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Silver Jubilee Year 1992 - 2017

ASM INTERNATIONAL
★★★★★ FIVE STAR CHAPTER

CELEBRATING 25 YEARS

ASM International, Pune Chapter
Chapter News Letter

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EDITORIAL...

Wishing all our readers a Happy, Healthy and Prosperous New Year – 2017.

We have completed 25 years of ASM Pune Chapter. This is well documented by Dr.P.G.Renavikar in his article. We had in our midst Mr.Jon Tirpak, Chairman ASM International, USA. He gave a very impressive talk on " Additive Manufacturing vs. Forging" Dr. Surojit Gupta gave a very inspiring talk on "Novel Structural Materials for Multifunctional and Sustainable Applications"

Our ASM EC Member, Mr.Vineet Marathe received the MCCIA Late Kiran Natu Udyojakta award for 1st generation successful Entrepreneur" for year 2016. We had 3 knowledge sharing meetings in the past 4 months. Our woman ASM member and Metallurgist– Ms. Jaswandi Gotmare was interviewed. A technical article on the evolution on the Rockwell Hardness Tester is incorporated, Courtesy : Forge Magazine . ...

HAPPY READING.

LOUIS VAZ

Editor

MILESTONE FOR PUNE CHAPTER

All of us are proud and feel elated as the Pune Chapter recently completed 25 years of its existence. It is really an important milestone in any organization's life, especially for the one like ASM which runs totally on volunteerism of its members. It needs to maintain the sustained enthusiasm amongst its members for sheer survival. Pune Chapter has not only survived but prospered and excelled in all activities and attained the distinction of dynamic and vibrant chapter globally.

The Chapter was inaugurated on 29th October 1990 by renowned industrialist Mr.S.L.Kirloskar in presence of Dr.H.M.Mehta, who brought ASM International to India by establishing India Chapter at Mumbai and later Chennai Chapter in Chennai. Mr Babasaheb Kalyani was the Chairman. He was assisted by Mr.C.V.Tikekar as Vice Chairman and Mr.G.D.Apte as Secretary. The chapter functioned with many activities like Technical talks and Training programs and generated good response for a couple of years but later went into the state of hibernation by 1995.

A few devoted members were pained with this state and decided to revive the chapter once again. They chose Dr.P.G.Renavikar as their leader and under his Chairmanship the Chapter was restarted with a bang by holding a big gathering in 1997 at Maratha Chamber of Commerce. Dr.R.A.Mashelkar was the Chief Guest who inspired the audience with his speech. Since then the Chapter has never looked back and went on attaining new heights in terms of membership, technical talks, training programs and national and international conferences and exhibitions. A team of dedicated and devoted members was developed who have

In this issue

since became a pillar of strength to the chapter. After Dr.Renavikar, Mr.Subramaniam took over as a Chairman in 2001, followed by Mr.Chris Dias. In this period, the Chapter won five 5 star awards consecutively for 5 years and 2 Chapter excellence awards instituted by ASM HQ in the U.S. The first Student Chapter of ASM-Pune Chapter was started at the Sinhgad Institute of Engineering and Technology, Pune in the year 2005. The second Student Chapter was started at the College of Engineering, Pune in the year 2006. The first materials camp was held in the year 2008. The materials camp has been a yearly event since then. For the last 5 years the Chapter is making excellent progress under the Chairmanship of Mr.B.R.Galgali and is maintaining the award winning tradition. In the year 2016 it won 3 awards in 3 categories.

Post the Silver jubilee year, the chapter has plans of expanding its reach among various technical professionals and associations. New areas of growth and expansion are being identified. A long range strategic plan is being worked out to focus the attention on these aspects. Efforts are on to leverage the opportunities offered by Government's new initiatives like Skill Development and " Make in India". So the future is challenging and exciting for ASM in India. With a good rapport built with the local Indian chapters as well as the ASM HQ in the past few years, Pune Chapter is looking forward to attain higher and higher goals and help the Materials Engineering community in and around Pune area.

.....Contributed by Dr. P.G.Renavikar
(past Chairman of ASM, Pune Chapter)

TRAINING PROGRAM ON FAILURE ANALYSIS

A three day training programme on 'Failure Analysis (Including Engine Components)' was held at ARAI-FID, Chakan, Pune, from 30 November to 02 December 2016 in association with ASM, Pune Chapter .

Faculty and Participants at the training programme

The objective of the programme was to understand the theoretical aspects of stress failure modes, fracture mechanisms and applying this knowledge to a number of failures, so as to build the expertise over a period of time. The training programme was designed to cover the theory as well as practical aspects of Failure Analysis.

The course covered three principal topics of interest viz Procedure analysis, Failure mechanisms, and forms of failure in product & components. Causes of failures were explained with easy to understand discussion on stress application and distribution. Various case studies of failure and their elimination were discussed.

A Session in progress

The faculty members selected for each topic are experts in that field and brought along a rich experience of theory and application of this theory to systematically resolve failures.

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ASM International Pune Chapter
Guruprasad, 37/4/A, 6th cross Lane, Prabhat Road, Pune 411004, Maharashtra, India.
Phone #: 91 - 020-25674455 / 0808.
E-mail: asm.pune@gmail.com
Web: www.asmpunechapter.com

ADDITIVE MANUFACTURING VS. FORGING

A Technical Presentation & Networking with Jon D. Tirpak, PE, FASM and President, ASM International, USA " On Additive Manufacturing vs. Forging" was held on 15th Oct 2016 at Pride Hotel, Pune.

Jon Tirpak's Presentation

Mr Tirpak started his presentation with the question *"Is additive manufacturing a threat to forging?"* The presentation identified the known current direct digital manufacturing technologies which compete with forging part manufacture and forging die manufacture. The presentation also identified the activities surrounding this technical community. He also touched on different Additive Manufacturing technologies available to produce metal parts. Whether or not these parts will compete with forgings remains to be seen. He concluded by saying that As fit-check prototypes, perhaps yes; as fatigue resistant, fracture tolerant parts, perhaps no.

Jon Tirpak explaining some finer points

The networking was very cordial, with Mr. Jon Tirpak mingling with the attendees and even obliging with photographs with some of them

KNOWLEDGE SHARING

As part of our Knowledge Sharing initiative of ASM, Pune, Chapter, ASM Pune Chapter hosted three such events.

"CHALLENGES IN LIGHT WEIGHT STRUCTURAL STEELS FOR AUTO APPLICATIONS"

This event was held at ASM International Pune chapter office, on **Wednesday 21.09.2016**

The session was conducted by Mr Avinash Arankalle "Faculty and Consultant in Engineering Materials".

Mr. Arankalle with a vast knowledge and experience in the automobile field, spoke at length with practical examples on the subject. The talk was very much appreciated by the participants.

METAL JOINING WITHOUT RIVET

A knowledge sharing meeting was held at ASM International Pune chapter office, on 19th October 2016. The topic for the event was “Metal joining without rivet "; and the speaker was Mr Shirish Vaidya - Technical Director, TOX® PRESSOTECHNIK (INDIA) PVT. LTD

Mr. Shirish Vaidya giving his presentation

Data Analysis/IOT & Business Intelligence

As part of our knowledge sharing, ASM, pune Chapter conducted a meeting on "Data Analysis/IOT & Business Intelligence" at ASM International Pune chapter office, on16th November 2016. The eminent speaker was Mr. Aniruddha Mayadeo, Co-Founder and Director, CALIBRION INFOTECH

Mr. Aniruddha Mayadeo with Mr.B.R.Galgali

NOVEL STRUCTURAL MATERIALS FOR MULTIFUNCTIONAL AND SUSTAINABLE APPLICATIONS

ASM International Pune Chapter and Indian Institute of Metals,held a lecture on “Novel Structural Materials for Multifunctional and Sustainable Applications” By Surojit Gupta, PhD Advanced Materials Research Group, Mechanical Engineering Department, University of North Dakota, USA at ASM Office, Guruprasad, 37/4/A, 6th Lane Prabhat Road Deccan Gymkhana Pune 411004. on Wednesday 28th Dec 2016.

Dr. Surojit Gupta presented research findings on three different areas of materials research: (a) MAX phases (novel natural laminates) and their composites, (b) novel sustainable structural materials, and (c) green and additive manufacturing.

Dr. Surojit Gupta with Mr. B.R.Galgali at the end of his lecture

Recent results on the mechanical behavior of MAX and their composites were presented. Dr. Gupta explained that there is a huge potential for these materials, as they can be used for different tribological and engineering systems, for example, air-foil bearings, gas turbine seals, cylinder wall/piston ring lubrication for low-heat rejection diesel engines, various furnace components, among many others.

Recent studies about the development of novel sustainable materials, like the development of green cements were presented. Novel practices for enhancing green manufacturing (GM) and additive manufacturing (AM) were also discussed.

Technical Article
HEAT TREATMENT DRIVES EVOLUTION OF ROCKWELL HARDNESS TESTIING

Unlike the Wright Brothers, Hugh Rockwell and Stanley Rockwell were two engineers working for the same company who shared nothing more than a common last name and an interest in developing a better type of hardness test, specifically to test the hardness of bearing races.

The year was 1914, and both Rockwells were employed by the New Departure Mfg. Company of Bristol, Conn., a maker of automobiles, as well as ball bearings for automobiles. As is so often the case, the mother of invention was necessity to develop a better method. Brinell was too slow, not good for small-radius, curved surfaces or hardened steel, and it also used a large indent that caused sample destruction. For hardened steels, the Scleroscope test was usable but quite difficult. And a third option, the file test, provided no data beyond go or no-go.

Together, the two Rockwells pursued a testing machine method that could measure indentation hardness via the application of a minor and a major load. They applied for a patent that took nearly five years to win approval. By then, both men had left New Departure and went in different directions. However, Stanley Rockwell continued to refine the design and focus on heat treatment of metals. He presented his test during the 1922 convention of ASM's predecessor, the American Society for Steel Treating, and the Rockwell method of hardness testing gained acceptance throughout the steel and metals industry.

Calibration blocks and indenter in a protective wooden box

Rockwell Hardness

The efficiency and range of the Rockwell process, and its ongoing refinement since the '20s and into the digital age, has made it the most widely preferred and used method for hardness testing. Hardness is somewhat of an elusively defined material property (and not to be confused with hardenability, a measure of potential, or toughness, which in metallurgy means resistance to failure under sudden or impact loading).

Given the existence of so many metals with so much hardness variance and that testing is so critical to quality control of metal material advantages, Rockwell has become the go-to method for commercial hardness testing answers. One big reason is that its test results can offer a reliable sense of the yield strength of the material. Another is that hardness testing can aid in comparing property differences of two materials. Lower hardness usually means higher ductility and lower yield strength plus the potential for premature wear. Higher hardness equates with more brittleness and higher yield strength.

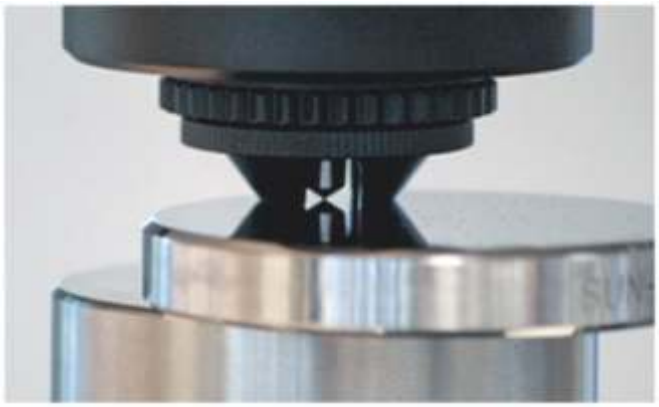
According to Daniel Herring, author of Common Pitfalls in Hardness Testing, “Hardness testing is arguably the most common quality-control check performed throughout industry. It is often used to determine the success or failure of a particular heat-treatment operation or to accept or reject material. Hardness testing is thought to be one of the easiest tests to perform on the shop floor or in the metallurgical laboratory, but it can be one of the hardest tests to do properly.”

Herring identifies Rockwell as “used for testing ferrous and nonferrous materials, which have been annealed, hardened, tempered or case hardened, sheet materials in heavier gauges and cemented carbides. Rockwell Superficial is used where lighter loads are required such as testing thin case-hardened surfaces, decarburized surfaces and sheet material in thin gauges. Microhardness tests are used for very small,

intricate shapes, thin parts and for case-depth determination."

In Rockwell testing, a material's resistance to being indented is evaluated by a steel ball or a diamond cone (the latter is known as a Brale indenter). If the material is known to be exceptionally hard, it is better to use the diamond cone to ensure the steel ball does not get deformed. The steel ball is preferred for all soft materials (those testing less than HRB-100). Since there are no hardness units, Rockwell assigns values in a series of scales (30 in all). In each scale, the higher the number, the harder the material.

The most commonly used Rockwell scales are "C" and "B." The B-scale is used for softer materials (such as aluminum, brass and softer steels). It employs a tungsten-carbide ball as the indenter and a 100-kg weight to obtain a value expressed as "HRB." The C-scale for harder materials uses a diamond cone and a 150-kg weight to obtain a value expressed as "HRC." There are several alternative scales for other purposes. Refer to ASTM E18 to determine the correct Rockwell hardness scale to use. The scale is typically based on case depth and sample size.



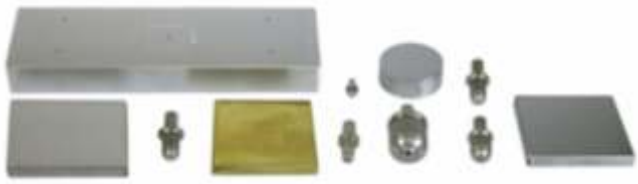
A fixture holds a calibration block in place during testing.

Rockwell Superficial Hardness

A second test, Rockwell Superficial hardness, is for use with thin, smaller, or more delicate or surface-sensitive samples. It employs significantly reduced loads. For instance, in a standard Rockwell test, the minor load is 10 kgf and the major load is 60, 100 or 150 kgf. In a Rockwell Superficial test, the minor load is 3 kgf, and the major load is 15, 30 or 45 kgf.

Tinius Olsen's FH-2-0 tester is used for Rockwell and Rockwell Superficial test

There are numerous applications involving a broad spectrum of metals where high hardness numbers are desired. For instance, the American Iron and Steel Institute identifies nearly 100 different grades of tool steels. More often than not, various heat-treatment processes are employed to increase the metal's overall hardness because hardness nearly always is a measure of heat-treat performance. The most typical heat treatments include: stress relief, modification cold-worked material, development of physical properties in solid-solution alloys, change in surface composition and development of special characteristics.



An assortment of Rockwell and Rockwell Superficial indenters and test blocks

It is important that those involved in part design work closely with those doing heat treatment and hardness testing in order to minimize cracking at various stress locations, such as notches, sharp corners and variances in the thickness of sections. Too much cool down of the material can contribute to cracks. In matching a hardness level to the intended application, it is important to keep temperature ranges in mind. You do not want one in which tempering leads to less toughness of the metal. Distortion is another risk, so

always bear in mind machining allowances. Finally, stress relief is worth specifying right on the part drawings.

Hardness Documentation

Measurable results and verifiable documentation at every critical step has led to improved accuracy in measurement, improved data collection, and enhanced overall monitoring and control of the hardness testing process. Rockwell and Rockwell Superficial hardness testers typically come with advanced digital-control interfaces for serious precision and at-a-glance presentation of critical data. When conversion between different types of hardness scales is critical, hardness testing software usually has that capability built right in. For instant or ongoing comparative analysis, a wide range of reports is easily generated.

Conclusion

Stanley Rockwell and Hugh Rockwell would be humbled to see how vital a quality-control technology their original invention has become, especially for testing the hardness of metals that are heat treated. They would also be amazed at how many innovations have taken place in the ongoing refinement of the Rockwell process. As long as materials engineers are seeking new advantages in properties and performance, the evolution of Rockwell testing will continue unabated.

Author: John Kraus,
U.S. sales manager, Tinius Olsen

"Article Courtesy : Forge Magazine
http://www.forgemag.com/

MCCIA LATE KIRAN NATU UDYOJAKTA AWARD

Our EC member Mr Vineet Marathe received the "MCCIA Late Kiran Natu Udyojakta award for 1st generation successful Entrepreneur" for year 2016.

The award ceremony was held at Tilak Smarak Mandir, on 6th October 2016

Mr. Vineet Marathe posing with the award

WOMEN METALLURGIST SPEAKS

An interview with our ASM member, Jaswandi Gotmare.

JASWANDI GOTMARE

What part of your job do you like most?

Failure analysis – either for customer complaints or for plant issues related to supplier parts.It demands, and also gives me opportunity for, rigorous cross referencing, thorough understanding of individual part's functioning as well as loads coming on it in the systemand insight of part manufacturing process.

What is your engineering background?

As a teen my dream was to be a Medical Doctor..During my higher schooling I fell in love with physics. That changed my passion to engineering. After completing my graduation in Metallurgical engineering, I started working in foundry as methods engineer. Very soon I realized the gap between actual practices and education acquired so far.So I decided to pursue post-graduationin Process Metallurgy - study of different manufacturing processes, metallurgy associated with them and characteristic defects.

Post-graduation prepared me not only with fundamental subject knowledge but also imbibed habits of cross referencing, literature review and ability to deep dive in what you do.

This is helping me a lot in my current job profile.

What attracted you to engineering?

It is the physics associated with engineering that fascinated me. And once I started practicing metallurgy, it is the 'magic' in material that makes me still attached to this field. We need components hard for wear resistance and also sufficiently soft for machinability.Similarly we need material with high strength but with low weight, recyclable and low cost etc.

How many people do you work with?

I manage a small core team of three 'critical mass' for day in and day out activities.

But being the global material support facility, actually working with representatives of different functions including product engineering, plant quality, supplier quality, reliability and CAE engineers across the globe.

If a young person approached you for career advice about pursuing engineering, what would you tell them?

'Listen to your heart and if it calls don't hesitate to pursue engineering. It's a wonderful experience! But don't stop at being only engineer, be an innovator'!

What are your Hobbies:

Learning, Reading and Astronomy

Which is the Last book you read?

I love reading nonfiction Marathi books. Recently I read 'AdharmYudha' by Girish Kuberwhich details about spread of terrorism.

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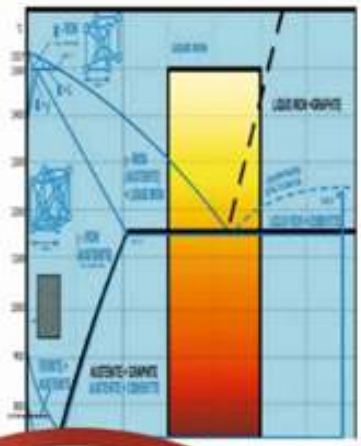

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