tranfer can significantly improve ECD and reduce Carburizing Cycle time.

3. High Pressure Gas quenching with single gas or gas mixture-especially suited for Vacuum furnaces

Instrumentation

Modern electronics permits not only more precise process control, but also storing of established HT cycles(Recipes) and recording the real-time process data which can be retrieved, as an when required, without paperwork. It is possible to have the calculation of HT cost on ongoing basis thus; both the human error in setting the cycle and the labor of manual logging of the process parameters can be eliminated.

Software

Process Simulation is a powerful tool in predicting the outcome of any process quite accurately. Wasteful trial-and-error can be avoided. Also, on-line process control software can actually track the process through preset logic based on laws of diffusion and produce very consistent results with minimum scatter.

Diffusion Simulation Software

This works in three stages:

1. Sensing the instantaneous values of temperature and Carbon Potential
2. Calculation of incremental values of case depth based on laws of diffusion
3. Continued integration and updation of calculated total case depth

Distortion Control

Distortion is uneven changes in the dimensions. It is a manifestation of stresses.

Factors in change of dimensions:

1. Release of previous stresses.
2. Thermal stresses due to uneven cooling for different sections of a component.
3. Transformational stresses at different sections in the component
4. Differential stress levels in core and the case

Previous stresses:

-- Forming and machining both generate stresses.
-- Improper normalizing leads to retention of forging stresses
-- These are released during the reheating operation. This itself can give changes in dimensions

Thermal stresses

Quenching involves rapid cooling in a suitable medium.This also means a thermal shock. On top of this different sections of the component cool at different rate and time.

This leads to uneven stresses and therefore distortion

Transformation stresses

In case hardened part, the core has low-carbon Martensite and Bainite causing volume change of 1% max., but generally less than that.

The case develops high carbon Martensite giving volume change of approx. 4 %

Also, the Core transforms between 450 to 200 deg.C. whereas Case transforms below 150deg.C depending on alloying and carbon content.

Thus, when case starts transforming, Core is already transformed .This leads to setting up of uneven stresses.

Combination of the three stresses results in Distortion.

Changes in dimensions due to transformation in the form of Growth is normal. As long as the changes are predictable and consistent, they can be corrected in previous machining. But, some cases need better control of dimensions and geometry .

Minimizing distortion:

1. At steel selection stage, fine grain size will give lower distortion.
2. At pre-machining stage, proper normallizing /stress relieving
3. During machining, use of sharp tool will give less stresses
4. At Heat Treatment stage, preheating, control of final micro, choice of correct quenchant and agitation will minimize distortion.
5. Tempering after hardening will reduce the stress level and give stable dimensions.
6. Use of Press-or Plug-quenching can also be used for many components where dimensions are critical.
7. Use of Hot oil/hot molten salts/ Gas as quenchants can reduce distortion substantially.

The reasons for this are:

- Reduced thermal shock and hence, thermal stresses
- Equallizing temperature of different sections before case transforms.
- Splitting the thermal and transformation stresses on a time scale.
- Splitting stresses of Core-and Case transformation on a time scale.

Gas Quenching is at high pressure,but still may need modified chemistry for achieving required microstructure and properties.

More than 40 years in industry out of which 26 years in Bharat Gears Ltd.,

13 years as independent consultant. Since last year as Director Technical in Shrid Metal Technologies ,Pirangut

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S. G. Kulkarni 9881470716

Technical lecture by Mr.D.Paranjpe

A technical talk on Investment Casting by Mr.D.Paranjpe was held on 11th March 2013 at Sinhagad Institute of Technology, Pune for the production engineering students. The talk was well attended. Mr.Paranjpe gave a general talk on castings and went in details on the topic of investment castings. The students showed a lot of interest on the topic and this was seen in the question and answer session.

Know Our Members

P. Sesh Subramaniam

Mr. Sesh Subramaniam has been a member of ASM India from the year 1983 onwards and served ASM Pune Chapter in various capacities including Chairman. A technocrat, who has accumulated over 38 years of manufacturing experience in Auto component industry in both ferrous and non-ferrous based, Indian owned and multi national organizations. Key player in successfully guiding organizations from green field start-up to critical integration with parent company as a profit centre Head.

INDUSTRIAL EXPERIENCE: His major industrial experience includes Executive Director - India Forge & Drop Stampings Ltd. Technical Director at Amforge Industries Ltd. Pune(Mahindra Forge) Chief Operations Officer - at Kalyani Forge, Pune, Technical Director -at Ahmednagar Forgings Ltd., Pune in India (Amtek India); Chief Quality Manager- M/S Precision Metals Inc. Sandiego, USA, and Plant Manager-M/S Colorado Forge, Colorado Springs, in USA.& Project Head- at Modern Steel Ltd, Chandigarh.

QUALITY : A certified lean enterprise expert, total quality facilitator and participated in several improvement events during my tenure of working in U.S.A and India. He was responsible for introducing Toyota Production System, TPM/TQM and implemented in various organizations the quality systems for ISO-9002, QS-9000 and TS- 16949 as audited by TUV-Cert-West Germany, Underwriters Laboratories Inc. U.S.A, and DNV Netherlands.

Educational Qualifications

Technical: B.Tech - Indian Institute Of Technology, Madras, India (1966)

Management: Dip. Eng. Management - George Washington University Washington, U.S.A (1982)

Professional Courses & Accreditation

Lead Assessors Of Quality Management Systems - BS5750 - 1987/ISO 9000-2000 /TS 16949.

ALAN-A-GRIFFIN & ASSOCIATES. U.K

QS 9000 - Underwriters Laboratories Inc. (UL). U.S.A.

TPM - Confederation of Indian Industries. INDIA

TOYOTA PRODUCTION SYSTEMS - Toyota Motor Corporation, U.S.A

LAMCON FINANCE MANAGEMENT & SERVICES LTD. PUNE, INDIA - Finance Management

ASM Pune Chapter conducted a Training Programme on **Metallurgy for the Non Metallurgists** jointly with **Forging Industry division of ARAI** at their Training Center at Chakan. The programme was held from 7th to 9th March 2013.

The programme was attended by various Automotive Company employees totalling to 27 from North (Punjab and Haryana) to South(Chennai and Bengaluru)

The Faculty consisted of seven EC Members of ASM. The programme was appreciated by most of the participants as apart from the published Text, E C Members put their Practical Knowledge in the Field

I thank all the Faculty members and the ARAI FID Staff.

K.C.Gogate
Chairman- Education Committee

ASM Pune Chapter Welcomes New Members –

Mr. Ravi Patodia,
Managing Director,
Jagadamba Auto Components, Ltd.

Mr. Daulat J Shinde,
Indosculp Autcomp Pvt., Ltd.

Mr. Shrikant P Ghare,
Force Motors Limited

Mr. Kalagauda R Patil,
Maass Flange India (P) Ltd.

Forthcoming events-

Materials camp for students of 11th and 12th standards scheduled from 19th to 23rd May 2013 at Department of Metallurgy & Materials Engineering, College of Engineering, Pune.

Contact Sudhir Phansalkar on 9822209917 or Rahul Gupta 9423009829 for details & participation.

The students participate in various experiments in material testing, welding, foundry, and heat-treatment. Factory visits are also undertaken like Tata Motors, Emitec, ARAI etc.

The camp is free for all eligible students.

A training programme on heat-treatment is planned in June 2013.

ASM Pune Chapter annual day will be held on 15th July 2013.