



Chapter News Letter



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EDITORIAL . . . ✍



Yathish Rao

Dear Readers, it's my pleasure and I think I am fortunate to write an editorial for ASM Pune Chapter. First of all, wishing all the readers a Happy Diwali.

In last four months Pune Chapter has conducted many activities.

In addition to the saying that if India is to develop, education must reach its villages in order to support & develop the students who are from the rural area schools, ASM Pune chapter conducted the Students

Outreach Program focusing on the metallurgical field every time. As a part of this program a technical lecture on "Opportunities in metallurgy" had been conducted at Government Polytechnic Pune. I heartily congratulate Mr. Rahul Gupta and Mr. DG Chivate for conducting this program smoothly.

Material failure is a major concern at any time, and it is not new that to be a good designer one must know the design failure mode. In this regard, a technical article on topic "Case study- A Failure Analysis of Semi Float Axle shaft- Incipient Melting Analysis" will throw light on the analysis methodology using latest metallurgical techniques and I am sure this will not fail to hold our readers attention. We are proud to say that this technical article was presented at the ASM IMAT 2021 Symposium at St. Louis.

Besides this, we had two technical talks, one in August and one in September.

Dr. Kaustubh Kulkarni, an associate professor from IIT Kanpur delivered a technical talk on topic "Multicomponent Diffusion Studies: Applications in High Entropy Alloys and Titanium Alloys" and I am sure this talk had brought back memories of college days for all the audience.

Another very interesting lecture was delivered by Mr. Kashinath D Deodhar from ARDE Pune on the subject "Advanced Defence Technologies and Materials" which you will read about in this newsletter.

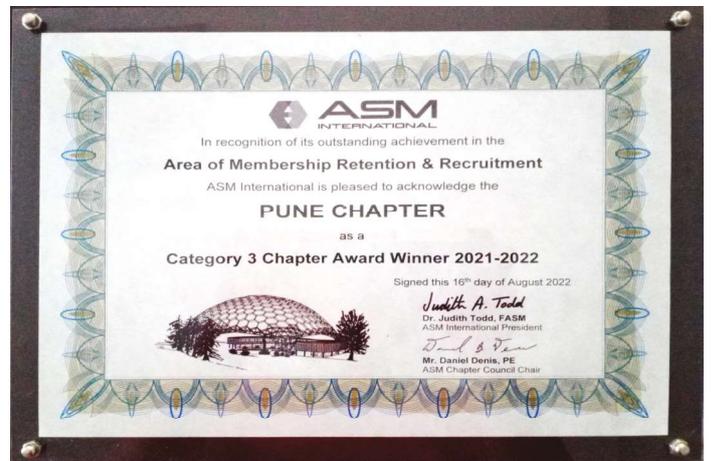
Under the column "Women in Metallurgy", we are pleased to introduce Dr. Sujatha Pushpakanth, VP/Research head at Bharat Forge. Her career path & success story would encourage many women students who are pursuing a career in metallurgy or material science.

In upcoming events, we have three technical talks - one in November and two are in December.

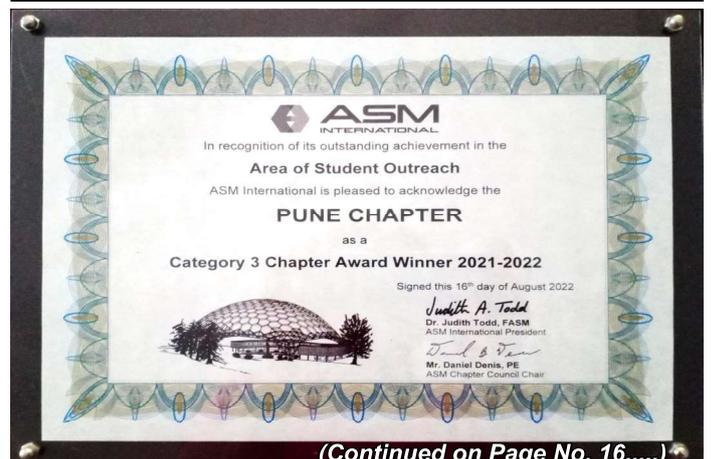
Finally, I request all the readers to encourage and continue your esteemed support to this magazine so that this magazine would become more fruitful in coming days. My heartfelt thanks to all the gentlemen and ladies who have worked tirelessly to bring out this issue out, I wish may this magazine see a bright future in days ahead.

Happy reading!

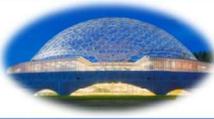
Editor - Yathish Rao



ASM 2021-22 Award Winner Pune Chapter



(Continued on Page No. 16.....)



CHAPTER NEWS

The Students' Outreach Programme targets students who are disadvantaged educationally and economically, who enrolled in rural area schools that have low college going rates and who need assistance in strengthening basic metallurgical skills. This program academically supports services that raises the aspirations and improves the academic performance of students.



As a part of the Students' Outreach Programme ASM INTERNATIONAL PUNE CHAPTER conducted a lecture on 'Opportunities in Metallurgy' at Government Polytechnic Pune on 15th October 2022 by Mr Rahul Gupta and D G Chivate. First and third year Students of Metallurgical Engineering Diploma students participated 60 nos.

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Technical Article

Case study- A Failure Analysis of Semi Float Axle shaft- Incipient Melting Analysis

Paper ID-ASM-IMAT2021-53236

Introduction

Quality of an axle shaft is very inevitable as this member is one of the most vital members in rear drive semi float axles. Premature field failure with in 1000 kms run made to suspect on quality of axle shaft. Fracture location & mode of failure was identical in all the field returned shafts as shown in figure-1. Upon the fracture analysis found that the crack is initiated from the core, propagated towards the case indicating the Incipient melting at the core. High temperature at core could cause the incipient melting at the core as case cools faster than core. Defect generation study was carried at supplier facility at the forging temp & repetitive heating at that temperature. Defect generation is evidenced by the morphology change of MnS inclusion from stringers to globular and also grain size was ASTM No. zero. Supplier was educated on the subject & preventive action been laid off by introducing the robotic automation in the machine so that repetitive heating will not occur.

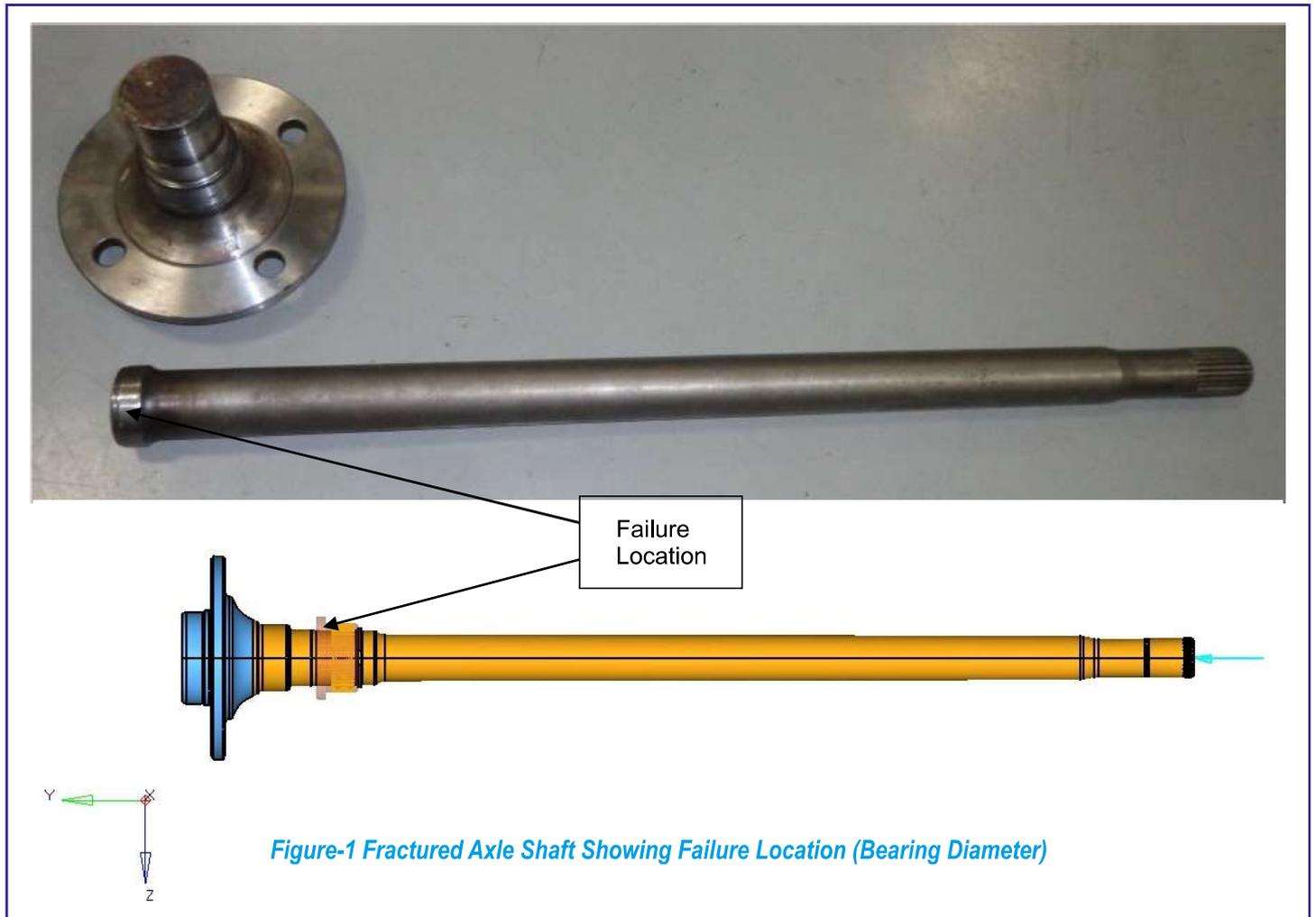


Figure-1 Fractured Axle Shaft Showing Failure Location (Bearing Diameter)

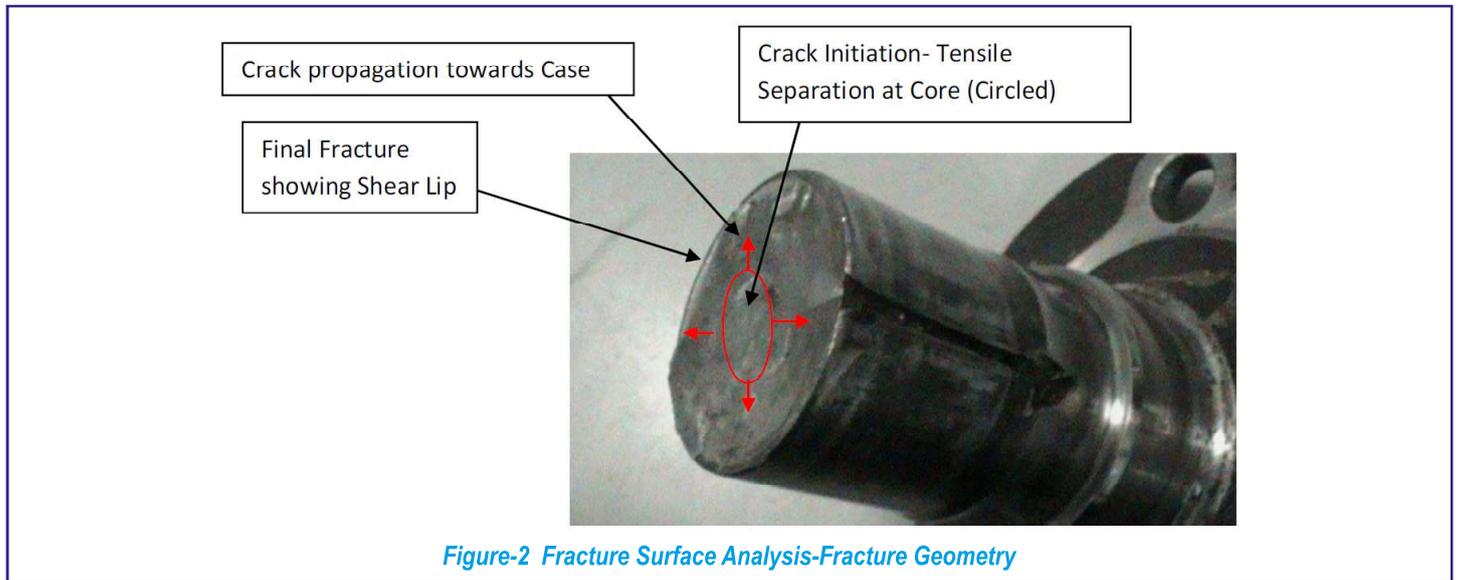
Typically medium carbon manganese steel is used to make such semi float axle shaft as the fatigue life requirement is sufficient to meet the warranty specifications. This axle shaft is typically used in small vehicles having GVW 1 to 4 ton.

Fracture Analysis [1] [2]

Visual Macroscopic- The fracture analysis conducted on the field returned axle shafts. The visual observation was the shaft fractured in the bearing journal region. The fracture surface appears typical of tensile separation initiating



from the shaft core as shown in figure-2 & propagated towards the case. No evidence of a bending overload or rotating bending fatigue was observed as no ratchet marks seen. A small shear lip was observed around the entire circumference of the shaft suggesting the surface or case was final fracture.



Scanning Electron Microscopic Analysis [3]

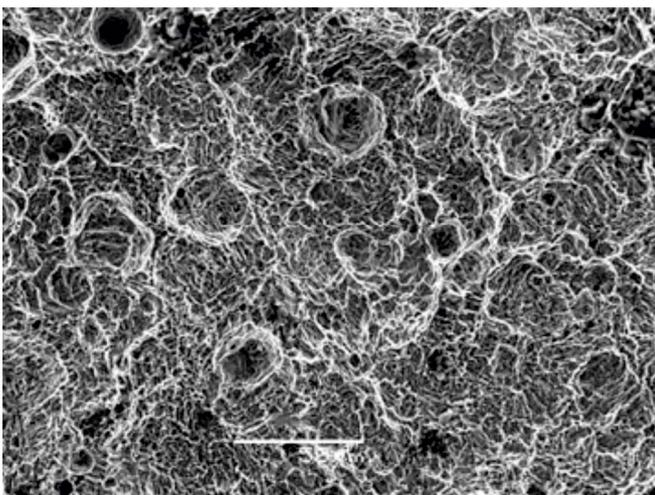


Figure-3-Equiaxed ductile dimple morphology at Case.

The shaft fracture surfaces were examined using scanning electron microscopy. The shaft surface is induction hardened case region of the fracture surface exhibited predominantly round & equiaxed ductile dimple fracture morphology as shown in Figure 3. The shaft core fracture surface exhibited a mixed intergranular and transgranular cleavage fracture morphology, see figure 4.

Micro structural Analysis-

The core microstructure in the region of fracture exhibits an extremely coarse prior austenitic grain size as large as ASTM number zero with banded sub grain structure of pearlite and ferrite as shown in figure-5. The micro tears were present within the core on each side of the fracture

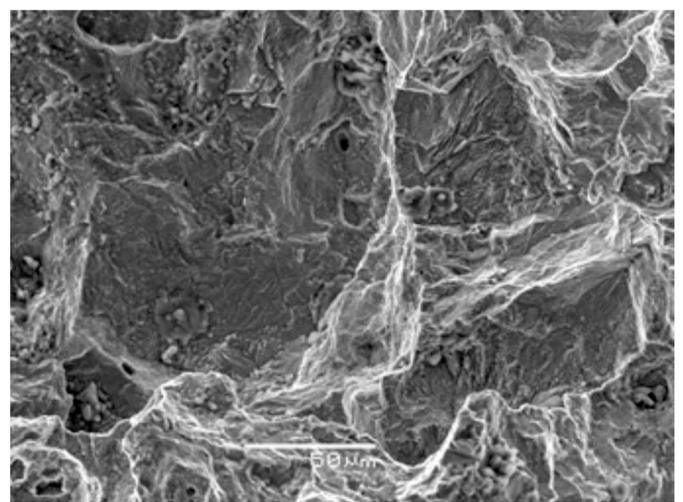
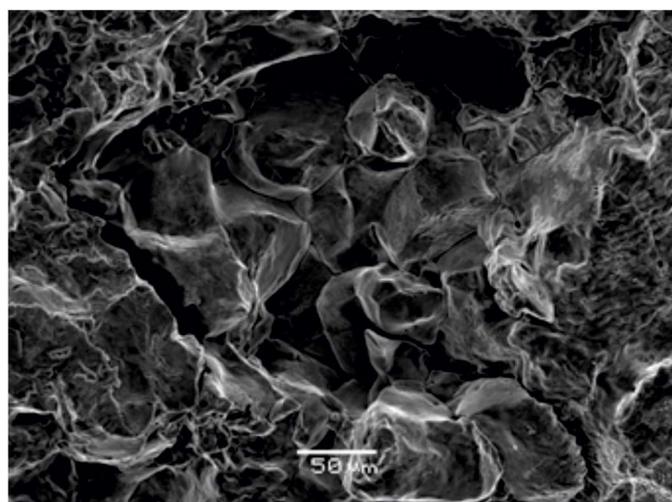


Figure-4-Core showing intergranular (left) and transgranular (right) fracture morphologies.



as shown in fig-6. The micro tears were oriented normal to the axial length of the shaft indicating they were tensile tears. Tears were observed along the prior austenitic grain boundaries (PAGB) as well as across the grains (transgranular). Tears were visible away from the fracture surface as well & with the frequency and size of tears increasing closer to the fracture location. These tears are opening up during some point of the manufacturing

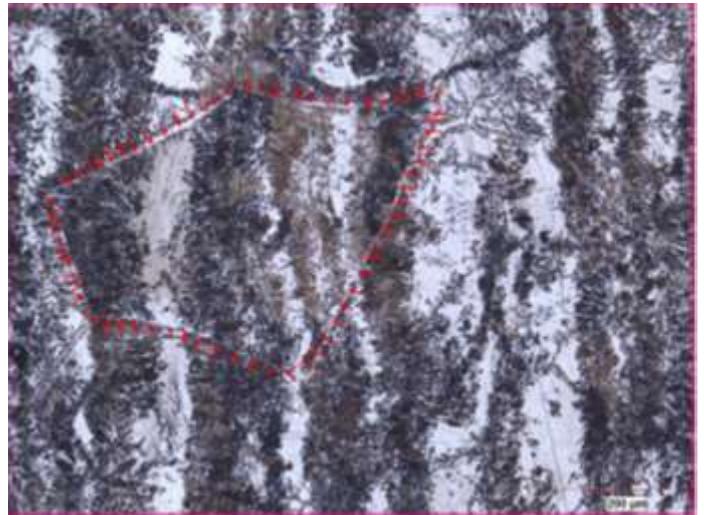
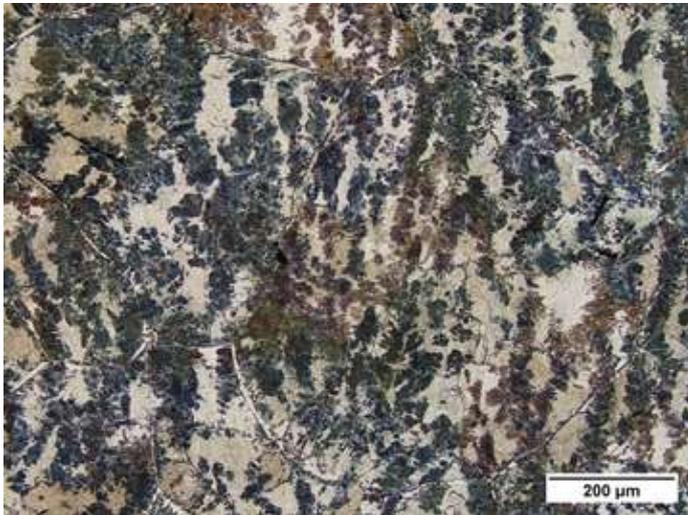


Figure-5-Fracture with prior austenite grains ASTM No. 0.0. (PAGB identified by red arrows).

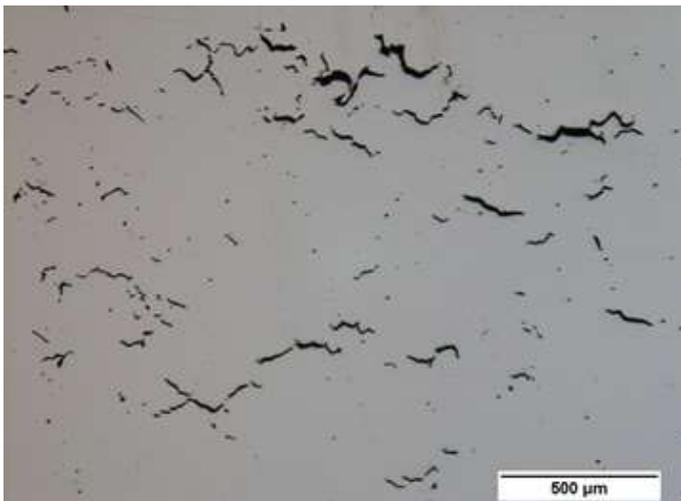


Figure-6- Micro tearing within the core near the fracture region (Left). Etched micrograph showing grain boundary tears and incipient melting (Right) (identified by red arrows)



Figure-7-As-polished micrograph showing globular MnS morphology with some incipient melting associated with the MnS inclusions (Left). Etched micrograph showing globular MnS inclusions precipitated along the PAGB.(identified by red arrows)

process or due to loading within the axle assembly. In addition to the coarse grain size and tensile micro tearing, incipient melting was visible along the PAGB and associated with some MnS inclusions as shown in figure-6. The MnS morphology was also observed to be globular and precipitated along the PAGB rather than elongated stringers that would follow the rolling or forging grain flow as shown in figure-7. All of these features, coarse prior austenitic grain size, incipient melting, and globular rather than elongated MnS inclusion morphology are indicative of overheating during the flange forging operation.

Remaining metallurgical evaluation such as heat treatment analysis does not show any deficiency in metallurgy.

Based on the fractography, it is evident that, the shaft fractured on the bearing journal between the retaining ring and the bearing locations. The fracture morphology is consistent with a tensile separation initiating within the shaft core. Coarse grain size, incipient melting, and tensile micro tearing were observed within the core microstructure at the location of fracture. Coarse grain size and incipient melting are attributed to overheating during the flange forging process

Root Cause Analysis

Ishikawa diagram (fish bone diagram) is plotted considering possibilities for the failure as shown in figure-8. Upon the analysis two root cause found mentioned below,

- 1) Lack of operator awareness causing the set up approval repetitive heated part put on the good part process line- As a preventive action proper operator training is conducted, importance of the operator job explained. Separate bin identified, rejected with Red colour code as shown in figure-10
- 2) Repetitive heating of forging part causing the incipient melting. Robotic automation is implemented as poka yoke - initial set up part is once heated would fall off the machine to rejected bin.

Typical major forging process flow is as below,

Raw Material → Blanking → Forging in MGM machine → Normalizing → Machining → Induction Hardening & Tempering → Grinding → Final Inspection.

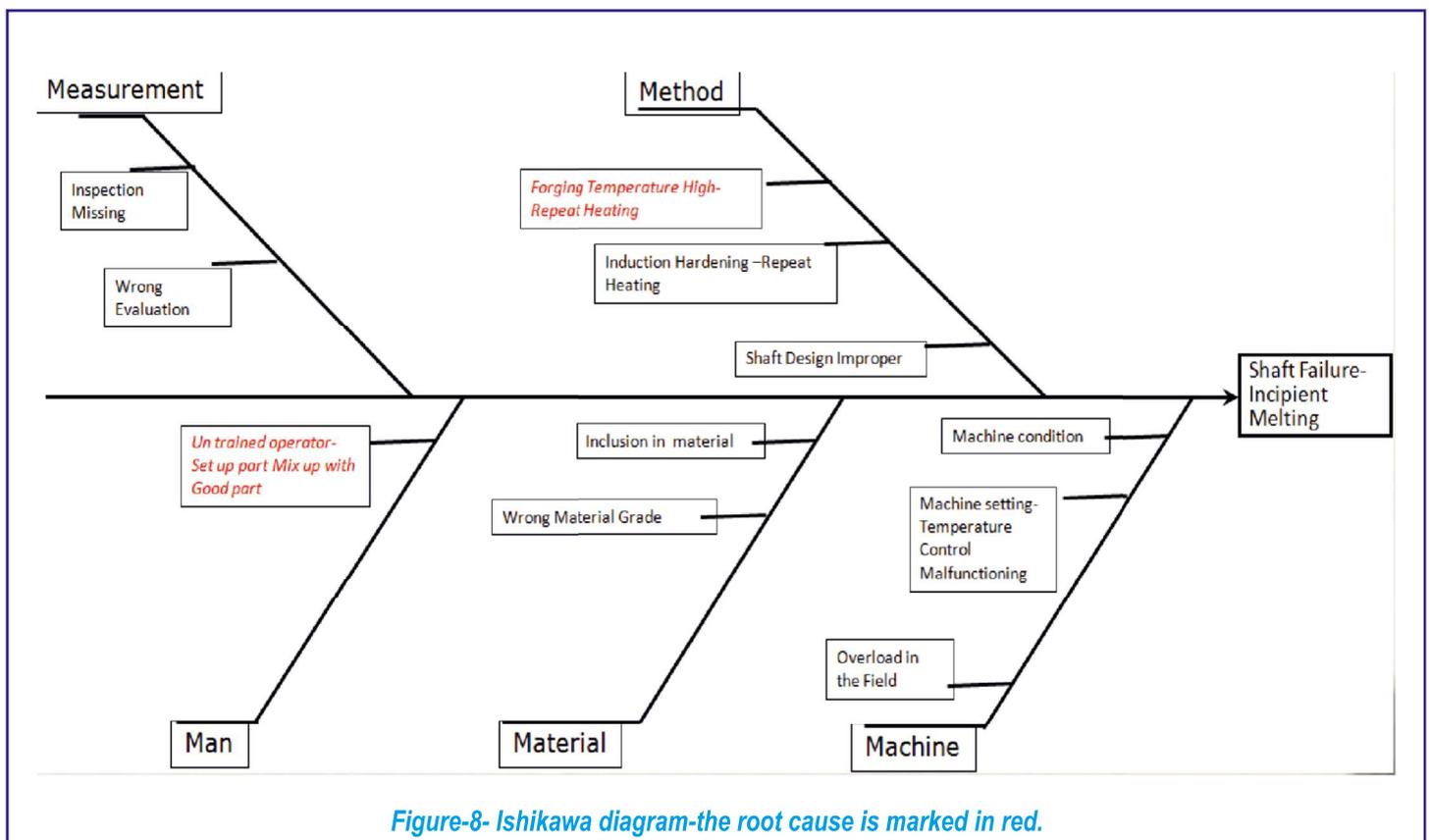


Figure-8- Ishikawa diagram-the root cause is marked in red.



Generating the Defect- Design of Experiments [4]

Two batches are processed batch A consist of 3 samples & batch B consists of 3 samples. Batch A is processed at normal forging temperature 1250 Deg C at material gathering machine (MGM). Correct quality process specification followed. The hot bulb formation was proper as desired at this temperature as shown in figure-9. Batch B samples were processed with deviation considering the repeat heating of part without allowing them to cool room temperature. After few seconds of power off, restarting the power while the part is at red hot condition. This exercise repeated for 3 times. The hot bulb was looks slightly elongated in its dimension observed visually. The online pyrometer showing the set forging temperature but temperature at the core could have extremely high causing the incipient melting at the core. During this repeat heating, by giving some interval to heating, surface cools faster than the Core. Repeat heating phenomenon makes the surface cools faster than the core. Hence Reheating would cause overheating condition at the core.

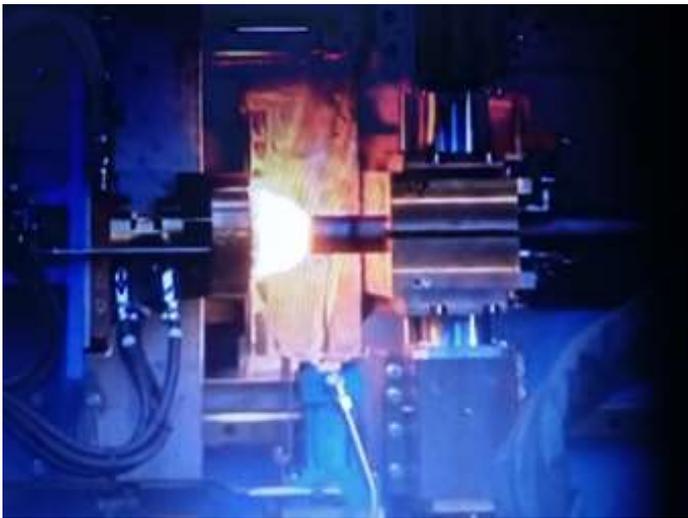


Figure-9- Batch-A-Hot Bulb Formation in MGM machine (Left). Batch A Good Part in the Correct Bin with identification



Figure-10-Set up Approval Part kept in Sperate Bin identified as Rejected with Red colour code

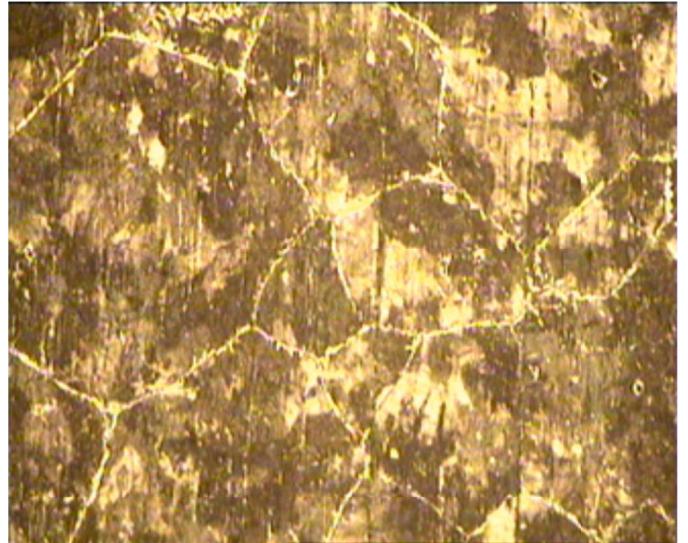
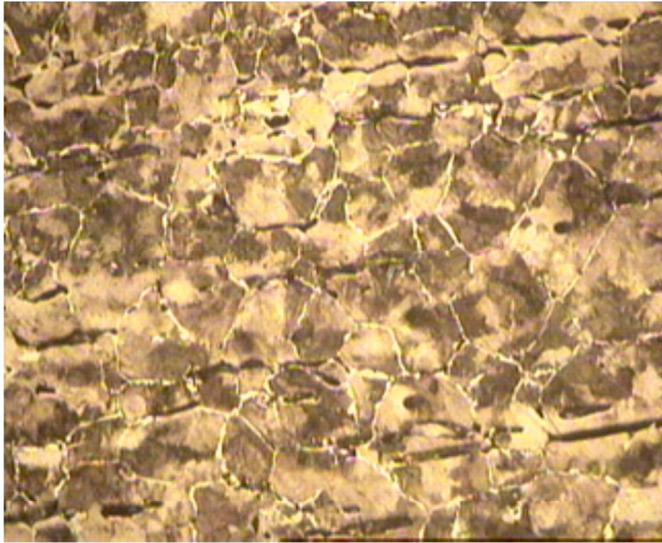


Figure-11-Batch A Microstructure Grain Size ASTM No.6 & Batch B Microstructure Grain Size ASTM No.Zero (Indicated by Red Arrow)

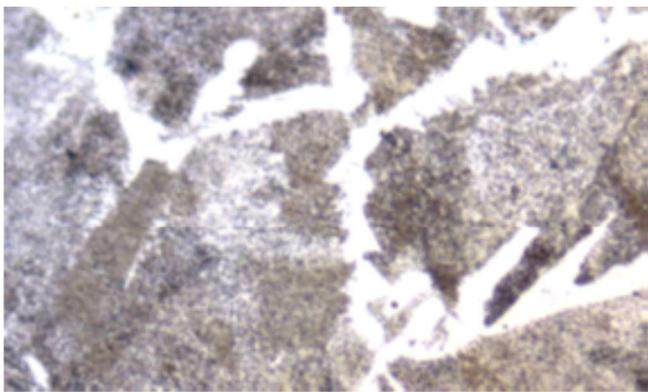


Figure-12- Globular MnS inclusion at the PAGB (Indicated by Red Arrow)

Metallurgical Evaluation of Batch A & batch B Samples [5]

Both the batch A & batch B samples are subjected to metallurgical testing particularly for incipient melting indicators namely grain size, globular MnS inclusion. Batch A samples do not find any metallurgical deficiency however the batch B samples observed coarser grain size, Globular MnS inclusion precipitated at PAGB as shown in figure -11 & figure-12. This evident that the repeat heat treated part causes the incipient melting or grain boundary melting resulting to early premature failure.

Summary & Conclusion

In this particular case study semi float axle shaft failure analysis was discussed. The fracture analysis conducted with latest available metallurgical tool. Also learned that no NDT method could detect this incipient melting defects. Ishikawa diagram prepared helps in understanding the root cause. Defect is generated & evaluated metallurgically. Action plan to arrest such root cause was implemented in process. Incipient melting phenomenon was addressed with proper defect re-generating & confirm methodology. Field failure analysis was addressed with proper design of experiments & fracture analysis.

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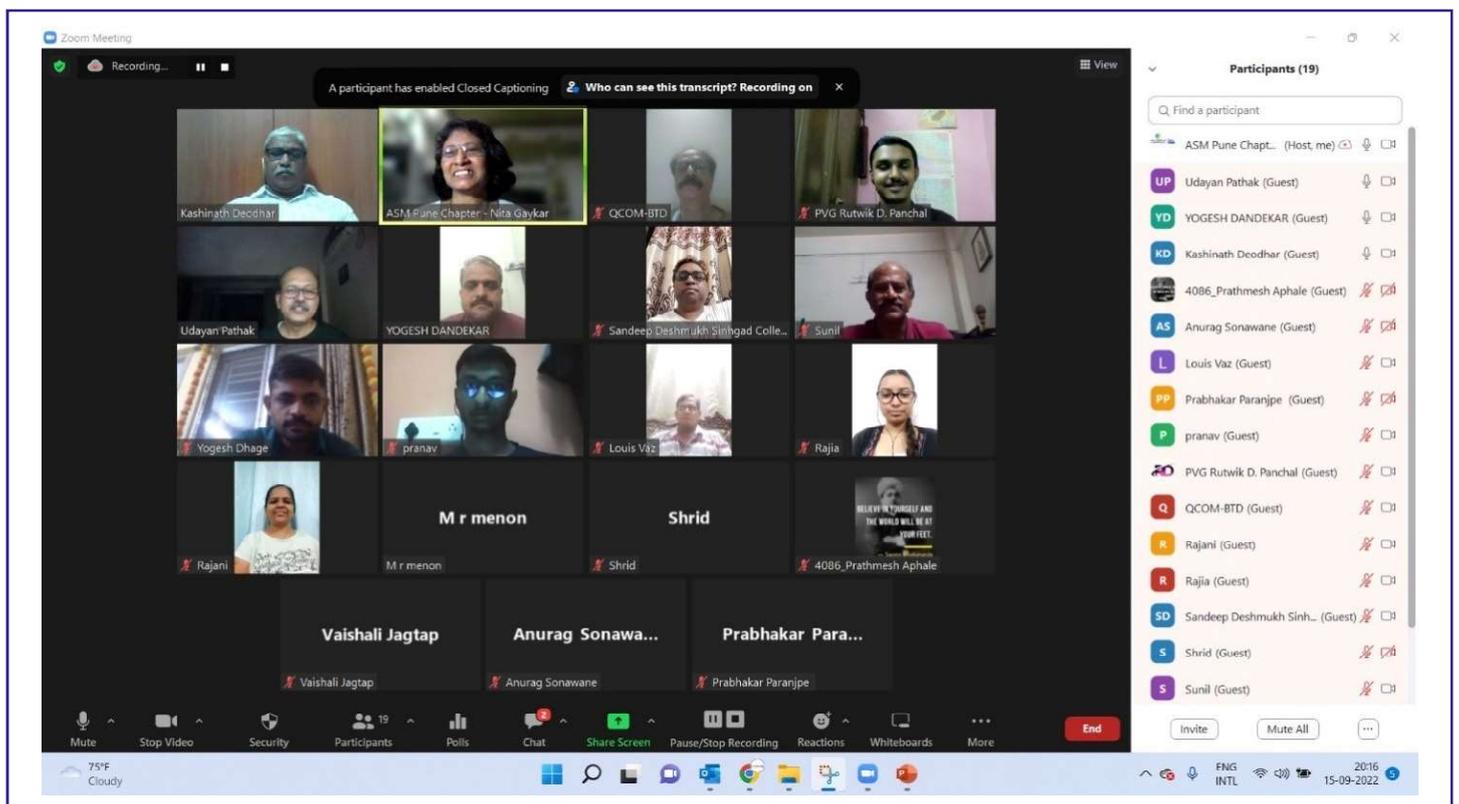
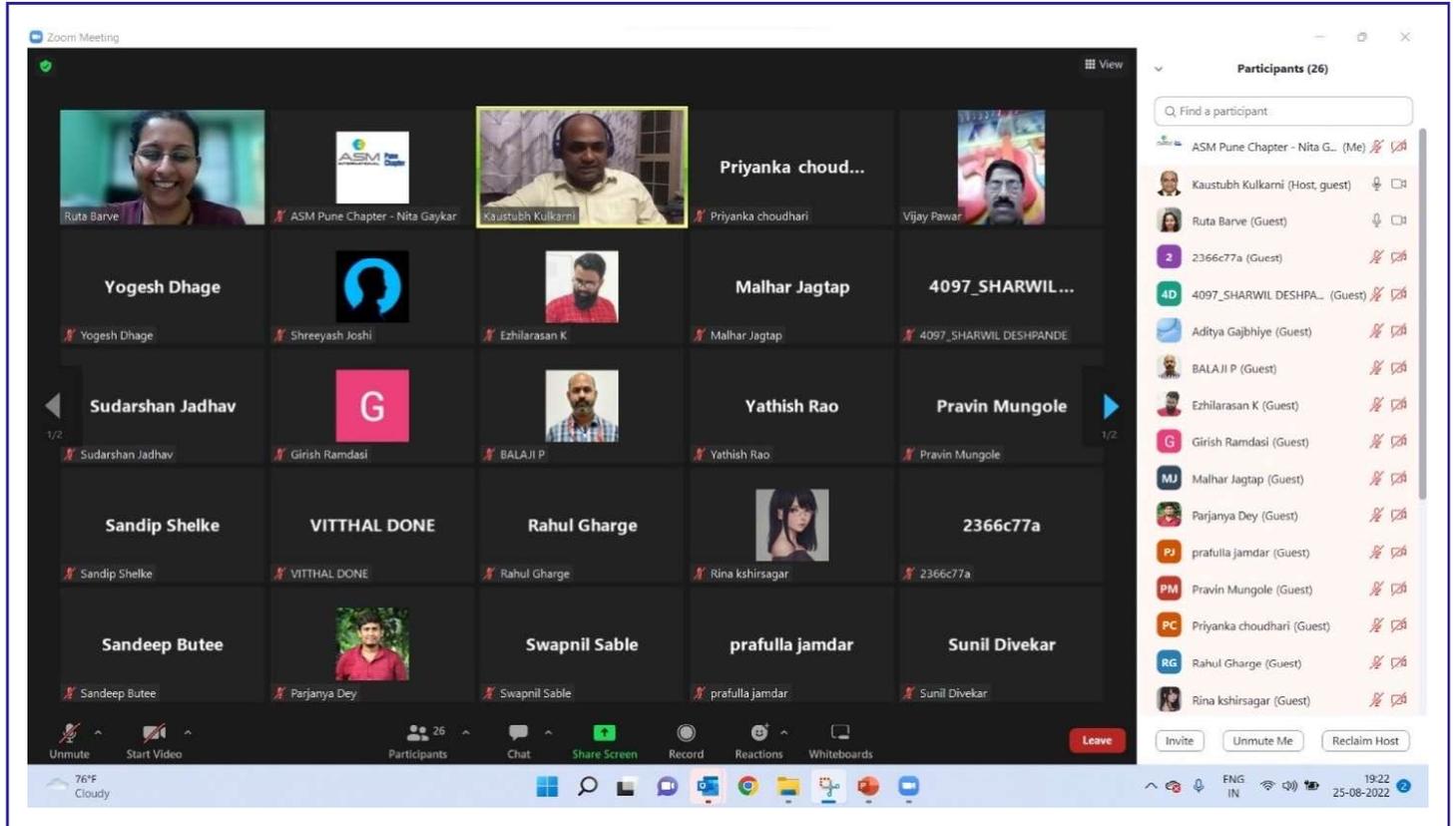
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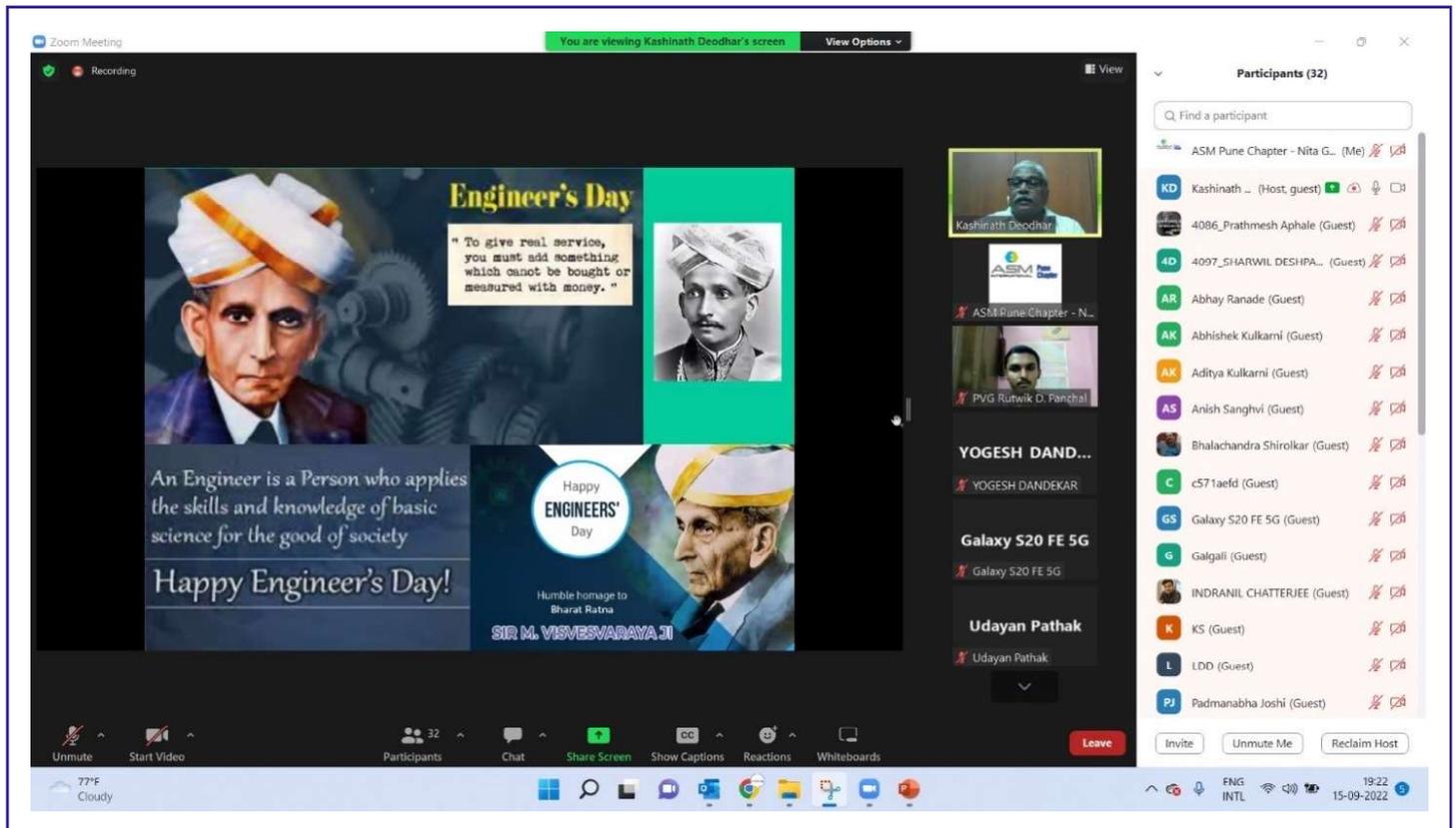
Technical Talk

Advancement in materials technology is important not only at academic level but also with regard to its application to industrial development. On this topic, Dr. Kaustubh Kulkarni, an associate professor from IIT Kanpur delivered a technical talk on 25th August 2022 on the topic 'Multicomponent Diffusion Studies: Applications in High Entropy Alloys and th August Titanium Alloys' with a few practical examples.



After a brief review of multi-component diffusion, he explained the significance of diffusion interaction and application particularly for titanium alloys. Prior to joining IIT Kanpur, Dr. Kulkarni worked in the Automotive Research Association of India and in GM Global R&D, Bangalore.

Another very interesting topic was delivered by Mr. Kashinath D Deodhar from ARDE Pune on the subject 'Advanced Defense Technologies and Materials' on the 15th of September 2022. Mr Deodhar, was working as Senior Scientist, Group Director (retd) ARDE, Pune a premier Lab of DRDO and joined Armament Research & Development in 1982. He is currently working as Honorary Prachar Pramukh, Paschim Maharashtra Prant unit of Vijnana Bharati, an all-India organization known as Swadeshi Science movement of Bharat.



He explained the various materials used in defense applications particularly with respect to ballistic, armament and missile technology, and quite mesmerized the audience with this mesmerizing topic.

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Women in Metallurgy

- 1) **Dr. Pushpakanth, you are the technical director and Vice President at Bharat Forge for over 8 years now. Please tell a little about yourself and your experience.**

My Background: With 25 yrs. of Industrial experience and an Education background: PhD (Chemistry/Material Science), University of Madras (2005), M.Tech (Polymer Sci. & Technology), Anna University (1996), M.Sc. (Applied Chemistry) Anna University (1995), B.Sc (Chemistry), University of Madras (1993)

Awards: International Young Scientist's Refereeing Programme for Biomaterials 2006, (Liverpool).

Publications: Published papers in National & International Journals-10 papers
Filled US Patents- 3 patents

Granted US 1 & Royalty 1

Filled India Patents- 17

Granted Indian Patents-4

Communicated papers in International Journals conference proceedings-1

Attend International Conferences-5

Reviewed International Journal Papers-15-25

Interest: Reads lot of Magazine, interested in gardening and wildlife and Travel Expro in TV channels

My BFL Experience: Technical Director (New Product Development)

Technical Staff, with different background (PhD in Metallurgy, PhD in Chemical Eng., PhD in Chemistry (Catalysis), M.Sc Physics (Nanomaterial & Instrument), M.Tech (Mechanical) M.Tech. in Energy Storage, PhD in Chemistry (Energy Storage & Testing) & B.Tech (Design)



Dr. Sujatha Pushpakanth

- 2) **What made you choose Metallurgy/ Materials Science as a career?**

It's not a matter of metallurgy/material science, I would love to work on different field and as well learn and understand the concept towards application, this made me to work in material science.

I've always tended towards the science side of engineering, really understanding how things work, how things interact with each other. In the metallurgy field/material science, you're almost designing metals and materials. You're saying I want it to perform in this way, I want it to be this dimension and look like this. How do we get there? How do we produce metal in such a way that it meets all of the desired requirements? It's what I love to do, understanding why things behave in the ways that we see.

One of the other things I love about working here is that we get involved in every aspect of a business. We go from working with customers to clarify their specifications to designing the process that's going to go through the shop floor and how we're actually going to make it. How can we produce the product that the customer wants? So, it's the full spectrum really, really, from concept to working with customers to get to the precise product they need for their particular application.

- 3) **What projects have you worked on up till now? Please elaborate on the projects you are working on at the moment.**

➤ Implementing New Technology in production line and Product development with all global centers as well



cross vertical business Lines (Energy-storage system- Battery Technology, like Lead Acid, Li-Battery, H2 Fuel cell and Fuel Cell Technology & Hydrogen storage.

- Forging Lubricant for Automotive parts
- Light weighting Technology: (Aluminum, Magnesium, Zinc & Carbon Fiber)- towards Automotive Industry, Coating Technology toward Oil & Gas, die life improvement in terms of Tribology, Clean Energy- for BS-IV & VI, i.e. Know the Know how knowledge and Technology for manufacturing catalyst and coating the catalyst on honey comb ceramic substrate for reducing the CO2 & Nox application. And jointly working with the customer for validation of the catalyst as well play a role of Techno-commercial in generating business.
- Feed stock development for MIM & CIM, and powder technology for permanent Magnet and Coating technology, where we can reduce the rare earth material in motor applications towards EV Vehicle.
- 3D printing technology for Metal and Ceramic for intergraded application and light weighting technology for Automotive and Non-Automotive Application
- As well working on carbon fiber composite for Hydrogen storage application Type III & Type IV, thereby the design will be for class III and reduce the size of cylinder/storage tank and by storing Metal Hydride, working Fuel Cell Technology (Hydrogen Fuel Cell & Hydrogen Storage Tank), where the MEA is the key factor of focus, with and without PGM loaded catalyst. Fabricating the complete fuel cell based on the required application.
- Leading team of Dynamic R&D Professionals to Collaborate, Co-Create and Deliver Innovative products for various business.
- Identification of Business Trends and Strategic Planning to deliver sustainable growth for the Category
- Co-ordination with internal / external stakeholders to identify new technologies, Products to meet the market requirement.
- Project management. Technology transfer from lab to pilot plant and finally to commercial scale
- Ensure best safety practices in R&D department and Pilot scale production.
- Working with business teams to support overall requirement of business from technology point of view.

4) Your research is focussed on commercially viable projects. Can you explain a few of them which are related to research in Materials Technology?

- Some of my projects has been implemented from R & D to manufacturing, the product has gone for commercials. E.g. Light Weighting (MMC, Metal & Ceramic Feedstock for Metal Injection Molding (MIM) & Ceramic Injection Molding (CIM) Application for manufacturing various small critical parts, e.g.: Fuel Nozzle, Spinal fixtures etc.
- Energy storage System -Lead Acid battery has been commercialized in 2020 in brand of Kalyani Nano enriched lead acid battery- till now we have sold around 5000 batteries- this is due our Nano technology.
- Graphite Lubricant-Waste to wealth area: we have converted the waste of the forging lubricant (called Sludge) to actual forging lubricant application and we have executed the project to establish the manufacturing unit and there by saved INR 10Cr to the company, now we have established the complete unit, where zero wastage has been applicable.
- In forging industry, we have established the coating on the die and there by improved the die life by 4X times and the production is grown to 4X improvement, the technology has been implemented in the plant. One die for 4yrs followed by design the tooling as per coating.



- In Light weighting sector: Aluminum metal Matrix composite, where we have designed our own master alloy and established different grade of Al-MMC alloy from 7XXX to 4XXX series, there by improved the mechanical properties from 15%-20% for Automotive components and developed a part for Battery casing and motor housing, where the thermal conductivity required as per customer is 190 (W/(m · K)) but we got 240 W/m.K and we have the capability to design the alloy based on its application and now working on Mg MMC composite, Carbon Fiber Composite based on different application.
- Working Fuel Cell Technology (Hydrogen Fuel Cell & Hydrogen Storage Tank), where the MEA is the key factor of focus, with and without PGM loaded catalyst, the design of Bipolar plates with our design and material selection based on the application, i.e. Mobile or Stand by.
- Regarding Hydrogen Storage tank: Work on with complete design, Validation for type III & IV, with metal composite and carbon fibre based composite.
- Working Magnesium based alloy for Automotive Application and followed by coating technology to improve the corrosion resistance- for suspension & wheel parts.
- Developed Mg based nano-composites for trauma and other surgical applications such as implants - bone plates, screws.
- Stabilized and the complete process line for catalyst, pilot scale for Application in Formulation
- Redesigned the facility for catalyst coating technology Unit for After Treatment system and developed by my team.
- Developed a polymer composite for Leaf Spring for Automotive, light-weighting technology.

5) What new developments do you see emerging in the materials sector?

There are many new development, which can be seen in the future market in terms of material science and we are mainly focus towards opportunities in EV, Energy, Light weight Technology.

6) What advice will you give for women pursuing a career in metallurgy?

A Women is born with multi talent by GOD gift, as an example, we have to take care family members, children career, home management, she has handle different task at one-go. The same way she has to balance work –life.

The Second point: I think mentorship is a really important thing, in fact I have mentor, who supports me. When you can stand firm in your beliefs and your abilities the worries will fade. To get more young women into engineering, we need to share with them that these concerns are normal and you can push past them to reach your goals.

I'd say, don't be afraid to walk into that room meeting room alone. You might be the only female in a room of 20 Top Managers & engineers but you can't be afraid. You've got to step up, show that you're just as capable. Women are far more prepared and far more researched than they realise. So, you just have to go for it. Don't let people doubt you.

Yes, as a woman you're going to be different, you're going to stand out, but that shouldn't be a problem, it shouldn't hold you back. Just be confident in who you are and go after your goals.

My last advice to female employees, don't ever give up in your career nor in your family, try face it and learn how to overcome it, each and every step will be a learning and turning point for you in life and career path, you will enjoy the real value once you achieve it...look into opportunities towards applications.

Thanks for giving me an opportunity to open up my thoughts!

ASM Pune Chapter was awarded at ASM's Annual Leadership Awards Luncheon

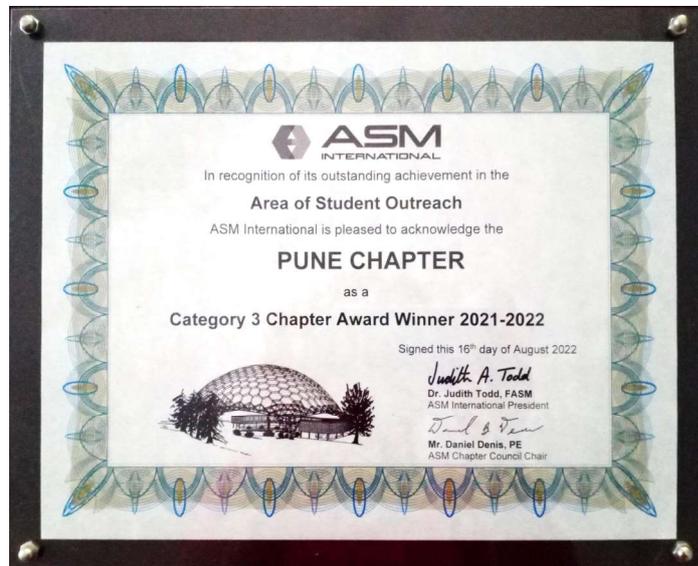
ASM Pune Chapter was awarded at ASM's Annual Leadership Awards Luncheon on 12th September 2022 at New Orleans Convention Centre, in recognition of its outstanding achievement in area of Student Outreach and Membership Retention & Recruitment. Pune Chapter was recognised as Category 3 Chapter Award Winner for 2021-2022.

In the area of Student Outreach, Pune Chapter was recognised for starting Two New Materials Advantage Chapters with Approved Charter, signing of MoU with Government Polytechnic and Engagement of Student Members in Professional Chapter activities. Dattatreya Chivate, Chairman, Students Outreach & Udayan Pathak, FASM, Chairman worked with continued focus on enhanced Women Participation, Students Outreach, Knowledge Sharing and Collaborations. The tireless efforts of students outreach committee resulted into formally starting Two New Materials Advantage Chapter, one each at Govt. Polytechnic Nagpur (20 Members) and PVG College of Engineering Pune (39 Members), with approved charters, taking our MA chapter membership to 104. A special task force was formed which identified various needs of Govt. Polytechnic Nagpur, more specifically those needs which can be catered and supported by ASM Pune Chapter. A MoU was signed between Govt. Polytechnic Nagpur & ASM Pune Chapter through which Pune Chapter agreed to support in Organising lectures for admission aspirants Materials Engineering with Rural (underprivileged) areas online technical lecture series, education, support for providing Faculty Development Programs recommending & volunteering Persons like Board of Studies Examiners, support for industry We further strengthened our Polytechnic Students of edition. The initiatives taken sustaining but in expanding our 400% plus MA membership growth just in one year.



Materials Camp, introductory about career prospects in special focus on students from and women students, arranging guidance for career and higher internship & job opportunities, (Teachers Camp), ASM Members as Resource (BoS), Expert Lectures, External visits, through ASM network etc. ASM Lecture Series for Maharashtra by conducting third helped the chapter not only in Students Outreach activities, by

IN the area of Membership Retention & Recruitment, Pune Chapter was recognised for the sustained initiative - 'Motivate, Engage, Involve, Retain, exposure and attract new members', with special focus on giving an exposure to young/new member members in ASM Pune Chapter events & programs, resulting in more than 300 % Membership growth within Two Years. We adopted various innovative ways to recognise our members, like Welcome E-mail & membership benefits documents, Chapter Memento, Nomination continuation on various Govt. Bodies, as Resource Persons, Member recognition in AM&P, Member article in AM&P, Know our Member in Chapter News Letter, New Members Introduction, Technical Talk by young and new members, Membership Renewal Drive, Women @ Materials Engineering. All these efforts paid dividend by sustained YoY increase in membership, Impressive 300% growth in 4 years.



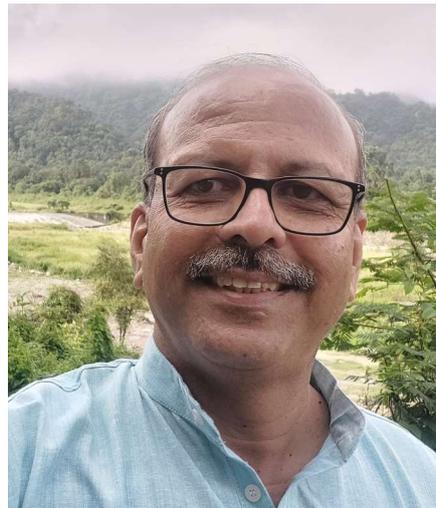


From Chairman's Desk

Festive Greetings!

I am glad to inform you, this year due to increased membership, we are elevated to class three category of ASM Chapters. This is a unique two step jump from class one. Probably we are the first chapter worldwide to achieve this. This was possible only due to support from all of you and hard work done by our Executive Committee Members. number in membership helped us steps, at the same time, we Corporates as Chapter Membership Development target of taking our Chapter Membership to 50. I appeal all of Development Committee. Let us at least one new member this

Keeping the tradition of Awards Chapter bagged Two ASM Outreach and Membership Chapter Category 3. We got many award-winning veteran strategizing our activities, which expectations but will also fetch Chapter Awards. Ruta Barve, joint secretary, received Chapter Awards on behalf of all of us.



Udayan Pathak, FASM

While on one side increased to move up the ladder by two realised we are missing many Sustaining Members. Our Committee has taken challenging Sustaining (Corporate) you to support Membership pledge, each one of us will bring year.

winning, this year our Pune International Awards – Students Retention & Recruitment in these awards competing with chapters globally. We are re-

not only meet your needs and ASM always takes efforts to develop Chapter leadership. One such effort is Leadership days. This year our Joint Secretary Ruta Barve attended the leadership days in USA.

We are again reverting back to off-line mode for technical programs. We appeal to join us for these offline events for more effective interactions. We are looking forward to many events & visits by ASM International Trustees and Office bearers which are lined up in the near future.

Best Wishes!

Up coming Tech-Talk

November'22	Materials in Defence Research	V V Parlikar	17-11-2022
December'22	Manufacturing Excellence - Siemens	Pranoti Joshi	15-12-2022
December'22	Magnesium Forging & Material Characterization	Medha Jambhale, Dr. Ajit Babu & Prasad Phale	29-12-2022



ASM International Leadership Day Conference - By Ruta Barve

Every year, ASM International arranges a Leadership Day Conference in US which a Leader from every Chapter of ASM International across the globe attends.

Due to Covid-19 pandemic this conference was conducted in virtual mode for past couple of years. This year the conference was organized in person mode at New Orleans Conventions Centre, New Orleans, Louisiana, US on 12th September 2022. Pune Chapter nominated me to attend this conference and represent Pune Chapter. It was an excellent Leadership Day Conference. The conference was attended by EC members of Chapters from India, China, Sweden and various states in USA. In the conference there was a keynote session on “From Joining To Belonging – Driving Member Engagement”, then a discussion session on “diversity & inclusion” and a brain walking session on “to identify solutions to common challenges faced by chapters across the globe”. There was a ASM Leadership Awards Luncheon where ASM Pune Chapter was recognised with 2 Awards for its outstanding achievement in area of Student Outreach and Membership Retention & Recruitment. The conference was ended with a business meeting in which New President, Sr Vice President & Vice President officially took over from their predecessors.

Although from this Leadership Day conference, there are many takeaways for me, the primary takeaways are :

- 1] Effective use of social media platforms for introducing new members, announcing events / Tech Programs
- 2] Opportunities for more micro or ad-hoc volunteering
- 3] Having increased ad-hoc networking events for chapter members
- 4] Use of Podcasts / YouTube Videos by collaborating with sister chapters
- 5] Use of incentive system for students to join & attend the MA chapters

Having shared these, the key benefit for me was to meet & network with other chapter members.



Cleanliness Analysis for Contamination Estimation

Particle Size Analysis System

- Fully compliant with the latest standards (ISO 16232)
- Automatic system with complete filter paper scanning , classifying non metallic , metallic and fiber particles and measuring their size.
- Options with stereo and metallurgical microscopes .
- Measurement of height of particle.
- Easy to use and quick to perform.
- Report Development According to user requirement.
- Access to measured particle data for further data processing



Model - CLEAN-EST

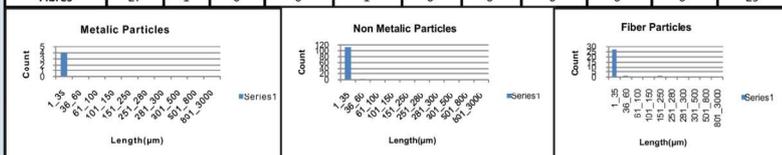
PARTICLE TEST REPORT.

Customer	ABC		
Part No:	A124N	Recd Date:	04-Jun-18
Report No.:	1672	Department :	QA Lab
Sample ID:	ABC	Test Date:	05-Jun-18
Analysis:	Particle	Standard Specification:	As per ISO 16232
Magnification	100X	Filter paper Size:	47 mm
No. of Fields :	5	Scanning Area	30 mm



Particle Size Analysis

Size ranges(µm)	1_35	36_60	61_100	101_150	151_250	251_280	281_300	301_500	501_800	801_3000	Total Count
Metallic	4	0	0	0	0	0	0	0	0	0	4
Non Metallic	111	3	0	0	1	0	0	0	0	0	115
Fibres	27	1	0	0	1	0	0	0	0	0	29



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