News Letter

July 2021

ASM International Chennai Chapter

Executive Committee

Address for Correspondence

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Chairman's Message

Season's Greetings

Dear Members,

Firstly, I would like to wish you all a belated happy new year. I wish you a safe and healthy time ahead for you, family and business in 2021 after the lock down and difficulties we had during 2020 with novel Corona virus spread and Covid 19 pandemic situation. During 2020 and First-half of 2021, due to lockdown and denial for mass gatherings by Government, we have transformed to digital media for conducting many events. In this 3rd Newsletter in the series for the period, I am delighted to inform you that we were able to conduct many online technical talks in association with the IIM CC. All these talks were delivered by specialists from various national and international academic institutes and industries, like: Caterpillar India, Technical University of Denmark, Schafeffer Group, Belgium, I.I.T Madras, Punjab Engineering College, Chandigarh, Fluidtherm Technology Pvt Ltd, Chennai, Lincon Electric India, IIT Madras, Wagner High Quality Lubricants, Germany, International Advanced Research centre for Powder Metallurgy& new Materials etc. I wish to record my deep sense of gratitude and profound thanks to all the speakers in taking part in ASM Chennai Chapter activities. I also express my sincere thanks to Dr Venugopal Shankar, Mahindra & Mahindra and Dr Niyanth Sridharan, Manager, Consumable R&D team, Dr. Uma Batra, Professor & Head, M & M Eng. Dept., PEC, Chandigarh for contributing technical articles for the current Newsletter.
Live Training Sessions with Thermo-Calc was organized by Prof. K. C. Hari Kumar, M&M Dept. ASMICC, IIM & IIT Madras in collaboration with Bhanu Scientific Systems., Hyd. & Thermo-Calc Software AB, Sweden, during 24-28 August, 2020 for 25 participants from academy and industry. In this issue, past Chairmen Mr V.L. Sridharan shared his valuable experience for the growth of ASM International Chennai Chapter in an article. Prof. M. Kamaraj, ASM Chennai Chapter Chairman has been selected as Member of the nomination committee of ASM International, USA for 2021. I am delighted to share that our past-Chairman, Dr U. Kamachi Mudali who is currently Vice Chancellor, VIT Bhopal University has been elected for Trustee of ASM International Board for a term of three years (2021-2024). I assure you that the present committee will do our level best to take our chapter to greater heights. Thank you for your continued support and we look forward to working with you in 2021 and years to come. Yet again, after an year of pandemic, we find ourselves dealing with an unprecedented situation due to the second wave. The impact of the COVID-19 pandemic this time is highly intense for all of us – affecting our families and our way of life. I am appealing to all members to be safe and stay at your place protecting yours and the family's health in good condition, and follow the guidelines of Government to continue to wear the mask, maintain social distancing, and get your self and family vaccinated at the earliest.
Stay safe, stay healthy !

Dr. M. Kamaraj

Office Bearers of ASM International Chennai Chapter

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Maxwarm Engineering

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Ambattur Heat Treaters

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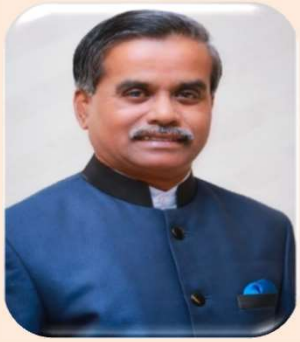
Caterpillar. Ltd

Mr. D. Ravikumar
Stanadyne India

Dr. Shubrajit Bhaumik
Wagner Lubricants

Honours and Achievements of Chapter Members

ASM International Chennai Chapter is proud and honoured for the selection of Dr. U. Kamachi Mudali, Past Chair, ASMICC as Board of Trustee (2021-2024) at ASM International, USA.



Hearty Congratulations

Dr. U. Kamachi Mudali is Vice Chancellor of VIT Bhopal University, and formerly Distinguished Scientist, Chief Executive & Chairman of Heavy Water Board, Mumbai during 2017-2020. Dr. Mudali successfully managed seven plants located at different parts of country, for the production of heavy water and specialty materials. Dr. Mudali is in World's Top 2% scientists in materials field from India, with 465 Journal publications, 5 patents, and 9300 citations with a h-index of 43. Dr. Mudali has co-edited 20 Books/Proceedings, and is Editor-in Chief of IIM-Springer Book Series, Associate Editor of Journal of Electrochemical Society of India (ECSI). He has also guided/coordinated 162 students for their UG/PG/PhD project works, including guiding 12 PhD students of HBNI University. Dr. Mudali has delivered 265 honour lectures in India and abroad. Dr. Mudali is a Fellow of 12 societies including ASM International, USA in 2013, and a Honorary Member of IIM and UDCT Alumni Association, Mumbai.

Dr. Mudali was the President of the Indian Institute of Metals (2019-20), the biggest national metallurgical and materials society in India. He has occupied leadership positions in ECSI, Bangalore; NACE International India Section; Indian Institute of Chemical Engineers, MRC; Governing Council of Indian National Academy of Engineering; East Asia Pacific Area of NACE International, USA; and, Chairman of ASM International, Chennai Chapter (2015-17). Dr. Mudali was a Visiting Scientist at Germany, Japan, UK, Israel, Bulgaria, France, and has visited leading Institutions in USA, China, Russia, Singapore, and Malaysia. Dr. Mudali has occupied responsible positions in: DAE-ICT Centre; Committee on Strengthening Recycling of E-waste, NITI Aayog, GoI; MTD24-Corrosion Protection and Finishes Committee of BIS; Confederation of Indian Industries-Corrosion Management Committee, Chandigarh.

Dr. Mudali has received Distinguished Alumnus Award from IIT Bombay where he did M.Tech. Corrosion Engineering in 1984; and, from PSG College of Technology, Coimbatore where he did MSc (Materials Science) in 1982, in addition to : Homi Bhabha Science and Technology Award, National Metallurgists Day Award, GD Birla Gold Medal, Tamilnadu Scientist Award, VASVIK Award, Indian Nuclear Society Medal, Frank Newman Speller Award from NACE, USA, Distinguished Faculty Award of HBNI, MASCOT National Award, ONGC Corrosion Excellence & NACE Meritorious Corrosion Awards, Distinguished Achievement Award from ASM Chennai Chapter.

My 25 years Journey with ASM International Chennai Chapter

Shri V.L SRIDHARAN, Past chairman, ASMICC

I have had a long association with ASM Chennai Chapter and it is difficult to put my journey with ASM into a few words. I believe that it is only because of people like you who encouraged and supported me that made me to be a part of the ASM family all these years. Your cooperation and love has motivated me to deliver my level best to coordinate and interact with people and to some extent make the ASM Chennai Chapter vibrant for few years. I visited ASM HQ in Ohio several times to attend Leadership Days and was delighted to received our chapter excellence awards. I am happy that during my tenure we could get the 5 Star award every year.

I created a ladder in the chapter executive office bearer system so that everyone gets the opportunity to become Chair and also get recognised & motivated. That system today gave good power and motivation to all newcomers to give their best to mention few like Mr. Shankar, Dr. Bakshi, Dr. Sushanta etc. I arranged ASM members family meet couple of times in the past which helped to keep family members involved in all our activities.

I may mention that I am instrumental in starting the ASM Student Chapter in Chennai, the first one being at IIT Madras and later at PSG Coimbatore during my tenure. I also initiated the activity to start a chapter in OP Jindal University in Raigarh, but now it is made as Materials Advantage chapter. I enjoyed doing volunteerism for ASM and our chapter in India and tried to contribute my best.

The ASM CC Newsletter was initiated and made self-sustaining during my time. I worked towards bringing transparency and outreach as Chairman of ASM INC and tried to connect all the chapters and get recognition for all chapters in India. During my tenure, I started ASM Delhi chapter though it is yet to become a vibrant chapter like others. I was made as a member of India Task Force for improving the ASM

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membership in India, which I am still working on. I still feel excited to promote ASM in India and in particular our Chennai chapter. My ambition for ASM is to start a Technical Training Centre to impart knowledge to all the young engineers so that they can find employment. I am trying to get land from Tamil Nadu Govt. for ASM Chennai Chapter and I am confident of achieving this with the support of our colleagues.

Today I am very sad to see many car drivers of Ola and Uber are well qualified engineers but not doing the job that merits their qualification. I feel it is our responsibility to put their education and skills to better use. Also, my ambition to create more entrepreneurs within our materials society. My first thanks to Shri. V. Parthasarathy who inducted me in to our ASM fraternity. My thanks next go to Dr. Bhanu Shankar Rao who always encouraged me during my initial days of association. I am also grateful to Shri Kidao and Shri Krishnaswamy, Prof. K. Prasad Rao, Dr. B. S. Murty and Dr. Kamachi Mudali who always supported my decisions. I am thankful to Dr. M. Kamaraj who always kept me in high esteem.

I am satisfied with the present status and achievements of ASMICC. All my contribution to this was made possible with supports from seniors like Mr. Ponnambalam, Mr. B. Venkatesh, Mr. N. Sampath kumar, Dr. T. Sundararajan, etc. I always got the support for organizing meetings at short notice or unscheduled times and it encouraged me to put in more efforts in contributing to our ASM.

My unfinished ambition is of starting a Chapter at Hyderabad and Coimbatore, which I still kept in my agenda's top list and I am hopeful of achieving it in near future. One of the reasons for this is start of my second innings in the business of manufacturing valves at Coimbatore which made me move out of Chennai and also slowed down my ASM activities but I am sure to take it forward soon with your help. I also tried to open a Chapter at Bahrain in Middle East and achieved success but could not complete due to lack of leaders to run the Chapter though members were enrolled and identified. Due to Covid-19, things could not be executed as planned. But, surely we can achieve this soon in 2021.

I also wish that our Chennai Chapter recognize the pillars of chapter such as the past & present Chairs particularly elders like Mr. Kidao, Mr. Krishnaswamy, etc. at the very earliest opportunity. I wish the present and future office bearers all success in making ASM Chennai Chapter vibrant and to be known throughout India.

V.L SRIDHARAN

FOUNDING MEMBER OF ASMICC

Shri T.V.K.KIDAO

Mr. T.V.K. Kidao is currently the Managing Director of Madras Metallurgical Services Pvt. Ltd., a leading supplier of materials testing equipment. He is also the Managing Director of Kidao Laboratories, an NABL Accredited lab carrying out materials testing.

Mr. Kidao had his early education in Kerala and after graduating in Science from the then Bihar University, had his initial training in TISCO, Jamshedpur. He then worked at Pioneer Equipment Co. Pvt. Ltd., one of the leaders in the manufacturing of foundry machinery and testing equipment for over 12 years. He then joined Kulkarni Foundries Limited, Pune as their Regional Manager for South India having its office in Chennai.

In 1970, following his entrepreneurial interest, he founded Madras Metallurgical Services Pvt Ltd. and again in 1986 established its testing division, Kidao Laboratories. He is one of the founding members of ASM Chennai chapter as well as a past Chairman of the chapter. He has been a member of IIF since 1965 and was also the first Chairman of its Chennai Chapter. He is also a member in several other professional bodies like ISNT, NIQA and the Madras Metallurgical Society.

Acknowledgement : *ASMICC records its appreciation to* ***Mr. M. Sundara Ganeasan,*** *Research Scholar, Department of Analytical Chemistry, University of Madras, Guindy Campus, Chennai for his time and efforts in designing of this news letter.*

Mr. R. Jayagovindan

Mr. R. Jayagovindan retired as Senior Manager-QAD, Greaves Cotton Ltd., Ranipet and has been an active Volunteer in ASM Chennai Chapter activities for several years.

He graduated in Chemistry and Education from University of Madras, Chennai. He completed Master of Business Administration and P.G. Diploma in Operations Management from Indira Gandhi National Open University (IGNOU), New Delhi. He has a P.G. Diploma in Marketing Management from Pondicherry University and a P.G. Diploma in Automobile Technology from Annamalai University. He also has a Post Diploma in Quality Management from FEPCOT, Coimbatore & NCQM-Bombay and a Diploma in Industrial & Pollution Control in Annamalai University. He started his carrier in the Q.A. Dept. in ERW Steel pipe manufacturing unit at Ranipet. Thereafter, he moved on to automobile industries. He was Head of the Metallurgical Laboratory – QAD for 50cc Two-wheeler manufacturing unit & Diesel Engine for Auto Rickshaw manufacturing unit at Ranipet. He has 38 years of experience in Metallurgical Laboratory-QAD. He has an NDT Level II certification for MPI & DPI.

Mr. Jayagovindan is a Life Member of Madras Metallurgical Society, Indian Institute of Metals, ISNT and a member of ASM International. He has contributed in the organization of Technical Meetings, School programs and Conferences of ASM Chennai Chapter. He was Awarded “Certificate of Appreciation for his service & dedication” in the year 2019 by ASM Chennai Chapter. He attended Virtual Leadership Days program organized by ASM International HQ during September 2019.

List of online programs attended by

Mr. R. Jayagovindan

Programs Attended					
S.No	**From**	**To**	**Topic**	**Organised BY**	**Association with**
1	07-05-2020	28-05-2020	Water Challenges during and post COVID 19	ICCW-IIT Chennai	
2	01-07-2020	01-07-2020	New Capabilities in Metal failure Analysis & interface Characterisation	Thermo fisher Scientific	–
3	07-07-2020	07-07-2020	Advanced Specimen Preparation for Metallography	ASM International	–
4	09-07-2020	10-07-2020	Development of Advanced Materials for Future Technologies. (DAMFT-2020)	Jeonbuk National University, Jeonju, South Korea & VIT, Chennai.	–
5	13-07-2020	17-07-2020	FDP on Recent Advance in Process Metallurgy.	Dept. of Metallurgical Engineering. OP Jindal University.	ASMI India Chapter, IIM Raigarh Chapter.
6	23-07-2020	25-07-2020	National webinar on secondary melting and Processing Technology (SMPT-2020)	Dept of Metallurgical & Materials Engineering. Mahatma Gandhi Institute of Technology,Hyderabad, Telugana.	IIM
7	28-07-2020	01-08-2020	FDP on Recent Trend in Manufacturing.	Dept of Mechanical (Mechatronics) Engineering. Mahatma Gandhi Institute of Technology, Hyderabad, Telangana.	–
8	29-07-2020	30-07-2020	Emerging Simulation Trends in Automotive Industry.	Dept of Mechanical Engineering in Association with MSC, software, SRM Institute of Technology, Ramapuram, Chennai.	–
9	01-08-2020	01-08-2020	Opportunities and Challenges in Friction Stir Welding & Processing of Nickel Based Supper Alloys.	Dept of Metallurgical & Materials Engineering. Mahatma Gandhi Institute of Technology, Hyderabad, Telangana.	IIM Hyderabad Chapter.
10	02-08-2020	02-08-2020	Webinar on Global Steel Industry Sustainability (GSIS -2020)	Dept of Metallurgical Engineering. N.I.T, Durgapur.	IIM Student Chapter, Durgapur.
11	03-08-2020	03-08-2020	FDP on Functional Materials: Processing & Applications (FMPA-2020).	Dept of Metallurgical & Materials Engineering. Mahatma Gandhi Institute of Technology,Hyderabad, Telugana.	–
12	17-08-2020	22-08-2020	Nano Technology & Functional Materials.(NTFM-Phase II)	Dept. of Mechanical Engineering. S.V.College of Engineering , Tirupati. A.P.	–
13	14-09-2020	19-09-2020	Nano Technology & Functional Materials.(NTFM-Phase III)	Dept. of Mechanical Engineering. S.V.College of Engineering , Tirupati. A.P.	–
14	15-09-2020	17-09-2020	Virtual Leadership days	ASM International-USA	
15	05-10-2020	09-10-2020	FDP on outcome based Education & Accreditation.	JNTUH College of Engineering & ISTE Telugana Section.	
16	06-10-2020	06-10-2020	Steel Retailing & Distribution.	Metalogic- PMS Webinar.	
17	02-11-2020	07-11-2020	STTP on Nano Technology & Functional Materials. (NTFM - Phase IV)	Dept. of Mechanical Engineering. S.V.College of Engineering , Tirupati. A.P.	

Materials Strategy for Future Mobility

Dr. Shankar Venugopal
Vice President, Mahindra & Mahindra

Dr Shankar is the Vice President for Technology Innovation for the Automotive and Farm business of Mahindra &Mahindra. He is also the Dean of the Mahindra Technical Academy. He holds a Ph.D in Materials Science and won the gold medal for the best doctoral thesis at the Indian Institute of Science. He is a prolific inventor with ten granted US Patents. He has been recognized as one of the 50 most innovative leaders at the World Innovation Congress 2020

Introduction

The future of mobility is being shaped by a combination of technology and business model disruptions. The convergence of electric, connected, autonomous vehicle technologies and the shared mobility business model has the potential to create sustainable mobility options for the future. Sustainable mobility is a key growth enabler for fast-growing economies like India. These new vehicle technologies are growing exponentially in their performance and are fast becoming affordable. Leveraging these disruptive technologies and building innovative products are important for companies and countries that wish to lead the development of sustainable mobility for the future.

The adaption of EVs in India will greatly accelerate when (a) the EV's range improves sufficiently to remove the range anxiety of customers (b) the initial cost of acquisition of EV reduces to match the price of ICE vehicle (c) the batteries can be charged easily and quickly. As the battery pack contributes to about 40% of the price of EV and determines the range of the EV, it is a key sub-system of the EV both from performance and price perspective. The greatest good of an EV arises from the elimination of vehicular tail pipe emission.

When we build a technology roadmap for connected, autonomous, electric and shared (CASE) vehicle technology, we realize that materials hold the key to unlock a whole new world of opportunities. The number of electric cars rose from 17,000 in 2010 to more than 7 million in 2019 — a 400x increase in a decade [1]. Successful scale up of EVs critically depends on the availability of certain materials - lithium, cobalt, rare earths etc – that go into the building of batteries and motors for EVs. We will describe two important group of materials that comprise (a) the battery that stores the energy and (b) the motor that powers the electric vehicle (EV).

EV Battery Materials

Batteries are key to the performance of EVs as they store incredible amounts of energy that can be discharged quickly, safely, and smoothly— thereby giving EVs instant acceleration, responsive handling, and fast recharging times.

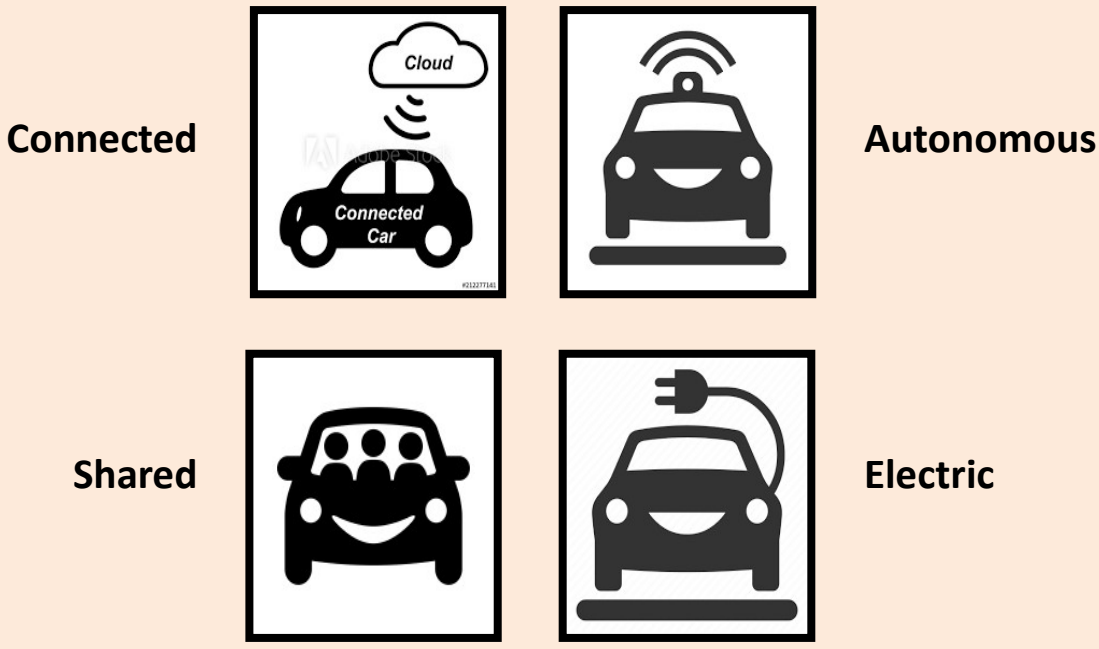

Figure 1 – CASE for Future Mobility

The key enablers that would encourage customers to adapt EVs – improving the range, reducing the initial cost and reducing the time for charging – are all controlled by the battery's performance. EV batteries have become the new oil and they hold the key to realising affordable electric mobility.

Most electric vehicle batteries are lithium based and rely on a mix of cobalt, manganese, nickel, and graphite and other primary components. When the first mass-market EVs were introduced in 2010, their battery packs cost an estimated $1,000 per kilowatt-hour (kWh). Today, we are at about $200 per kWh - that's a drop of more than 70% in the price per kWh in 6 years! EVs are forecast to cost the same or less than a comparable gasoline-powered vehicle when the price of battery packs falls to between $125 and $150 per kWh [2]. The cost of storage is expected to reach $100 per kWh by 2025 [3].

The 2019 Nobel Prize in Chemistry was awarded to John B. Goodenough, M. Stanley Whittingham and Akira Yoshino, who developed a truly transformative technology that has permeated billions of lives across the planet, touching anyone who uses a cellphone, laptop computer, electric car or any other device that is powered by a rechargeable battery.

There are five primary lithium battery combinations for EVs - Lithium Nickel Cobalt Aluminium (NCA), Lithium Nickel Manganese Cobalt (NMC), Lithium Manganese Oxide (LMO), Lithium Titanate (LTO) and Lithium Iron Phosphate (LFP) – of these, NCA and NMC batteries are the most prevalent in EVs [4]. Battery cell materials include lithium, aluminium, carbon, cobalt, copper, graphite, iron, manganese, nickel, silicon, phosphorous, polyvinylidene fluoride and polyolefins. Battery pack materials include aluminium, copper, thermal management materials, thermal interface materials, steel, glass fibre reinforced polymers, carbon fibre reinforced polymers, inter-cell insulation and compression foams and pack fire-retardant materials. An electric car with a 70 kWh battery uses 63 Kg of lithium carbonate equivalent (more than the amount of lithium in 10,000 cell phones).

For every 1% increase in market penetration of BEVs, there will be additional lithium demand of 70,000 LCE / year. Global reserves of the raw materials for EV batteries are concentrated among a few countries. 75% of world's lithium resources are found in the region of Argentina-Bolivia-Chile. 65% of cobalt production happens in Democratic Republic of Congo (DRC). The highly concentrated production of these materials necessitates a risk mitigation strategy for reliable supply of the raw materials to battery manufacturers. Recent research directions include lithium-air, lithium-glass, lithium-sulphur batteries; researchers have recently reported a battery formulation that can support a million miles.

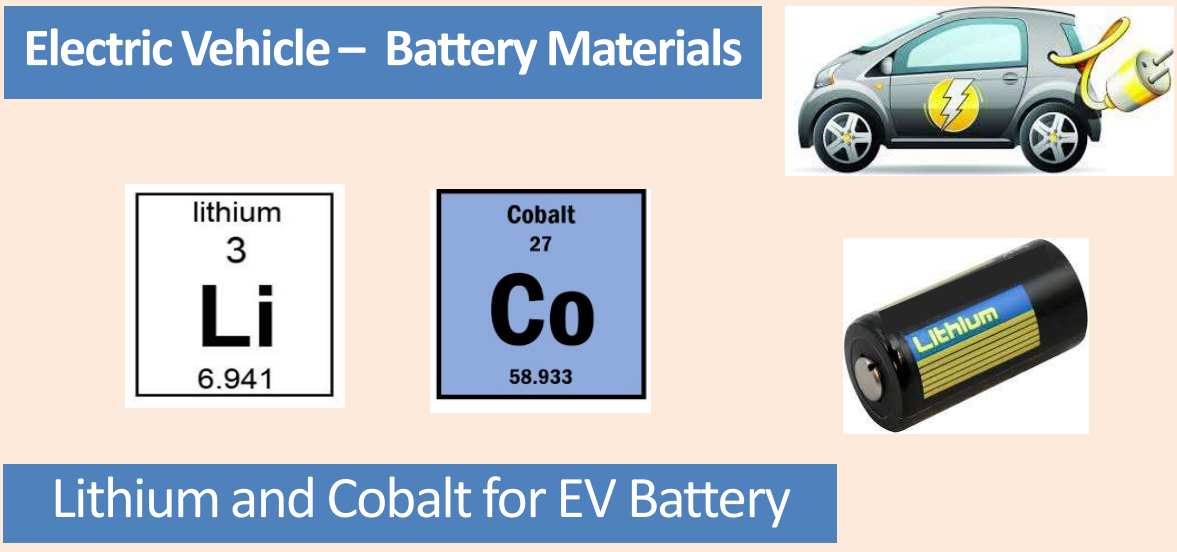

Figure 2 – EV Battery Materials –Lithium and Cobalt

Electric Motor Materials

The demand for electric traction motors will increase rapidly over the next 10 years, not just from the overall EV sales but also with the rise of EVs using more than one motor, specifically in premium cars and heavy-duty vehicles. Desirable EV Motor characteristics include high efficiency, high instant power, fast torque response, high power density, low cost, high acceleration and robustness. The majority of EV models use permanent-magnet motors, which are smaller and more efficient than induction motors, the common alternative. Increasing the motor performance will demand stronger magnets, which in turn will require more of the rare-earth elements. These materials typically contain several rare-earth elements (REE) such as Neodymium (Nd), Dysprosium (Dy), Praesodymium (Pr) etc. A magnet's strength is commonly measured by its coercive force and flux density. The magnets made from the rare earth neodymium rate are the highest in coercivity and are good for high-powered EVs. The drawback of simple neodymium magnets is a low operating temperature. Adding the rare earth element dysprosium to the Neodymium increases the operating temperature. Dysprosium, along with the rare earth element praseodymium, can also increase a magnet's coercivity, when alloyed with neodymium [5].

REEs have a very geographically constrained supply chain and a volatile price history. Whilst they are in a relatively small quantity in the motor, they can make up a very significant portion of the cost of the motor. The important materials that constitute the motor are aluminium, boron, cobalt, copper, dysprosium, iron, neodymium, niobium, silicon-steel, terbium and praseodymium [6]. These rare-earth elements like Nd, Dy are difficult to produce, as they must be extracted from other minerals via labour-intensive refinement processes. More than 90 percent of the current production of rare earths takes place in China. Research directions include reducing the amount of Res, formulations with alternative REs, exploring environmental-friendly mining and refining processes, urban mining (recycling and reuse), motor architectures that do not need permanent magnets etc.

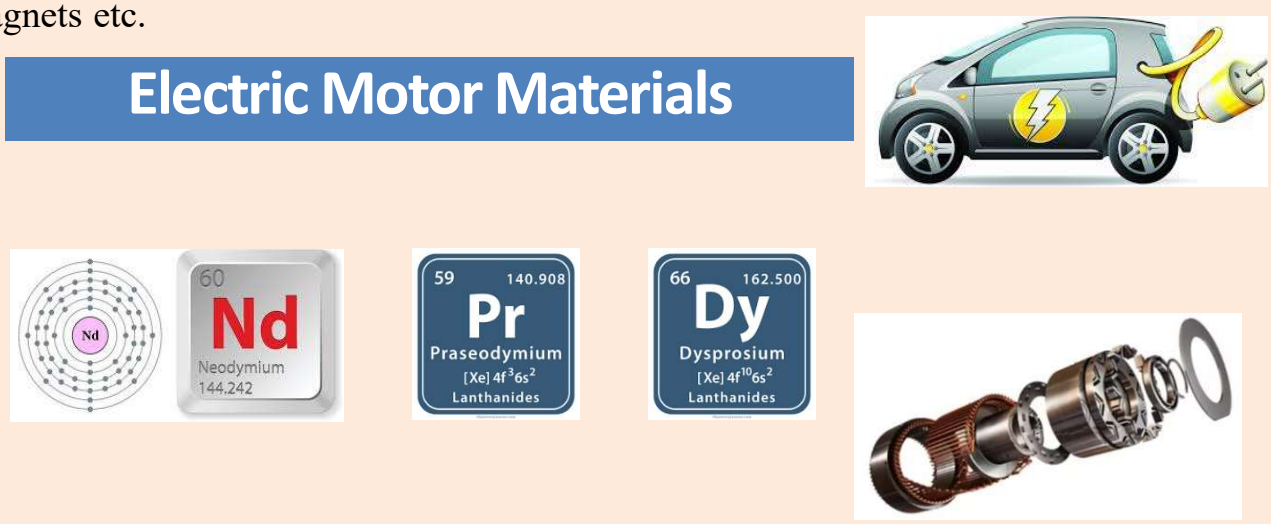

Figure 3 – Electric Motor Materials – Rare Earth Elements (REE)

Alternative Sources for Critical Materials

The battery materials (lithium and cobalt) and the motor materials (rare earth elements) are critical for the development of clean mobility and clean energy. Since the availability of these minerals are limited to a few locations on the earth's crust, there is a strong need to look at alternative sources, use the available materials wisely and ensure abundant availability of the materials in future. The wise use of these materials involves the design of batteries and motors in such a way that the critical materials can be efficiently recycled and reused at the end of operational life of these components – commonly referred to as Urban mining [7]. The exploration of alternative sources for these materials has also opened up two new opportunities:

(a) **Deep sea mining** – there are parts of the ocean bed (such as the Clarion - Clipperton Zone CCZ) that are rich in elements such as Manganese (Mn), Cobalt (Co), Nickel (Ni) and even a few rare earth elements (REEs) [8,9].

(b) **Asteroid mining** – there are many asteroids located in the region between Mars and Jupiter. Among these, the bigger asteroids with slower rotation and having an orbit that revisits Earth often are suitable for mining. Metallic or M-type asteroids (iron meteorites) are composed of up to 90% of iron, nickel and cobalt. Among the M-type asteroids, **16 Psyche,** is one of the biggest, and made up of iron, nickel and a number of rare metals, including cobalt [10].

Conclusion

With the rising penetration of battery powered electric vehicles (BEV), the batteries have become the new oil. The lithium ion battery (LIB) is the energy storage of choice for EVs. Lithium and cobalt are the two most critical elements for EV LIB. There is also a rising demand for these LIB for application is solar photovoltaics (PV).

The growing need for compact electric motors, enabled by strong permanent magnets, raises the demand for rare earth elements (REE) – Neodymium, Praesodymium and Dysprosium. These electric motors find application in EVs and wind turbines.

The growth of clean mobility and clean energy industries in the future depends on the reliable supply of critical materials lithium, cobalt and rare earth elements. We, as a community of materials scientists, should focus our research and innovation efforts to systematically mitigate the risks in the supply of these critical materials. These materials innovation efforts could enable India to emerge as a global leader in sustainable energy and mobility.

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2. Electric Vehicle's Celestial Future - https://medium.com/@tausif000/electric-vehicles-celestial-future-d77599793962

New Member Profile

Dr. Shubrajit Bhaumik, Ph.D
Assistant Professor & Laboratory
In Charge: Tribology and Surface Interaction Research
Laboratory, Department of Mechanical Engineering
S.R.M. Institute of Science and Technology
Kattankulathur, Tamil Nadu 603203

He earned his Bachelors in Mechanical Engineering, his Masters in CAD (Distinction) and Doctorate of Philosophy (in the area of tribology) He joined the Department of Mechanical Engineering in SRM Institute of Science and Technology (SRMIST) in 2012. He handles Tribology and Surface Interaction Research Laboratory started by him in 2012 and is equipped with several tribometers and caters solutions to several reputed industries - steel and automobile. His industrial experience in the areas of tribology viz. wear plates, lubricants and open gear systems. He has published research articles in refereed journals and conferences and won the Best Session Presenter (Malaysian International Tribology Conference 2015), Gold medal for his paper on nano-lubricant in Research Day 2017, SRMIST, the Selective Excellence Project Award 2017, SRMIST and Teachers Associateship For Research Excellence, Science and Engineering Research Board (SERB), Government of India. Presently, he is working on tribological and fatigue behaviour of steel under lubricated condition, surface texturing on steel to reduce friction, friction materials, polymers, composites, green lubricants, industrial lubricants and tribo-energy harvesters. He is also the reviewer of reputed journals such as Tribology International, Applied Surface Science, Tribology in Industry etc. He is also serving as a Guest Editor for a Special Issue on Tribological properties of 2D materials and liquid crystals, Crystals, Impact factor 2.404. He played a major role as the Joint Organizing Secretary in conducting TriboIndia 2020. He is the Faculty Advisor of SRMIST Material Advantage Student Chapter at SRMIST. He is a life member of Tribology Society of India, Malaysian Tribology Society, ASM International Chennai Chapter and Institution of Engineers (India).

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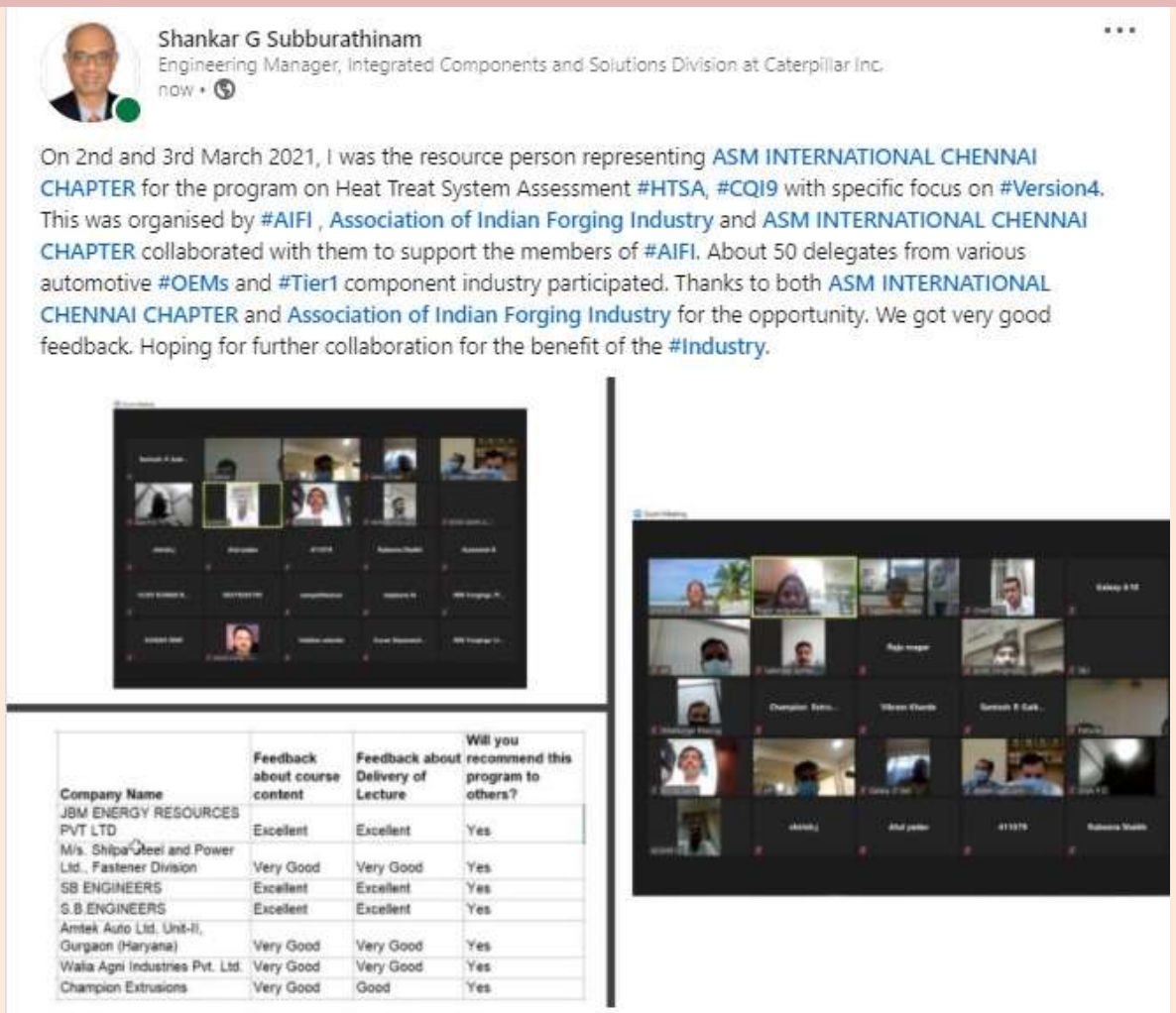
New Member Profile

Dr. K VENKATESWARAN ,

Head-R&D and New Projects, BIMETAL BEARINGS LIMITED, Sembium, Chennai 600011

Area of your Expertise and Interest : Powder Metallurgy, Gas and Water Atomization of Metal Powders, Design and Development of Gas /Water Atomizers, Tribology, Tribo Metallurgy, MIM, Additive Manufacturing-3D Printing, Heat Treatment, Failure Analysis, Characterization of Metal Powders and Applications, Magnetic Materials , Bearing ,Energy and Auto M Materials

External Trainings Organised



Shankar G Subburathinam
Engineering Manager, Integrated Components and Solutions Division at Caterpillar Inc.
now •

On 2nd and 3rd March 2021, I was the resource person representing ASM INTERNATIONAL CHENNAI CHAPTER for the program on Heat Treat System Assessment #HTSA, #CQI9 with specific focus on #Version4. This was organised by #AIFI , Association of Indian Forging Industry and ASM INTERNATIONAL CHENNAI CHAPTER collaborated with them to support the members of #AIFI. About 50 delegates from various automotive #OEMs and #Tier1 component industry participated. Thanks to both ASM INTERNATIONAL CHENNAI CHAPTER and Association of Indian Forging Industry for the opportunity. We got very good feedback. Hoping for further collaboration for the benefit of the #Industry.

Company Name	Feedback about course content	Feedback about Delivery of Lecture	Will you recommend this program to others?
JBM ENERGY RESOURCES PVT LTD	Excellent	Excellent	Yes
M/s. Shilpa Steel and Power Ltd., Fastener Division	Very Good	Very Good	Yes
SB ENGINEERS	Excellent	Excellent	Yes
S.B.ENGINEERS	Excellent	Excellent	Yes
Amtek Auto Ltd. Unit-II, Gurgaon (Haryana)	Very Good	Very Good	Yes
Walia Agni Industries Pvt. Ltd.	Very Good	Very Good	Yes
Champion Extrusions	Very Good	Good	Yes

Hybrid manufacturing- A panacea for remanufacturing in India

Niyanth Sridharan
Lincoln Electric Company

Additive manufacturing (AM) is a disruptive technology and is perceived as a tool to fabricate new parts cost effectively. While AM community has focused largely on making new parts, a relatively unexplored territory is the use of AM with precision CNC machining in the repair/remanufacturing space.

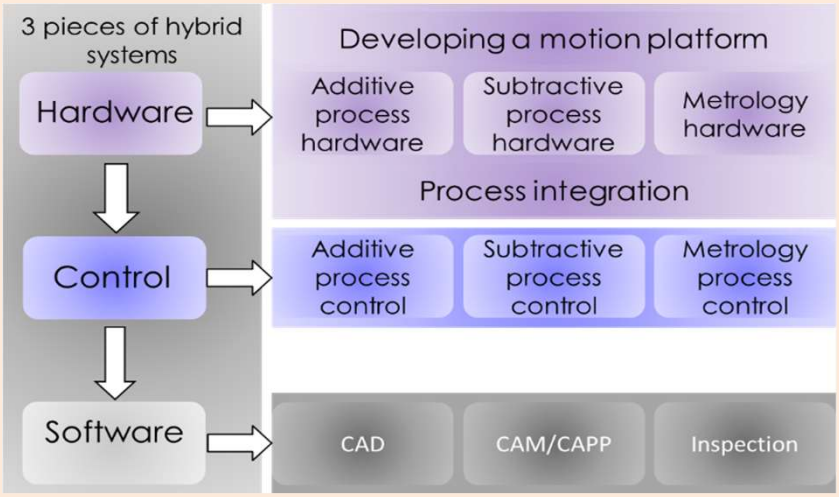


Figure 1: A schematic illustration of the various components necessary for a hybrid AM system

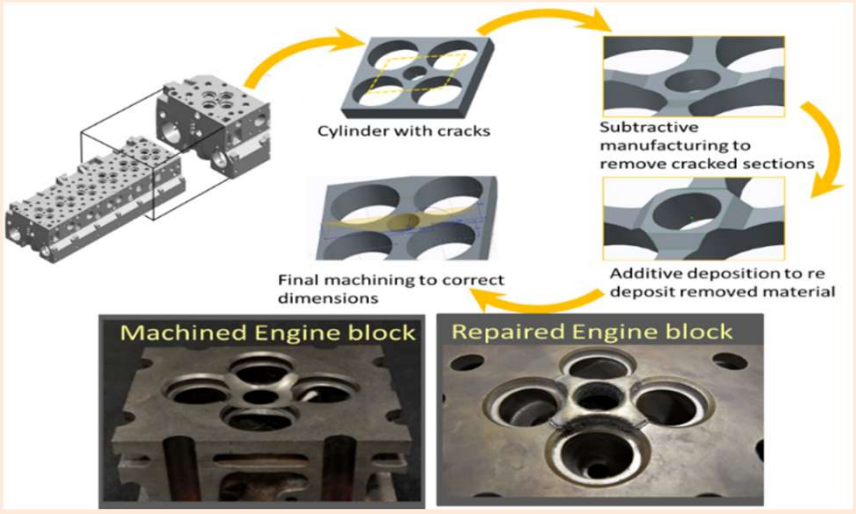


Figure 2: Illustration of a typical repair process; Photographs of the repaired parts

Several industries are adopting remanufacturing to ensure sustainable manufacturing and boost margins. Timken, a bearing manufacturer is aggressively remanufacturing products for customers like Essar Steel, Tinplate Company of India and Usha Martin. Consequently this added a value of $ 14,075, $ 46,000 and $ 75,000 respectively as direct saving. Remanufacturing without automation typically increases rejection rate due to operator fatigue necessitating the use of automation to improve productivity.

This article will focus on one case study which uses hybrid manufacturing in conjunction with computational material science to repair diesel engine cylinder blocks. Cast iron cylinder blocks after several hours of operation typically crack in the cylinder head. Instead of scrapping these parts, we developed a solution to enable remanufacturing using hybrid manufacturing. The overall approach used to enable this repair is shown in figure-2.

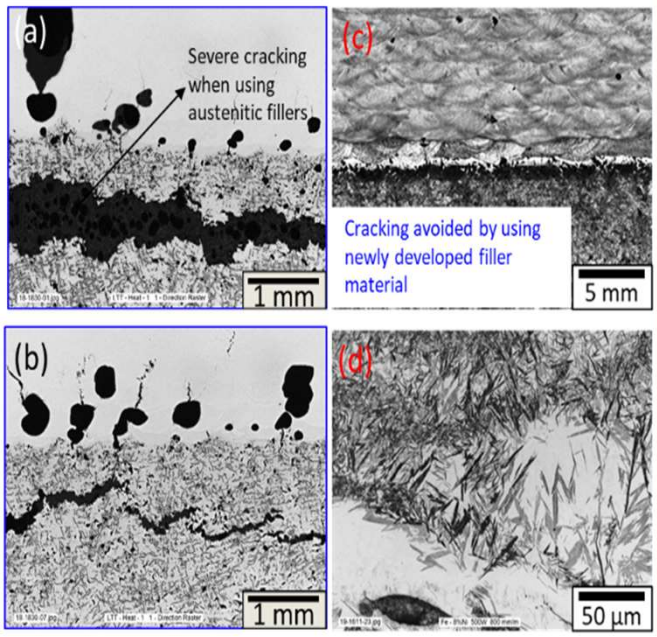


Figure 3: Summarizing the approach used to develop new fillers and the results showing the lack of cracking in the newly developed filler material (figure (c)-(f))

When it comes to cast iron repairs, there is also a popular misconception that low heat input welding processes (such as CMT) yield lower dilution and therefore prevent cracking. While data does not exist to back these claims, using very low heat inputs to avoid cracking could be effective to deposit a single layer of material (<2 mm). However when it comes to volume deposition (60x60x15 (height) mm^3) over cast iron, these processes cannot be used since the prolonged thermal cycling typically cracks the cast iron (figure 3(a) & (b)). Avoiding cracking also necessitates the use of high pre heat at the expense of productivity. Creating a volume buildup using Ni based filler materials would exacerbate challenges with cracking driven by significant differences in co-efficient of thermal expansion (CTE). Differences in CTE (if > 20%) typically accelerates cracking in gray cast iron due to accrued thermal stresses.

Therefore increased productivity in these cases can be achieved only by developing materials that are amenable to high deposition rate processes. To overcome these challenges we use a CALPHAD approach to design and develop a ferrous high Ni containing filler material specifically to induce a high compressive residual stress in the weld to prevent cracking. While these studies have been proven to be effective at a lab scale commercializing these have significant hurdles necessitating research. One of the primary challenges is the low deposition rates in CMT based systems (<1 kg/hr for low heat input welding) needing higher deposition rate processes for faster material addition to make repairs involving volume addition

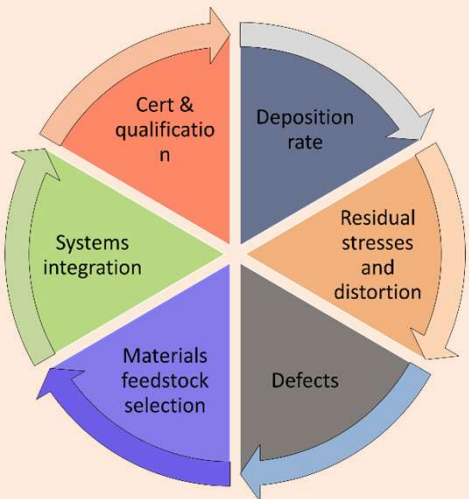


Figure 4: Summarizing various challenges which need to be addressed in order to commercializehybrid technologies

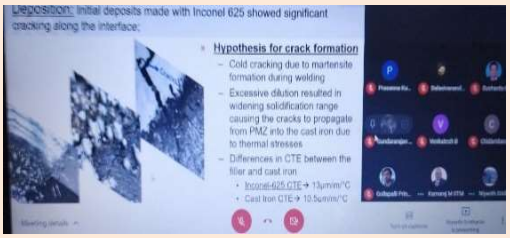
At present most of the systems have a subtractive head and an additive head mounted on a 5 axis CNC platform. This is configuration means that the additive and subtractive heads are changed using an automatic tool changing unit. While integration of these systems are simple, there are time delays in changing affecting part turnaround time. Therefore, research should focus on developing platforms where material removal and addition occurs in unison. Apart from challenges in productivity qualification protocols for these processes are challenging. This is due to the layer wise nature of the AM process. Therefore future systems needs to be instrumented with a host of sensors to collect data as a part is being manufactured. Machine learning and Artificial Intelligence could be used to analyze the in situ data streams to qualify the parts.

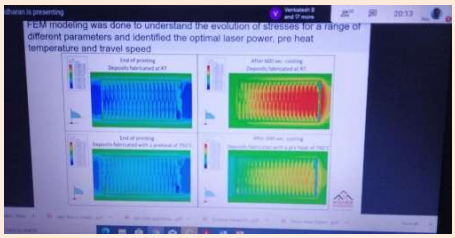
Chapter Activities – Technical Talks

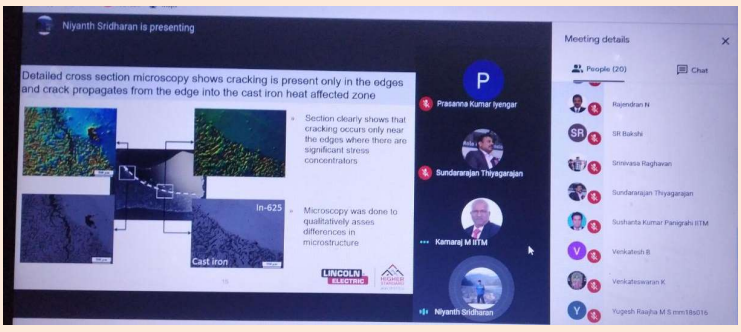
Technical talk (Webinar) on 12th September 2020

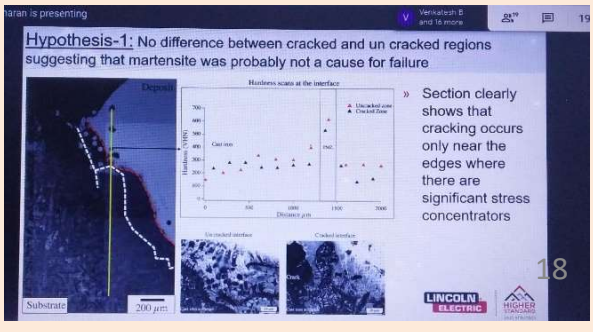
ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Dr Niyanth Sridharan, Manager, Consumable R&D team Lincoln Electric India** on "**Manufacturing Metrology – Widening horizons"**

Additive manufacturing is a disruptive technology and is one of the central pillars of industry 4.0 in addition to artificial intelligence and industrial internet of things. One of the key aspects of additive manufacturing which makes it attractive is "*complexity is free*" i.e. the ability to fabricate a limited number of complex parts with expensive materials cost effectively. While additive manufacturing is typically used for producing new parts from scratch, a relatively unexplored territory is the use of hybrid manufacturing. Hybrid manufacturing leverages both additive manufacturing and precision machining to enable the fabrication of new parts, or repair existing ones. The goal of this talk is to demonstrate how advances in metallurgy, manufacturing and computation can be cross pollinated to develop a solution to address challenges faced by OEM's. Specifically, this talk will focus on the use of the industry 4.0 technology to enable remanufacturing of high value parts for the automotive and aerospace industry. The first part of the talk will focus on how advances in computational materials science can be coupled with advances in manufacturing to develop a solution for cast iron diesel cylinder block repair. Diesel engine after service typically suffer from cracks in the cylinder head and are scrapped since cast iron is challenging to repair. We now present an innovative solution to repair cast iron with a low-cost high Ni filler. The second part of the talk focusses on the applying hybrid technologies to repair high γ′ nickel-based alloys used in jet engines. These are expensive materials which are used in the hot section of the engine and need to be repaired periodically to ensure that they are not scrapped. Here the efficacy of using digital twinning to model the repair process to ensure that the substrates or deposits don't crack during the repair process is demonstrated.









Austempered Ductile Iron Technology: A Green Alternative for Automobile and Agricultural Industries in India

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Department of Metallurgical & Materials Engineering,
Punjab Engineering College,
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Austempered Ductile Iron (ADI) technology is a cost effective green technology with enormous potential. The ADI technology consumes low energy and the material-process combination offers sustainability of engineering design. ***ADI technology*** involves ductile iron casting, being a near-net shape process produces less waste and is a low energy process as compared to forming, welding, etc. The most important applications of ADI technology in the field of automobile, agricultural, railway, mining and construction is due to exceptionally high wear resistant, impact resistance and toughness of ADI. Despite this, ADI technology in these fields has not been fully exploited in India. It seems that the product designers in India have not yet appreciated the properties of ADI and still prefer using established materials to avoid any risk of component failure. Other contributing factors are: low hardness of ADI as compared to steel seems represent inferior mechanical properties, the castings are perceived inferior to forgings, lack of research on ADI in India and the myth about its poor machining.

In recent years, there has been a glaring awareness of the importance of green technologies and processes. The concept of sustainability is strongly impacting the industrial community, which is more and more focusing on minimizing weight to strength ratio and adopting strategies from renewable, sustainable resources on starting materials. Forged steel, hardened and tempered steel, case hardened steel components used have higher specific strength, more embodied energy for equivalent stiffness, more material removal. Presently the industry be it the Automobile, Agricultural, Construction, Railway etc. is looking for green alternatives, fuel efficiency, weight reduction, cost reduction, etc. This article aims at putting the existing work into perspective, highlighting the significance and potential of the ADI technology as a green, sustainable technology to facilitate the identification of areas of future development.

In this respect, ADI has opened up new possibilities in the area of conflict, as: 'Strength Meets Toughness' and 'Iron is lighter than Aluminum'. ADI is produced by a controlled austempering treatment of a ductile Iron (DI) to produce a unique microstructure 'Ausferrite' comprising acicular ferrite and high carbon austenite to result in the best combination of mechanical properties.

A myriad of benefits of ADI over other ferrous materials are highlighted as: (i) Up to 10 % - 30% less cost than forgings and hardened steel, (ii) 10% less weight than steel (Density of Steel 7.85 Kg/m^3 and ADI 7.095 Kg/m^3), (iii) Mechanical properties are comparable and better than to forge grade steel (UTS ~ 1.3 to 1.5 times, Yield Strength ~ 1.3 to 1.7 times of forged steel,(iv) Superior static fracture toughness, contact fatigue strength and fatigue strength, (v) Superior wear / abrasion resistance (comparable to hardened AISI 4340 alloy steel, and 2 times of hardened medium carbon steel, white cast iron, alloyed cast iron), (vi) Excellent resistance to crack propagation, (vii) with usage it work hardens and improves fatigue strength, (viii) Easy to produce components of any shape and geometry/ Lower operating noise levels due to presence of graphite, (ix) Improved life-mitigating net energy and ambient effect, (x) produces less waste but uses waste (steel scrap) in manufacturing. The density of ADI is ~2.4 times that of aluminum alloys, but so is the stiffness. The allowable yield stress for ADI is about 3-5 times that of cast aluminum and 2-3 times that of forged aluminum. Therefore, a properly designed ADI component can replace an aluminum component at equal or lower mass barring limitation of minimum wall thickness of about 3 mm. Thus, extremely light components can be designed for given loads - ADI designs can even be lighter than aluminum solutions. Therefore, one must appreciate that at lower costs ADI competes with cast steel, quenched and tempered forged steels with high strength such as 16 $MnCr_5$, 42 $CrMo_4$ and 34 $CrNiMo_6$ and also for higher mechanical requirements with typical lightweight materials like aluminum or magnesium.

Commercial Development of ADI anticipates certain practical difficulties such as: (i) Casting of superior ductile iron, (ii) Effective use of alloying elements, (iii) Close control of heat-treatment process, (iv) Control on the scale of microstructure and hence the properties, (v) Tooling and Fixture requirements for new designs of ADI components, (vi) Standardization/ Customization of ADI components to meet specific/ a set of applications has not been explored yet. Suitable alloying in ductile iron is required for good austemperability and to attain appropriate austempered microstructure. Manganese (Mn) is the most potent austemperability agent, it segregates at the eutectic cell boundaries and delays the austempering transformation. While, high Mn can be easily produced, but producing low Mn Iron is extremely difficult, therefore, commercially minimizing Mn content is recommended.

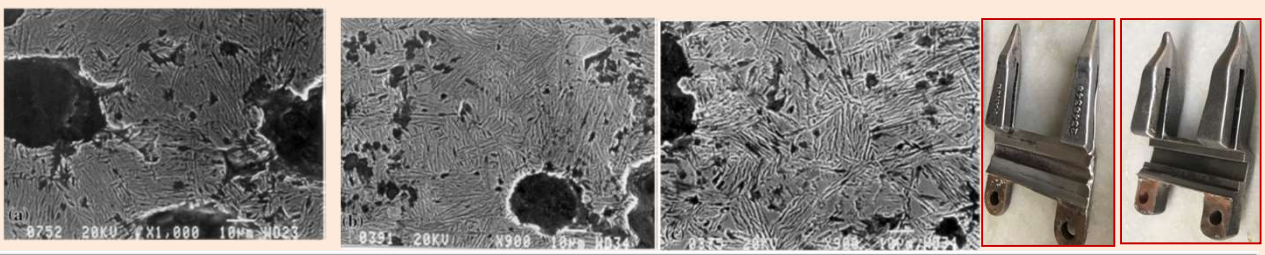
Molybdenum (Mo) is the next potent austemperability agent, shows similar effect as Mn but to a lesser extent, therefore, addition of Mo to DI is also recommended to be limited. Copper (Cu) and Nickel (Ni) on the other hand, do not segregate at the eutectic cell boundaries, improve austemperability, compensate reduction in austemperability due to reduction in Mn in DI. Since segregation of impurities leads to variation in austenitization and thus the austempered microstructure needs strict control. The formation of ausferrite during austempering involves carbon build up in high carbon austenite and reduction of volume fraction of untransformed austenite. The elemental composition of ductile iron and austempering temperature

influences the austempering kinetics. For a given composition, an increase in the austempering temperature increases time to start ausferritic transformation and the processing window becomes narrower. Austempering time if fixed into the processing window has huge impact on the mechanical properties, machinability, and wear performance of ADI.

Three different grades of ADI have been successfully indigenously developed (Figure 1 a-c), which are equivalent to or better than ASTM 897A (Table). The harvester finger shown in Figure1d is a steel forging (EN8D) weighing 0.97 Kg with an embodied energy of approximately 58 MJ. Figure 1e shows an ADI solution to the harvester finger depicted in Figure 1a. The ADI harvester fingers were developed indigenously from grade ADI-2. The finished finger weighed 0.86 Kg with a total embodied energy of 26 MJ; a 55% reduction compared to the steel forging (58 MJ). Besides, there was 11% reduction in weight per piece. These fingers were used on a reaper for harvesting the fields of Punjab and UP, India for 210 hours in order to compare their performance. Interestingly, the average wear loss in ADI fingers was 35% lesser and average of increase in blade fitting slot was 9% lower than for the forged fingers. As 30 to 40 harvester fingers are used in a reaper or combine harvester machine, a huge saving is anticipated on account of embodied energy, weight saving and enhanced life.

Conclusions and Future Perspectives: Extensive research work over the past decade has helped to develop the property combination of ADI in three directions: (i) Increased strength, ductility and toughness, (ii) Enhanced wear resistance/ toughness combination, (iii) Improved machinability. ADI offers high level of mechanical properties at a competitive cost. The high strength of ADI successfully competes with steels and light weight alloys. Yet these benefits are to be fully appreciated in India. Novel ADIs such as Carbidic ADI, Ausformed ADI, bainitic-martensitic ADI etc. would open new opportunities.

Acknowledgement: Uma Batra is thankful to the Gov. of India, Ministry of Steel for the support under project [F.No.11(6)/GBS/2019-TD].



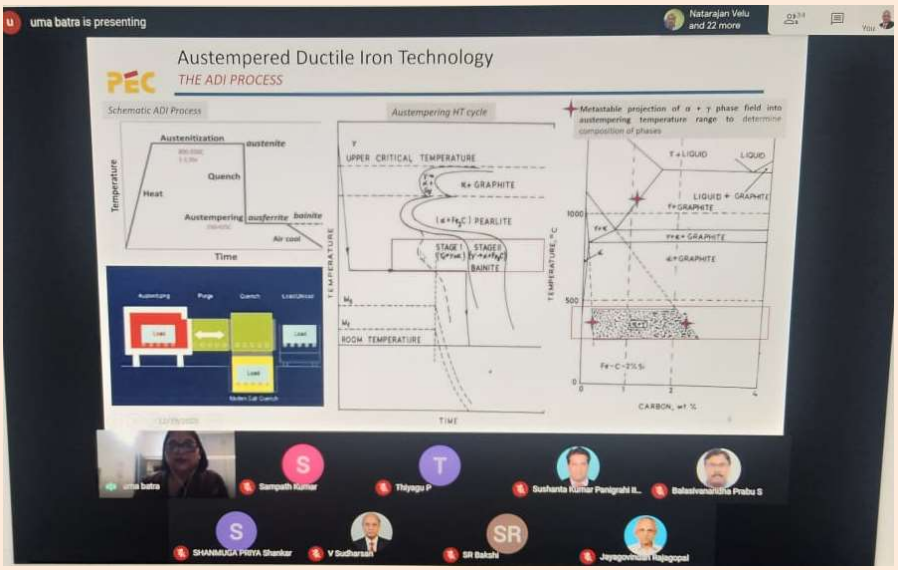
ADI	X_γ	C_γ, wt.%	d_α, Å	Hardness HV_{10}	UTS, MPa	$\sigma_{0.2}$, MPa	% El	n
ADI-1	0.26	1.65	162	445	1340	1276	3.7	0.137
ADI-2	0.36	1.77	190	354	1094	881	10.2	0.169
ADI-3	0.43	1.95	252	327	887	701	8.5	0.179

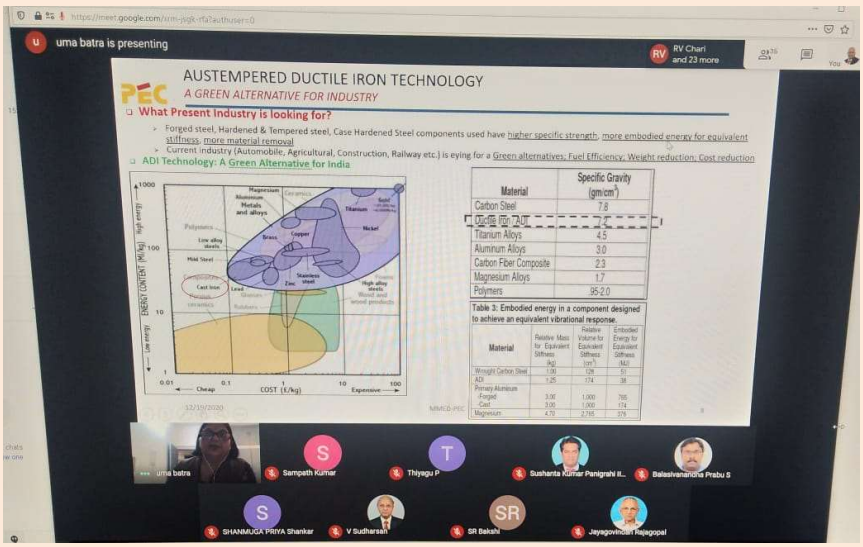
Figure 1: (a-c) SEM micrographs of microstructure of indigenous ADI grades (a-c) and Harvester fingers- forged steel (d); ADI-2 (e).

Chapter Activities – Technical Talk

Technical talk (Webinar) on 19th December 2020

ASM International Chennai Chapter. The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Dr. Uma Batra Professor and Head, Dept of Metallurgical and Materials Engineering, Punjab Engineering College, Chandigarh,** on "**Austempered Ductile Iron Technology: A Green Alternative for Automobile and Agricultural Industries**





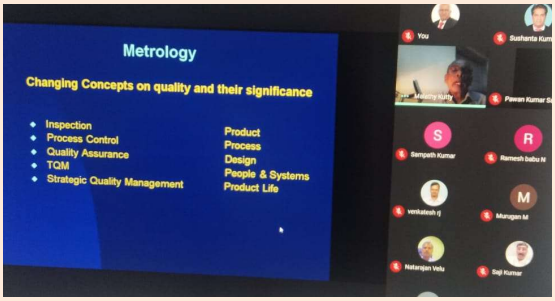
The talk was on Austemepered Ductile Iron (ADI) that provides a high strength to-weight ratio material at a component price that is typically 20% less than that of steel or aluminum. Surprisingly, in some applications, ADI has even replaced aluminum as a weight savings. ADI components are very competitive with steel forgings, castings, and weldments, as well as aluminum castings and forgings. Austempering process can also replace induction and flame hardening to provide cost savings. Current industry be it Automobile, Agricultural, Construction, Railway etc. is eying for a green alternative from the perspectives of fuel efficiency, weight reduction and cost reduction. There are various practical difficulties in the commercial development of ADI in India that needs finding possible solutions. This talk will focus on 'ADI Technology' as a green alternative for India and focus on its applications in Automobile and Agricultural Industries.

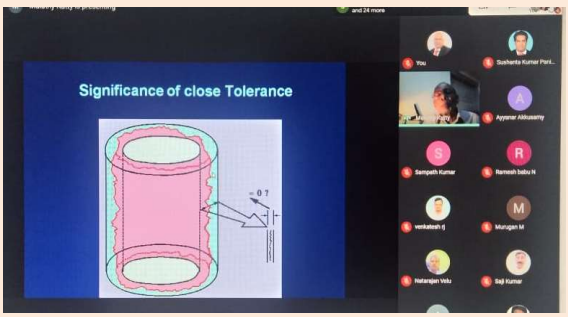
Chapter Activities – Technical Talk

Technical talk (Webinar) on 7th November 2020

The Indian Institute of Metals, Chennai Chapter, ASM International Chennai Chapter and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Dr. V. RADHAKRISHNAN,** Retired Professor & Former HOD, Department of Mechanical Engineering, IIT Madras, Former Dean of Industrial Consultancy and Sponsored Research, IIT Madras , Distinguished Professor of INAE, Professor Emeritus at IIST Trivandrum on "**Manufacturing Metrology – Widening horizons".**

Over the years there has been a sea change in the field of Metrology. Gone are the days when the vernier calipers and micrometers were the main measuring instruments used in the shop floor. Metrology was nota main stream area in engineering. Metrology is closely associated with quality and the importance of quality in manufacturing gave it a respect that it truly deserved.





Dramatic changes in manufacturing, starting from 1970 with the introduction of NC and CNC Machine tools, had a profound impact on inspection and metrology. With the introduction of cheap microprocessors, there has been a dramatic change in the field of metrology covering instruments and measuring procedures. Digital measurement has changed the field of metrology. Today, metrological instruments whether mechanical, electrical/electronic or optical are basically data loggers. Measurement of the desired parameters is done through software. Software metrology has its own advantages and disadvantages. However it has brought in flexibility and higher precision that are currently in demand in manufacturing.

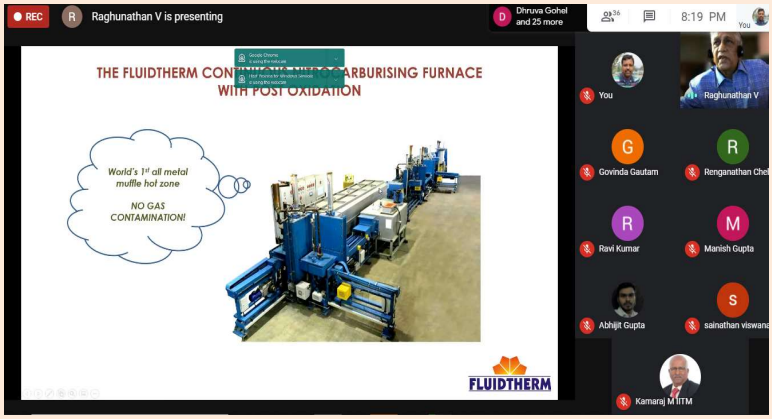
Automation in manufacturing has its impact on metrology, needing automated inspection strategies to be developed. In process metrology is in demand to meet this. Sensor based measurements are on the increase.

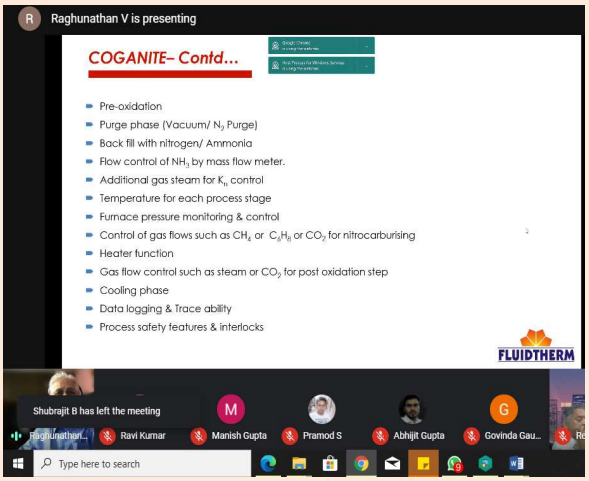
With the introduction of additive manufacturing as a viable option to realize complex parts and machinery, metrology has become more complex, needing entirely new procedures. This presentation gives a brief outline of the developments in the field of metrology to meet the challenges posed by these dramatic changes in the present manufacturing scenario.

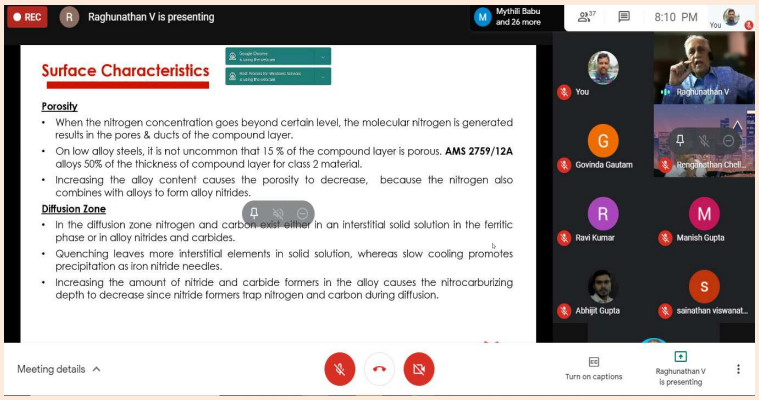
Chapter Activities – Technical Talk

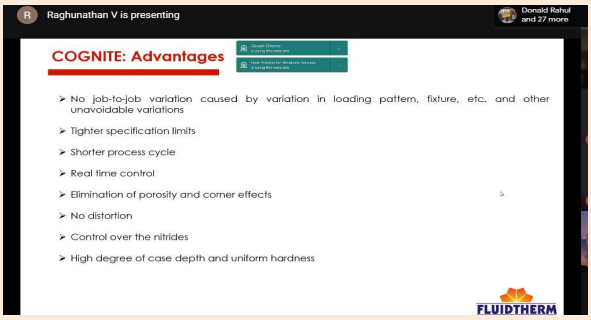
Technical talk (Webinar) on 7th November 2020

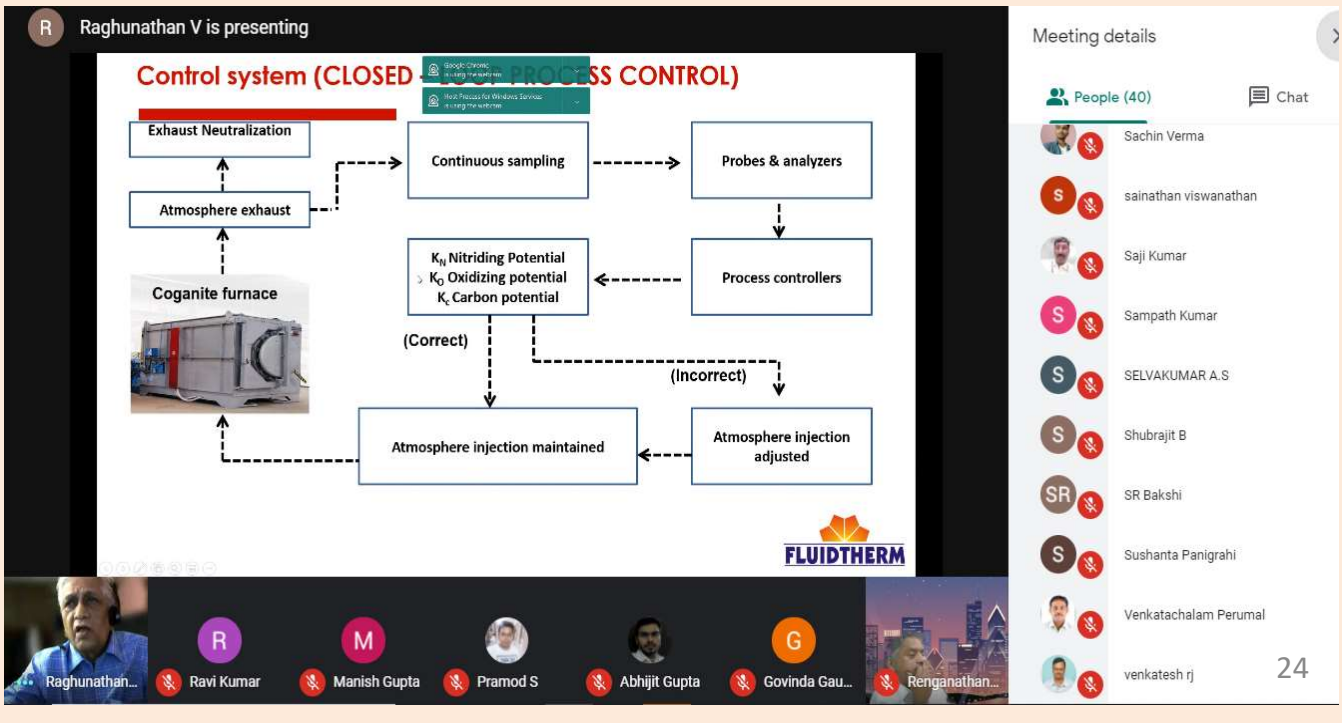
ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Mr. V. Raghunathan, Fluidtherm Technology Pvt. Ltd. Chennai** on **"Gas Nitriding and Nitro Carburizing Current Status and Future Challenges"**









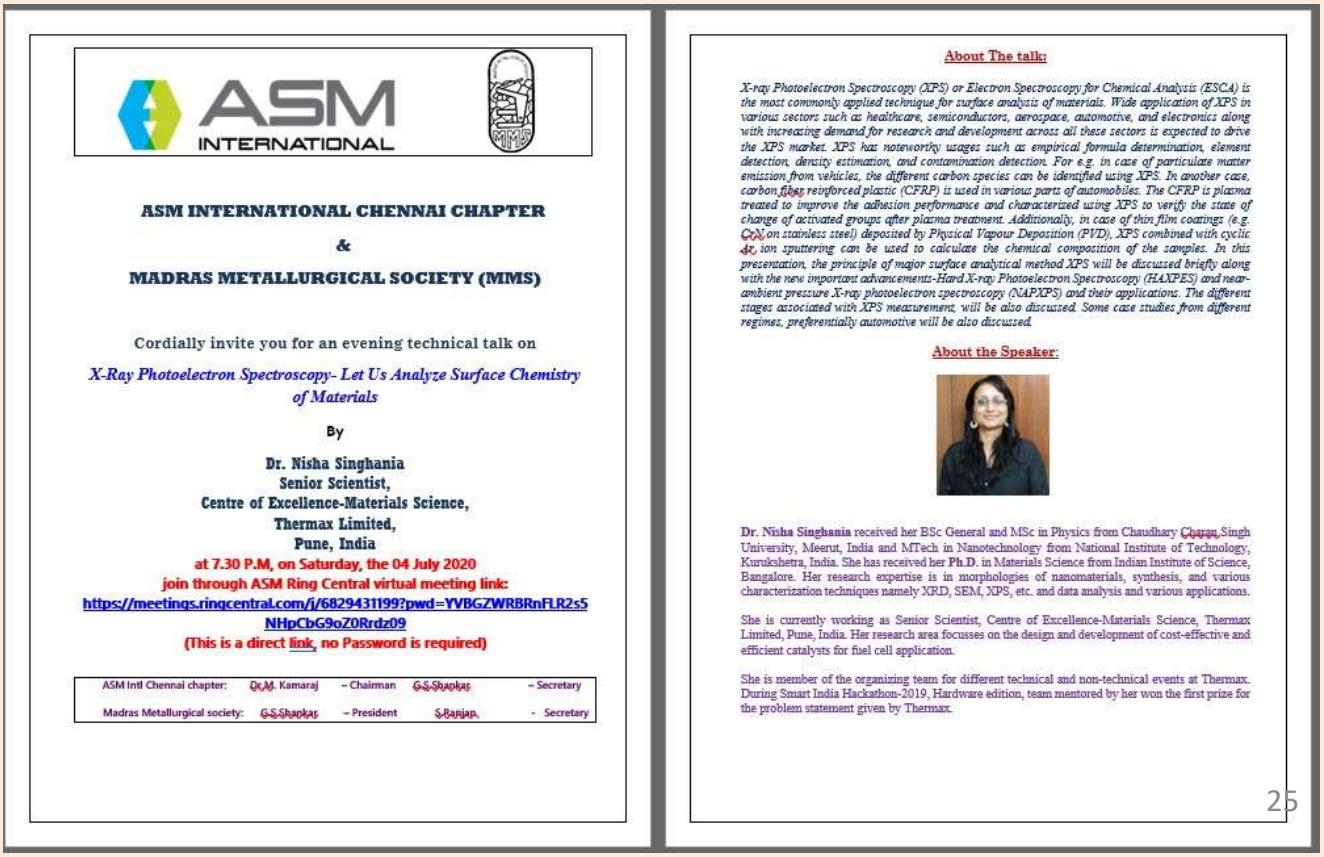


Chapter Activities – Technical Talks

Technical talk (Webinar) on 4th July 2020

ASM International Chennai Chapter and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Dr. Nisha Singhania, Senior Scientist, Centre of Excellence-Materials Science, Thermax Limited, Pune, India** on "**X-Ray Photoelectron Spectroscopy- Let Us Analyze Surface Chemistry of Materials**"

X-ray Photoelectron Spectroscopy (XPS) also known as Electron Spectroscopy for Chemical Analysis (ESCA) is the most widely used surface analysis technique because it can be applied to a broad range of materials and provides valuable quantitative and chemical state information from the surface of the material being studied. The average depth of analysis for an XPS measurement is approximately 5 nm. PHI XPS instruments provide the ability to obtain spectra with a lateral spatial resolution as small as 7.5 µm. Spatial distribution information can be obtained by scanning the micro focused x-ray beam across the sample surface. Depth distribution information can be obtained by combining XPS measurements with ion milling (sputtering) to characterize thin film structures. The information XPS provides about surface layers or thin film structures is important for many industrial and research applications where surface or thin film composition plays a critical role in performance including: nanomaterials, photovoltaics, catalysis, corrosion, adhesion, electronic devices and packaging, magnetic media, display technology, surface treatments, and thin film coatings used for numerous applications. https://www.phi.com/surface-analysis-techniques/xps-esca.html



ASM INTERNATIONAL

ASM INTERNATIONAL CHENNAI CHAPTER

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MADRAS METALLURGICAL SOCIETY (MMS)

Cordially invite you for an evening technical talk on

X-Ray Photoelectron Spectroscopy- Let Us Analyze Surface Chemistry of Materials

By

Dr. Nisha Singhania
Senior Scientist,
Centre of Excellence-Materials Science,
Thermax Limited,
Pune, India

at 7.30 P.M, on Saturday, the 04 July 2020
join through ASM Ring Central virtual meeting link:
https://meetings.ringcentral.com/j/6829431199?pwd=YVBGZWRBRnFLR2s5NHpCbG9oZ0Rrdz09
(This is a direct link, no Password is required)

ASM Intl Chennai chapter:	Dr.M. Kamaraj	– Chairman	G.S.Shankar	– Secretary
Madras Metallurgical society:	G.S.Shankar	– President	S.Ranjan	– Secretary

About The talk:

X-ray Photoelectron Spectroscopy (XPS) or Electron Spectroscopy for Chemical Analysis (ESCA) is the most commonly applied technique for surface analysis of materials. Wide application of XPS in various sectors such as healthcare, semiconductors, aerospace, automotive, and electronics along with increasing demand for research and development across all these sectors is expected to drive the XPS market. XPS has noteworthy usages such as empirical formula determination, element detection, density estimation, and contamination detection. For e.g. in case of particulate matter emission from vehicles, the different carbon species can be identified using XPS. In another case, carbon fiber reinforced plastic (CFRP) is used in various parts of automobiles. The CFRP is plasma treated to improve the adhesion performance and characterized using XPS to verify the state of change of activated groups after plasma treatment. Additionally, in case of thin film coatings (e.g. CrN on stainless steel) deposited by Physical Vapour Deposition (PVD), XPS combined with cyclic Ar+ ion sputtering can be used to calculate the chemical composition of the samples. In this presentation, the principle of major surface analytical method XPS will be discussed briefly along with the new important advancements-Hard X-ray Photoelectron Spectroscopy (HAXPES) and near-ambient pressure X-ray photoelectron spectroscopy (NAPXPS) and their applications. The different stages associated with XPS measurement, will be also discussed. Some case studies from different regimes, preferentially automotive will be also discussed.

About the Speaker:

Dr. Nisha Singhania received her BSc General and MSc in Physics from Chaudhary Charan Singh University, Meerut, India and MTech in Nanotechnology from National Institute of Technology, Kurukshetra, India. She has received her **Ph.D.** in Materials Science from Indian Institute of Science, Bangalore. Her research expertise is in morphologies of nanomaterials, synthesis, and various characterization techniques namely XRD, SEM, XPS, etc. and data analysis and various applications.

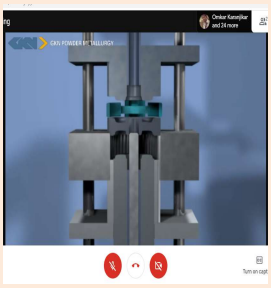
She is currently working as Senior Scientist, Centre of Excellence-Materials Science, Thermax Limited, Pune, India. Her research area focusses on the design and development of cost-effective and efficient catalysts for fuel cell application.

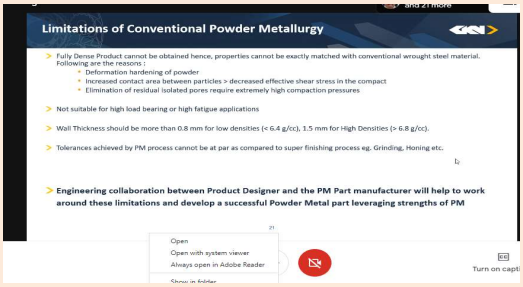
She is member of the organizing team for different technical and non-technical events at Thermax. During Smart India Hackathon-2019, Hardware edition, team mentored by her won the first prize for the problem statement given by Thermax.

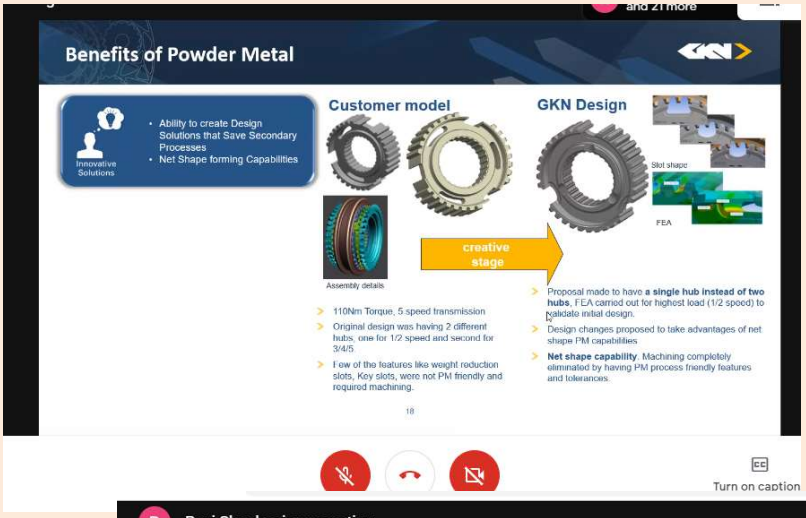
Chapter Activities – Technical Talks

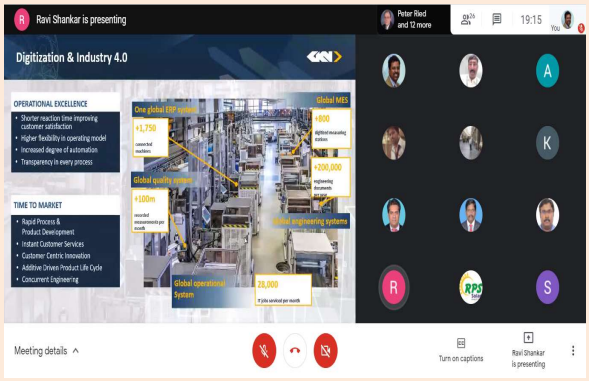
Technical talk (Webinar) on 20th February 2021

The ASM International Chennai Chapter and Madras Metallurgical Society organized a **WEBINAR TECHNICAL** on **"Powder Metallurgy Technology- Present and Future" by Mr. Ravi Shankar, Head of Engineering, GKN Sinter Metals 20th February 2021 at 7.00 P.M.**









The talk started with the Introduction to powder metallurgy (PM) technology and its advantages, conventional PM the process involved and tis relevant applications. This was followed by introduction and discussion on the soft magnetic parts development, additive manufacturing and hydrogen development and applications.

Chapter Activities – Technical Talks

Technical talk (Webinar) on 1st August 2020 ASM International Chennai Chapter and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Mr. G. Kotteeswaran, Senior Deputy General Manager, Sales & Marketing, Oerlikon Balzers Coating India Private Ltd Sipcot Industrial Park, Irrungattukottai, Tamilnadu-602105** on **"Functional Coatings by Physical Vapour Deposition Techniques"**

Physical Vapor Deposition (PVD) processing is carried out in high vacuum at temperatures between 150 and 500 °C. The high-purity, solid coating material (metals such as titanium, chromium and aluminium) is either evaporated by heat or by bombardment with ions, at the same time, a reactive gas (e.g. nitrogen or a gas containing carbon) is introduced; it forms a compound with the metal vapour and is deposited on the tools or components as a thin, highly adherent coating. In order to obtain a uniform Coating thickness, the parts are rotated at uniform speed about several axes.

Tools are a significant factor, for efficient & economical manufacturing. Short tool life and premature failures result in production stoppages. Such frequent production stoppages for tool maintenance results in monetary losses in terms of tool costs, maintenance costs and most importantly, the cost of downtime (machine downtime, labor costs, opportunity costs etc.). Current industry practices such as just in time (JIT) have introduced an additional burden on component manufacturer to run smooth, uninterrupted production schedules. As performance of tool material and operating surface, determines the competitive product pricing and efficiency of process. There is always pressing need to improve tool life by preventing such common causes of tool failure. In this era of unrelenting pricing pressure evolutionary, incremental improvements are essential to preserve profitability.

The most primary cause for frequent production stoppages as reported by component manufacturers is identified as wear (abrasive, erosive & tribo-oxidation / corrosion, adhesive). To enhance life, tools are made of expensive advanced materials (steel / Carbide) and lubricants are commonly used. The selection of tool material and heat treatment, if necessary is dictated by the need for the greatest possible wear resistance; accordingly, hardness combined with adequate toughness is sought. This compromise is achieved in rare cases.

Engineered tool surfaces with wear protection surface treatments / coatings represent great opportunity to preserve and increase profitability. Today, wear protection surface coatings are employed for decisive productivity gains and consistent multi-fold tool life improvements there by reducing cost per component. Added advantages are in terms of significant improvement in quality of components produced & reduced lubricant consumption. Oerlikon Surface Solution segment formed by combining the complementary strengths of Oerlikon Balzers (Thin film PVD / PACVD coating) and Oerlikon Metco (Thermal Spray, Nitriding), the two pioneers in surface technology solutions – under one roof. Together we stand for pioneering innovation in technology and providing leading-edge surface solutions for our customers.

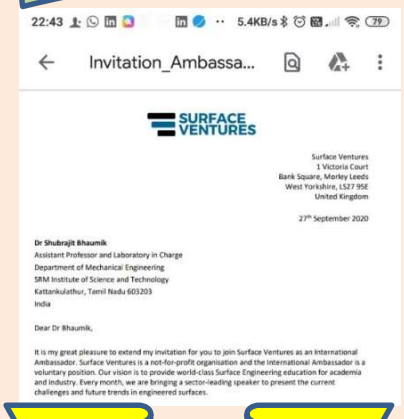
Oerlikon Balzers the pioneer, innovator & world's leading supplier of advanced thin film PVD (physical vapour deposited) coatings; world renowned as BALINIT® coating services have developed range of wear protection surface coatings to overcome wear problems. Wear protection surface coatings are globally used in metal cutting, forming, die casting, plastic & rubber processing tools and precision components to significantly improve its performance.

Congratulations

World Ranking of list for top 2% Indian Scientists! Metallurgical Engg & Materials based on an independent study done by Stanford University scientists (for methodology and data visit)- https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000918

Prof. B. S Murty
Dr. U. Kamachi Mudali
Prof. M.Kamaraj
Dr. Baldev Raj (Late)

Congratulations and Best wishes
Dr T. Sundararjan has taken over as Senior Associate Vice President and Head of Technical, Tube Products of India, Murugappa Group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Invitation_Ambassa...

SURFACE VENTURES

Surface Ventures
1 Victoria Court
Bank Square, Morley Leeds
West Yorkshire, LS27 9SE
United Kingdom

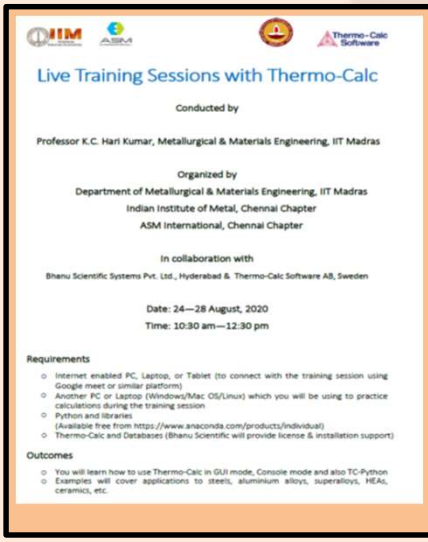
27th September 2020

Dr Shubrajit Bhaumik
Assistant Professor and Laboratory in Charge
Department of Mechanical Engineering
SRM Institute of Science and Technology
Kattankulathur, Tamil Nadu 603203
India

Dear Dr Bhaumik,

It is my great pleasure to extend my invitation for you to join Surface Ventures as an International Ambassador. Surface Ventures is a not-for-profit organisation and the International Ambassador is a voluntary position. Our vision is to provide world-class Surface Engineering education for academia and industry. Every month, we are bringing a sector-leading speaker to present the current challenges and future trends in engineered surfaces.

Congrats
Dr. Shubrarjit B


Live Training Sessions with Thermo-Calc

Conducted by

Professor K.C. Hari Kumar, Metallurgical & Materials Engineering, IIT Madras

Organized by
Department of Metallurgical & Materials Engineering, IIT Madras
Indian Institute of Metal, Chennai Chapter
ASM International, Chennai Chapter

In collaboration with
Bhanu Scientific Systems Pvt. Ltd., Hyderabad & Thermo-Calc Software AB, Sweden

Date: 24—28 August, 2020
Time: 10:30 am—12:30 pm

Requirements
- Internet enabled PC, Laptop, or Tablet (to connect with the training session using Google meet or similar platform)
- Another PC or Laptop (Windows/Mac OS/Linux) which you will be using to practice calculations during the training session
- Python and libraries (Available free from https://www.anaconda.com/products/individual)
- Thermo-Calc and Databases (Bhanu Scientific will provide license & installation support)

Outcomes
- You will learn how to use Thermo-Calc in GUI mode, Console mode and also TC-Python
- Examples will cover applications to steels, aluminium alloys, superalloys, HEAs, ceramics, etc.

Live Training Sessions with Thermo-Calc was organized by Prof. K. C. Hari Kumar, M&M Dept. ASMICC, IIM & IIT Madras in collaboration with Bhanu Scientific Systems., Hyd. & Thermo-Calc Software AB, Sweden, during 24-28 August, 2020 for 25 participants from academy and industry.

Congratulations

ASM International Chennai Chapter congratulates **Dr. M. Kamaraj, FIWS, FIE, FASM, FIIM Chairman ASMICC and** Professor, Department of Metallurgical And Materials Engineering IIT Madras, has been appointed to the **ASM Nominating Committee 2021.**

ASMNEWS

FURRER TO CHAIR 2021 NOMINATING COMMITTEE

Members of the 2021 Nominating Committee have been selected and **Dr. David U. Furrer, FASM,** senior fellow discipline lead, Pratt & Whitney, was elected to serve as chair by the ASM Board of Trustees. Furrer has been a member of ASM International since 1985 and served as ASM trustee in 2010-2013 and as ASM President in 2019. He earned both his bachelor's and master's degrees in metallurgical engineering from the University of Wisconsin-Madison, and a doctorate of engineering from the Universität Ulm in Germany. Furrer joined Pratt & Whitney in 2010 and leads the Pratt & Whitney Materials Discipline Chiefs and Materials Fellows in development of technical strategies, new materials and processes, and engineering standards and procedures. He is also responsible for the materials engineering discipline health relative to technical talent growth, sustainment, and succession planning. Prior to Pratt & Whitney, Furrer was chief of strategic materials and process technology and fellow of materials process modeling at Rolls-Royce. Furrer is actively involved with ASM chapters, committees/councils and Affiliate Societies and most recently helped to establish the formation of technically focused committees, such as the Residual Stress Committee, for ASM. Furrer is a member of the Connecticut Academy of Science and Engineering and was installed as an ASM Fellow in 2003.

Furrer

ASM Officers Appoint Members

In accordance with the ASM International Constitution, ASM president **Diana Essock, FASM,** vice president **Dr. Judith Todd, FASM,** and immediate past president **Dr. Zi-Kui Liu, FASM,** appointed nine members to the Nominating Committee from among candidates proposed by chapters, committees, councils, and ASM Affiliate Society boards.

The committee is responsible for selecting a nominee for vice president-trustee (one-year term) and for nominating three trustees (three-year terms). Members do not select a candidate for president of the Society, because Article IV, Section 3 of the Constitution states that the office of president shall be filled for a period of one year by succession of the vice president. The 2021 Nominating Committee's nominee for vice president will serve as ASM's president in 2023.

2021 Nominating Committee Members Include:

Dr. Andrew S.M. Ang, research engineer, Swinburne University of Technology, Melbourne, Victoria, Australia (nominated by the Thermal Spray Society); **Robert Goldstein, FASM,** executive director of product development and strategic planning, Fluxtrol Inc., Auburn Hills, Mich. (nominated by the Heat Treating Society); **Dr. M. Kamaraj, FASM,** professor, Indian Institute of Technology, Chennai, India (nominated by the Chennai Chapter); **Dr. Guiru Nash Liu, FASM,** senior experimental metallurgist, Progress Rail, LaGrange, Ill. (nominated by the Chicago Regional Chapter); **Alexandra Merkouriou,** project manager for Project Daedalus, University of Connecticut, Colchester (nominated by the Emerging Professionals Committee); **Dr. Dongwon Shin,** senior R&D staff member, Oak Ridge National Laboratory, Tenn. (nominated by the Alloy Phase Diagram Committee); **Hans Shin,** laboratory director, Pacific Testing Laboratories Inc., Valencia, Calif. (nominated by the San Fernando Valley Chapter); **Dr. John Smugeresky, FASM,** chief technical officer, A M Materials Consultants, Pleasanton, Calif., and senior member technical staff (retired), Sandia National Laboratories, Livermore, Calif. (nominated by the Materials Properties Database Committee); **Prof. Veronique Vitry,** associate professor, University of Mons, Belgium (nominated by the IDEA Committee).

The Nominating Committee will meet on April 14 and its recommended slate of officers will be published in the May/June issue of *ASM News*.

63 ADVANCED MATERIALS & PROCESSES | APRIL 2021 ASMNEWS

International Metallographic Contest at IMAT

Deadline: September 3, 2021

The International Metallographic Contest (IMC), an annual contest cosponsored by the International Metallographic Society (IMS) and ASM International to advance the science of microstructural analysis, will take place on September 12 as part of IMAT 2021. The conference is scheduled for St. Louis, September 13-16. Six different classes of competition—including a new video class—cover all fields of optical and electron microscopy:

Class 1: Light Microscopy—All Materials
Class 2: Electron Microscopy—All Materials
Class 3: Student Entries—All Materials (Undergraduate Students Only)
Class 4: Artistic Microscopy (Color)—All Materials
Class 5: Artistic Microscopy (Black & White)—All Materials
NEW—Class 6: Video Entry

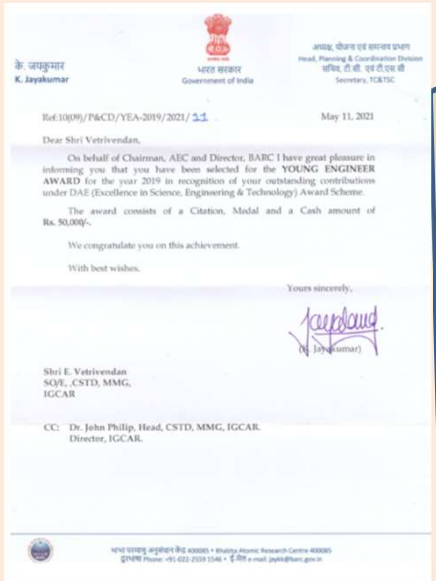
The new video class is aimed at engaging undergraduate students who may be unable to get into the laboratory due to COVID-19 restrictions.Best-In-Show receives the most prestigious award available in the field of metallography, the Jacquet-Lucas Award, which includes a cash prize of $3000. For a complete description of the rules, tips for creating a winning entry, and judging guidelines, visit metallography.net or contact IMC chair, Ellen Rabenberg at ellen.m.rabenberg@nasa.gov.

Member Achivements of the Chapter

Congratulations on being appointed as Professor of Practice (Honorary), Department of Metallurgical And Materials Engineering, IIT Madras, Chennai & for being awarded the "Honorary Member" of the Indian Institute of Metals in February 2021

Congratulations Dr. N. Rajendran on assuming charge as Head, Department of Chemistry, Anna University, Chennai

Congratulations Dr. T.M. Sridhar, on assuming charge as Placement Officer, University of Madras



के. जयकुमार
K. Jayakumar

भारत सरकार
Government of India

अध्यक्ष, योजना एवं समन्वय प्रभाग
Head, Planning & Coordination Division
सचिव, टी सी एवं टी एस सी
Secretary, TC&TSC

Ref:10(09)/P&CD/YEA-2019/2021/11 May 11, 2021

Dear Shri Vetrivendan,

On behalf of Chairman, AEC and Director, BARC I have great pleasure in informing you that you have been selected for the YOUNG ENGINEER AWARD for the year 2019 in recognition of your outstanding contributions under DAE (Excellence in Science, Engineering & Technology) Award Scheme.

The award consists of a Citation, Medal and a Cash amount of Rs. 50,000/-.

We congratulate you on this achievement.

With best wishes.

Yours sincerely,

(K Jayakumar)

Shri E. Vetrivendan
SO/E, CSTD, MMG,
IGCAR

CC: Dr. John Philip, Head, CSTD, MMG, IGCAR.
Director, IGCAR.

भाभा परमाणु अनुसंधान केंद्र 400085 • Bhabha Atomic Research Centre 400085
दूरभाष Phone: +91-022-2559 5546 • ई-मेल e-mail: jayk@barc.gov.in

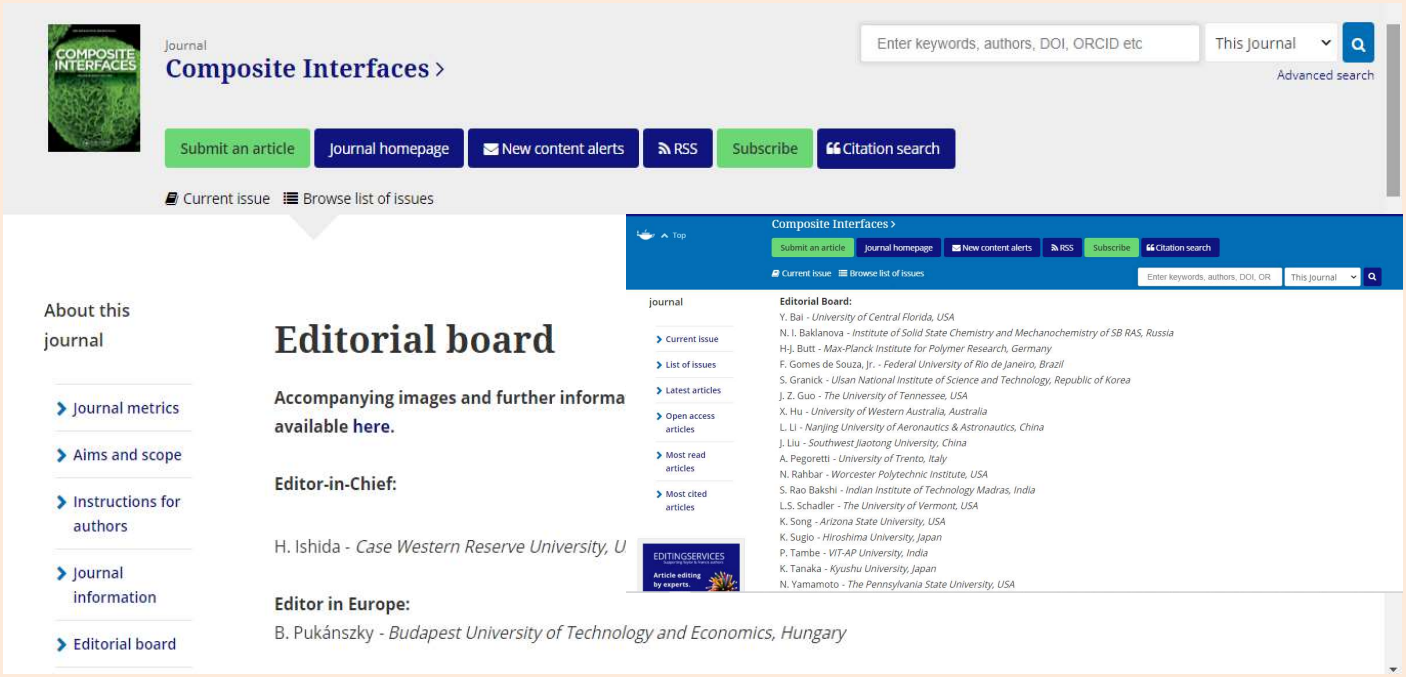
Congratulations Shri. E Vetrivendan, IGCAR, Kalpakkam received the "Young Engineer Award" for the year 2019 in recognition for the outstanding contributions under DAE (Excellence in Science,Engineering & technology) scheme of awards

Achievements & Awards

Prof. Srinivasa Rao Bakshi

Promoted as PROFESSOR, Department of Metallurgical And Materials Engineering, IIT Madras, Chennai.

Congrats on being invited to be a member of the **Editorial Board** of **Composite Interfaces** which is a journal published by Taylor and Francis.



Material Advantage Student Chapter, NIT Trichy
Guest Lecture by Dr. George Vander Voort on 29.12.2020 @9.15PM

New year 2021 greetings. On behalf of Material Advantage Student Chapter, NIT Trichy, I cordially invite you all for the 2nd lecture in theSir Alan Cottrell Guest Lecture Series by Dr. George Vander Voort, World-Reknowned Metallography Consultant on 29th Dec 2020 at 9.15 PM through online mode (MS Teams). Lecture topic: Basics of Metallography Meeting Link: https://rb.gy/t3mmwl *Short biography of Dr. George Vander Voort is below.* George received his BS in Metallurgical Engineering from Drexel in 1967 – the last class as Drexel Institute of Technology and received their Distinguished Alumnus Award in 2005. He received an M.S. degree in Metallurgy and Materials Science from Lehigh University in 1974. George is the principal author of >373 publications, including the book Metallography: Principles and Practice(McGraw-Hill, 1984, ASM Intl., 1999, 752 pgs.) and Buehler's Guide to Materials Preparation. He has edited eighteen books. He is the author of 29 articles in various editions of the ASM Metals Handbook series, 8 of these articles are on failure analysis topics, was editor for the 2004 revision of Vol. 9, Metallography and Microstructures, and made eleven of the fourteen videotapes in the ASM video course Principles of Metallography. He is the author of nine ASTM standards and holds six patents. His micrographs have been within or on the covers of >161 books, magazines, newsletters, brochures or calendars. He has won 35 awards for his work in metallography contests including the Jacquet-Lucas Grand Prize. George has been active with the International Metallographic Society, IMS, since 1974 serving on the board of directors, as membership chairman, secretary, vice president and president (1981-1983). George is a member of the American Society for Testing and Materials, ASTM (now ASTM International), since 1979, as a member of committees E-4 on Metallography and E-28 on Mechanical Testing. George is a member of the American Society for Metals (now ASM International) since 1966 (Life Member); and served on the executive committee of the Lehigh Valley Chapter (secretary, 1971-1974). He has given 405 lectures (nine honorary lectures) in 39 countries; spoken 85 times at 52 ASM Chapters, and at 74 universities. The detailed biography and other details can be found at http://www.georgevandervoort.com/

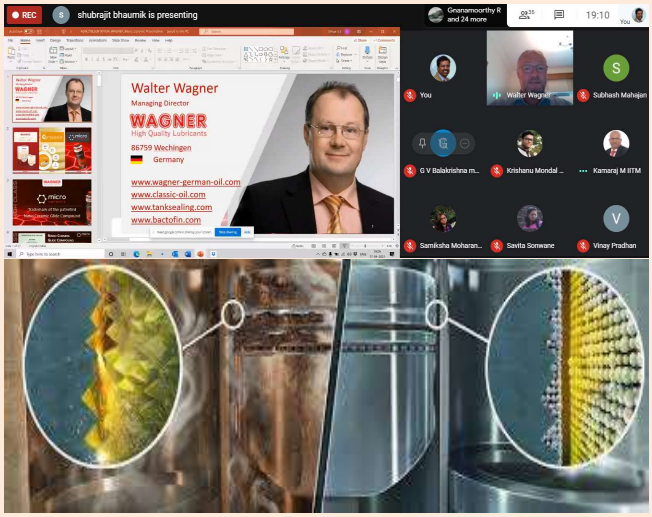
Activities of the Chapter - Technical Talk – Webinar, 17th April 2021

Wagner Micro Ceramic: Harnessing The Power Of Nanotechnology For Smarter Lubrication by Mr. Walter Wagner, Managing Director, Wagner High Quality Lubricants, Germany

Friction, Wear and Lubrication are three important aspects which controls the GDP of any country. Since, ages lubricants have been used as an integral part of any equipment and hence, is always considered as the bloodline of any equipment. In order to explore the advances in lubrication a talk on Next Generation Nano Lubricants, "Wagner Micro Ceramic: Harnessing the Power Of Nanotechnology For Smarter Lubrication" was organized jointly by ASM International Chennai Chapter, Indian Institute of Metals-Chennai Chapter and Madras Metallurgical Society. Prof. M. Kamaraj, Chairman ASM Int. Chennai Chapter welcomed the gathering. Dr. Shubrajit Bhaumik introduced the speaker and then Prof. Kamraj invited Mr. Walter Wagner, Managing Director to deliver the talk.

The talk was delivered by Mr. Walter Wagner, Managing Director, Wagner High Quality Lubricants, Germany and his team (Dr. Shubrajit Bhaumik, Tribologist India and Mr. Arupanjan Mukherji, Business Head India). About 86 participants attended the talk. The speaker presented the utilization of their patented nano lubricants and stressed upon controlling friction and wear in industrial application. They also pointed out that with the usage of the next generation nano lubricants less power can be consumed. Field results have indicated that the usage of Micro Ceramic nano additives have reduced the power consumption by 5.66% in spinning mills with an increased productivity of 2.3%. Additionally, these Micro Ceramic nano additives have enhanced the life of engines and reduced emissions in automobiles. The speaker also presented a case study on Generators which exhibited 33% reduction in emissions and 13% reduction in fuel consumption. Other field studies included the usage of nano Micro Ceramic in automobiles which showed a decrease of about 75% reduction in emissions, smooth engine sound and about 16% increase in mileage. The speaker also stressed on the disadvantages of using Molybdenum di sulphide and graphite greases which were overcome by using the Micro Ceramic Additives added Greases. The load bearing capacity of the Micro Ceramic Additives in Greases was 25%-50% more than Molybdenum di sulphide greases. At the end of the session, the participants interacted with Wagner team in full enthusiasm. Prof. M. Kamaraj , Chairman ASM Int. Chennai Chapter thanked Mr. Walter Wagner and his team for the informative session of the modern technology of next generation lubricant- Nano lubricant. Dr. Shushant Kumar Panigrahi, Secretary ASM Int. Chennai Chapter thanked the wonderful gathering for their active participation. Prof. Kamaraj also thanked Dr. Shubrajit Bhaumik, Member ASM Int. Chennai Chapter for organizing the talk.

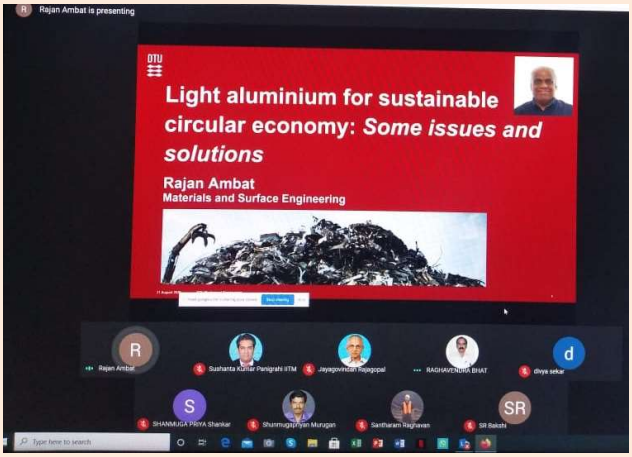
For more details on the nanotechnology implemented next generation nano-lubricants you can write to Dr. Shubrajit Bhaumik, Tribologist, Email: shubrajit.bhaumik@wagner-german-oil.com and Mr. Arupanjan Mukherji, Business Head, Email: arup@wagner-german-oil.com, who are based in India.

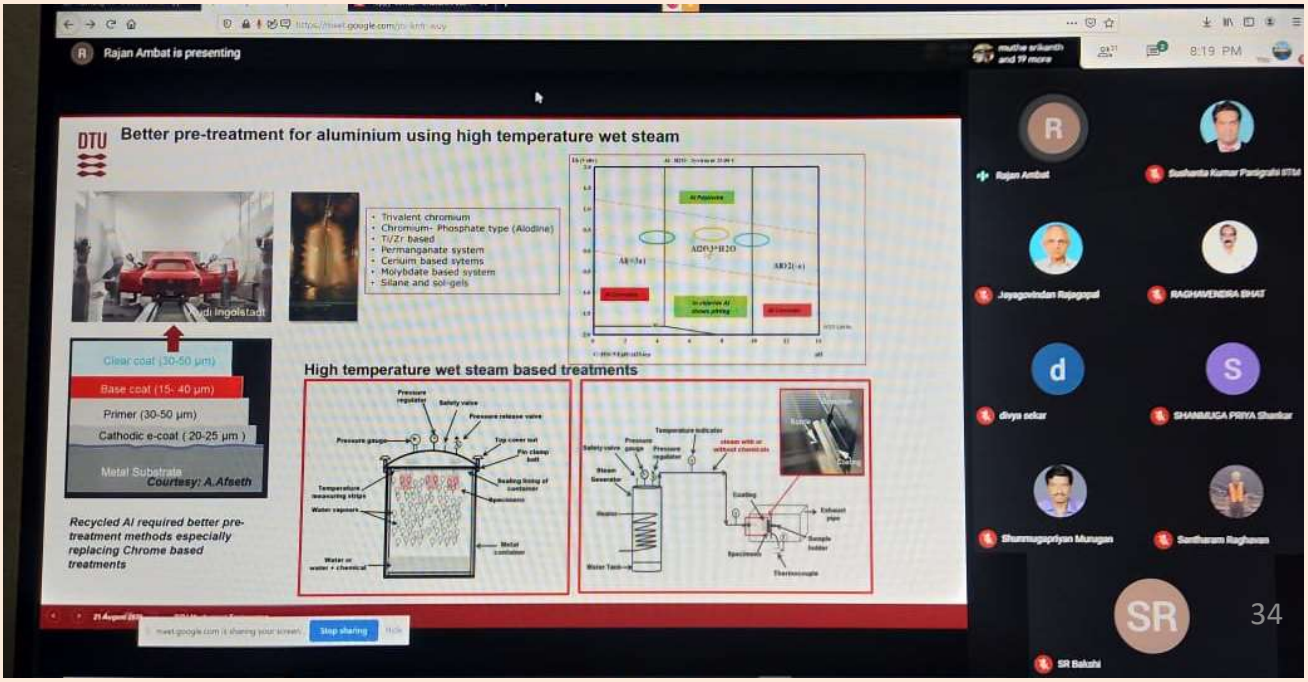


Technical talk (Webinar) on 22nd August 2020

ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter and Madras Metallurgical Society organized a **WEBINAR TECHNICAL TALK by Prof. Rajan Ambat, Materials and Surface Engineering, Department of Mechanical Engineering, Technical University of Denmark, DK 2800 Lyngby, Denmark** on "**Light aluminium for sustainable circular economy: Some issues and solutions".**

Aluminium alloys are seen as an alternative sustainable material for many applications due to its light weight and high recyclability with matching mechanical properties. Recycling and use of recycled aluminium alloys are most important order to obtain full potential of aluminium as a sustainable alternative material for a circular economy. From the point of view of engineering applications, use of recycled aluminium face lots of challenges, therefore its application needs to weigh against these challenges. This talk will cover the importance of light aluminium alloys today as a material of high efficiency, including recycling, and pros and cons, and then overview some of the corrosion and surface engineering activities focusing on recycled aluminium for finding suitable solutions for efficient applications for example: automotive heat exchangers, anodizing etc.

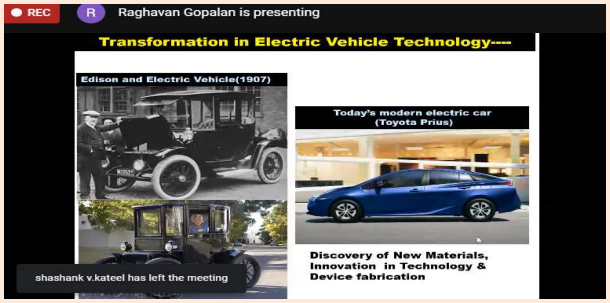


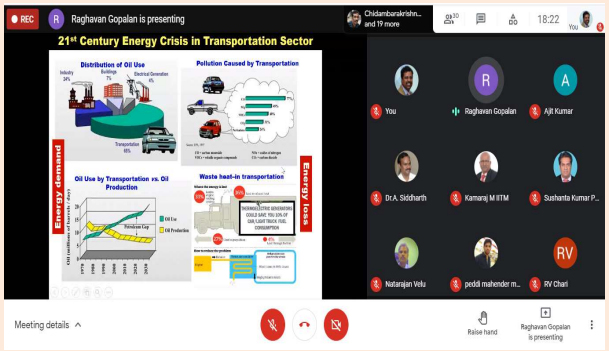


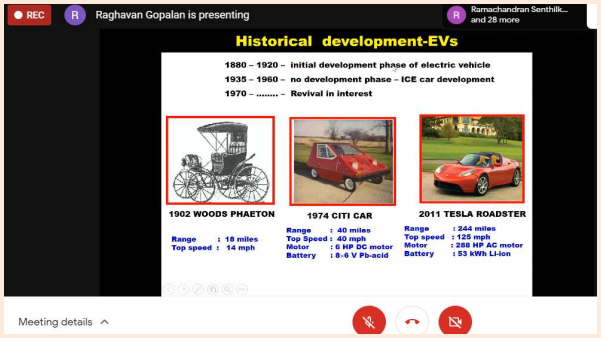
NATIONAL TECHNOLOGY DAY -Technical Talk - Webinar on 15th May 2021

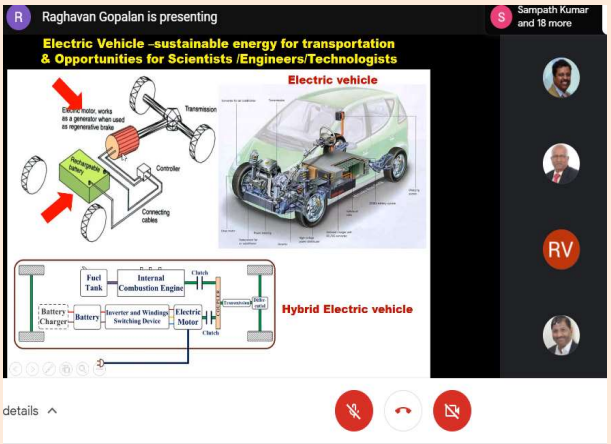
Opportunities and challenges in Li-ion battery and Magnets Technology for Automotive Application

Dr. R. Gopalan, FNAE, FIIM, FTAS, FASC, FEMSI, FISAS
Regional Director
International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), IITM Research Park, Chennai

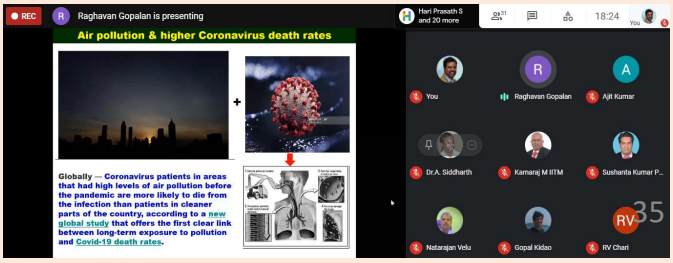








ASM International Chennai Chapter, The Indian Institute of Metals, Chennai Chapter, and Madras Metallurgical Society organized a National Technology Day webinar on "Opportunities and challenges in Li-ion battery and Magnets Technology for Automotive Application" The talk dealt with Electric Vehicle (EV) / sustainable transportation technology is looking for key materials and manufacturing technology for energy saving. Li-ion battery and magnet take a vital role for such applications. The technology on these materials demands that a strategic and economical process on industrial scale is required to cater the large scale automotive applications especially for EV sector. In this context, it is worth to discuss about the progress in Li-ion battery technology, especially among the electrode materials to battery fabrication which is a great boom to Electric Vehicle. The fabrication of lithium ion batteries for EV applications at ARCI at pilot plant scale will be highlighted with E-vehicles demonstration at Lab as well on road. The discussion will cover the major challenges as well in processing of the batteries and magnets.



Unexpected Happy Entry Into ASM International

V. Parthsarthy, B.Sc., AMIE, PDMET, FIE, FASM
Past Chairman
ASM International – Chennai Chapter
Immediate Past Chairman of India National Council

During 1985, I have joined ASM International as a member (then called American Society for Metals) and my membership automatically attached to India chapter formed during 1979, functioning at Mumbai (then as Bombay) as head quarter of India chapter. I was also a committee member of India chapter for two years but to my knowledge I had never attended any committee meeting or regular meeting normally held at Mumbai, because of the distance.

During 1985 Chennai Chapter was formed, but then I never knew about it or had any information or invitation from chapter sources, although I was a member of ASM. This may be due to my membership in India chapter. In the year 1997, I was involved in establishing Tamilnadu Heat treaters Association organizing hectic Technical activities relating to Heat treatment, Metals, Materials and Heat treat equipments etc.

Mr. PKM Pillai, who was the chairman of Chennai ASM got associated closely and in some programmes at his request, I used to include ASM name also in the invitation.

During 1997 ASM Head Quarters requested to merge the chapter with India chapter, since the chapter is not active and very learn membership. At this crucial juncture, I was requested to attend committee meeting of Madras chapter. In the meeting it was decided to revamp the situation. The committee decided that myself along with Mr. PKM Pillai (late) to attend India chapter meeting with the International President, who planned to visit Bombay. Myself along with PKM Pillai, made a presentation and convinced the ASM International President that Madras chapter can be made active with improved membership at the earliest.

After return, I was requested to take up Chairmanship of Chennai chapter (then madras chapter) and took up the responsibility. In the 1st year membership rose more than 100%. The activities became Vibrant. The during 1999- 2000, ASM Headquarters recognized as the 5 star chapter, for India - 5 star statune, this is the FIRST for INDIA, although 4 chapter exists already. The next year, Chennai chapter received the coveted No 1 position with “Chapter Excellency Award” in addition to 5 star Award.

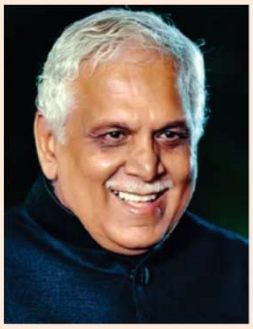
Likewise the chapter involved in useful and best services to members, Professionals and Industry.

the council chairman Dr Mehta and every member of the council in one voice decided that I should take up the responsibility as India National council chairman for which I had accepted. From then onwards the activities at National level started with propagating ASM where ASM is not known i.e. at Bangalore, Nashik etc where excellent training programmes are also conducted.

Bangalore chapter is chartered with good membership and doing good work to the region. In this connection I have my appreciation to Mr. Ramasamy Pandian & Shri. S. Raghunathan who worked hard. In this voyage, I wish to recognize some of the personalities (V13) Mr.T.V.K. Kidao, A. Krishnasamy in the initial formation years. Later Dr Bhanu Sankara Rao, Dr. Prasad Rao, Dr. Murthy and Dr. Kamachi Mudali especially in establishing student chapters at Khangapur, I.I.T. Madras, Mailam Eng college Pondicherry and other places. At National level Dr. Mehta, who brought ASM to India and passed on the Baton to me for improved progress and betterment of ASM. There are many who rendered the best services, but could not give here for want of space.

Here, I wish to emphasize, that committed hard work, with selfless service will render enormous satisfaction to the person who leads and immense benefits to society. One need not be after posts or power but posts are ready for the ones who accept to give selfless service.

Condolence



With Deep Regret, we inform the sudden demise of **Shri. Premkumar Aurora-ji** (former chairman of ASM INC, Trustee of ASM International). Shri Prem-ji played an enthusiastic role in bringing ASM Chapters close to our community. We have lost our mentor and good human being. We pray the almighty to rest the great soul in peace and to give strength to his family.

– ***M. Kamaraj**, FASM, Chair, Chennai Chapter*

During pandemic time Prem ji met me and impressed about being safe and taking care of family and colleagues. Such a lovely person with ever smiling face, and dedication to ASM, he met me for starting the ASM Kanpur Chapter and for the organization of MET+HTS at Mumbai. His enthusiasm and commitment to ASM's growth in India is unbelievable. Many times he has concentrated more on ASM growth than his own business. We have really lost a true soldier of ASM in India ! **-U. Kamachi Mudali,** Trustee-Elect, ASM International

He has been personally so close with me for so long. I can say he is one person so genuine and at the same time the entire ASM Chennai Chapter family shares in their grief. Here are some remembrances of Prem Aurora. ***C. Renganathan**, Chennai Chapter*

"In Prem Aurora's passing, I lost a dear brother in my ASM family. I met Prem in 1990 during a visit to the ASM community in Mumbai, India, and a lifelong friendship blossomed. He was a young ASMer beaming with enthusiasm, a true disciple of the legendary Harsukh M. Mehta.

Anytime I needed a task to be carried out, Harsukh bhai directed me to Prem. Indeed, Prem understood the potential for the growth of ASM in India and South Asia. His efforts resulted in phenomenal membership growth and a dynamic expansion of chapter activities. He initiated the Heat Treat show in Mumbai (1991), and its success resulted in the biennial MET+HTS (materials engineering technology conference and heat treat show) International Event in Mumbai. He contributed significantly to the success of the India Task Force in enabling new ideas, targets, and achievements for the ongoing growth of ASM in India. He also fostered partnerships with other societies in the materials community of India.

"I was enthralled by the passion, commitment, and total dedication of Prem to the mission of ASM. When he came to ASM as a trustee, many heard me address him as 'Premji' (with the honorific suffix 'ji'), and he became Premji for all of us. Indeed, Premji stands out in our hearts as a star, inspiring the volunteers of ASM International." – ***C. Ravi Ravindran**, FASM, ASM past president.*

"Prem was an outstanding leader and individual. He had the highest levels of ethics, integrity, and sense of community. ASM has lost a pillar in our community." – ***David Furrer**, FASM, ASM past president.*

"We shall all remember the progressive and creative contributions of brother Premji to ASM as culminated by his trustee volunteer service. Personally, my presidential pilgrimage to India hosted by Prem was the most significant initiative of my year of service." – ***Fred Schmidt**, FASM, ASM past president.*

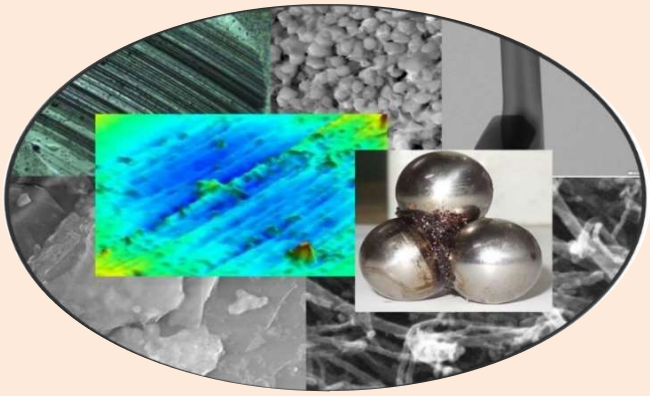
"Prem was one of the most down-to-earth people, willing to do everything or anything for ASM. His outstanding leadership and contributions toward the development of ASM in India have been well recognized by leaders of ASM headquarters." – ***Ashok Kumar Tiwari**, FASM, India Council chair.*

ASM International Chennai Chapter deeply condoles the sudden demise of our former EC member **Shri. R. G. SADAGOPAN** Managing Partner – Thermal Systems and Engineering and Managing Director- Welmech Engineering Company Pvt Ltd

Forthcoming International Conference

International Conference on Friction, Wear and Lubrication 2022 (FWL 2022)

In order to highlight the importance of controlling friction and wear and the selection of correct lubricants, ASMICC is organizing the "International Conference on Friction, Wear and Lubrication 2022 (FWL 2022)" jointly with Material Advantage and the Department of Mechanical Engineering, SRM Institute of Science and Technology, Kattankulathur Campus.



The conference will not only be a common platform for the participants to share and display their research results but will also be a connecting gate between the industry and academia. It is expected to have participants from various countries and hence, ASMICC invites active participation of its members. Kindly give wide publicity among your friends and colleagues.

Authors are encouraged to submit their original articles to the indexed journals which will be notified later.

- **Surface treatments**
- **Composites**
- **Coatings**
- **Fretting**
- **Corrosion**
- **Bio-mimetics**
- **Wear Modelling and Reliability**
- **Contact Mechanics**
- **Sustainable approaches of controlling friction**
- Condition monitoring
- Friction measurement devices
- Lubricants and additives
- Friction Materials
- Friction and wear controlling aspects in design & manufacturing. Case studies.
- Artificial intelligence and machine learning in friction, wear and lubrication
- Material Design for controlling friction and wear

Manuscript including findings from nano to macro scale of applications are in the scope of this conference. The call for abstracts would be announced shortly. Stay tuned for further announcements.

Condolence - Remembering Mr.Gunasekaran

Mr. K. GUNASEKARAN has been our active executive committee member of ASM International Chennai Chapter for several years. He retired from service as Senior Controller, TAFE Gears Division, An Amalgamation Group Company, Kanchipuram District, Tamil Nadu. He is basically a chemist who holds a A.M.I.I.M. (Metallurgy) from Indian Institute Of Metals. Calcutta. India in 1987. He has a vast industrial experience in heat treatments and in dealing with industrial challenges of metals and how to choose and apply them, testing of industrial grade alloys. The process used by different industries like TAFE gears to increase production with quality improvement, work holding fixture-designing; fabrication & implementation and develop strategies to increase production with improved quality. He has handling the Heat treatment Production & Quality of Crown Wheel & Pinion; Incoming Raw Material & Heat treated parts Metallurgical Control; Continuous Improvements; Motivation of Operators by involving in Suggestion Schemes for accident free working zone with better quality Production; Consumable Control; Manpower Control; Special Projects; New Process Developments & Establishments with Latest Technologies for improving Production & Quality ISO 9001 with CQI-9 Documents: Preparation & Implementation; Problems trouble shooting; Training for Heat Treatment personnel with Techniques: HT Operations; Metallurgy; Furnace Maintenance; House Keeping; QCC; Daily HT Documentations; TAFE Gears Division Standards Up-gradations and Etc.

His experiences at Hicom petro-pipes, Kedah. Malaysia includes the use of on-line automatic ultrasonic pipeline (straight & spiral seam tester from Germany; refabricated & implemented–for ultrasonic testing of thicker pipes as per aAPI 5 L requirements. He has rich industrial experience in India and abroad and is familiar with industrial process adopted by Selangor Industrial Corporation, Selangor, Malaysia, Madras Motors Forgings Ltd., Hindustan Motors Ltd., Lucas TVS, Chennai. He started his career at Ashok Leyland ltd, Ennore, Chennai were he was involved for 13 years on development of new analysis techniques to analyse the composition of metals and alloys used in auto component manufacturing and their test protocols.

Condolence - Remembering Mr.Gunasekaran

He has contributed two Books on “Heat Treatment Furnaces Around the World” and “Metallurgical Inspection of Materials”. Professionally he has been associated with several socities and was an active member in American Society for Metals, Indian Institute of Metals, Calcutta, National Institution for Quality Assurance, Madras Metallurgical Society, Indian Society for Non Destructive Testing

A few of his achievements and honors include filing of a patent on behalf of M/s TAFE- for increase in production with quality improvement & accident free heat treatment zone. He was awarded the TAFE-President Gold Medal Award for work holding fixture-designing; fabrication & implementation-production increase with improved quality and for designing a mechanical robot - designing & fabrication– component unloading from hot furnace with improved quality and more safety. He was honored and appreciated for his contributions to ASM and ASMICC by all the ASM presidents visiting our chapter.

Condolence - Remembering Mr.Gunasekaran

His contributions have been recognized @ M/S TAFE for suggestions on QCC; e-CIMP; 3M implementing many improvements in the field of quality & ease of heat-treatment operation. He has redesigned the on-line automatic ultrasonic pipeline (straight & spiral seam tester from Germany; refabricated & implemented–for ultrasonic testing of thicker pipes as per API 5 lL requirements at Hicom Petro-Pipes, Kedah. Malaysia. Awarded bronze medal for improving sales at Selangor Industrial Corporation, Selangor, Malaysia. He received the Certificate of Merit for Economy in Power Consumption and increase in Work Safety at Lucas TVS, Chennai. He received cash award twice for designing; fabrication and implementation of a fixture-for re-assembling of loose leaf springs-assembly & non destructive hardness testing of cylinder liners from Ashok Leyland, Ennore, TN.

There are no words to describe his association with ASMICC and the time and dedication with which he has enthusiastically participated in all the activities from delivering lectures in workshops to organizing material camps, evening lectures, International and National conferences and many mor events for decades with a smiling face. He has been a resource person for training programmes conducted on basic metallurgy & heat treatment in co-ordination with Madras Metallurgical Society for non-metallurgical executives; shop floor operatives in both Tamil and English. Training programmes conducted for students on basic metallurgy & modern Indian industry in co-ordination with SRM University; Hindustan university; Karpaga Vinayakar University in TN and many more. ASMICC records its hearlfelt condolences to Mr. Gunasekarn and shares its grief with the family members.

About Our Corporate Members

Fax: 91-44-28131703

Phone: 28133093
28133903

Madras Metallurgical Services Pvt. Ltd.

METALLURGISTS AND ENGINEERS
P.B. No. 5553, No. 24, Lalithapuram Street, Royapettah, Chennai - 600 014, India.
E-Mail: mmspl@vsnl.com, info@madrasmetallurgical.in

MADRAS METALLURGICAL SERVICES PVT LTD is a leading supplier of materials testing equipment. We have had the privilege of supplying these equipment to leading industries in the public and private sectors all over India. The product range broadly includes:

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5. FOUNDRY SAND TESTING: Complete range of equipment for testing foundry sand.
6. PLASTICS, RUBBER AND PAINT TESTING: Complete range of equipment
7. ENGINEERING COLLEGE LABORATORIES: Equipment for various labs like Metallurgy, Theory of Machines, Thermal, Heat Transfer, Fluid mechanics, Metrology.

For more details: www.madrasmetallurgical.in

Our testing division, KIDAO LABORATORIES, is an NABL accredited lab carrying out chemical, mechanical and NDT testing. More details visit: www.kidaolabs.com

Mr. T.V. K. Kidao, one of the founding members of our Chapter as well as a past Chairman, is the Managing Director of both the above companies while his son, Mr. Gopal Kidao who is also a member of our Chapter serves as a Director of both the enterprises.

GH Induction INDIA Pvt Ltd

Innovative Heating Solution

GH Induction India Pvt. Ltd. is an Indo-Spanish joint venture, established in the year 1998 in Chennai and engaged in the manufacture of induction hardening machines and induction heating systems.

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Our machines consists of modern IGBT/MOSFETs based power electronics modules, CNC/PLC controls, automation and part handling systems to suit the variety of parts and production demands; cooling water packages for DM water and quench water circulation and re-cooling; chillers; fume extraction systems; safety devices for machine reliability and operator safety. We meet the current international standards of quality monitoring and maintenance.

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We are in association with ASM Chennai Chapter from 2006

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DP No: 145,12th Main Road,
Sidco Industrial Estate,
Thirumudivakkam, Chennai 600 132.
Tel: 044-2478 1042 / 4398 4747
Fax: 044-2478 0042 / 4398 4700
E-mail: sales@ghinduction.co.in
Digital Address : X3GM+5J, Chennai

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About Our Corporate Members

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Since 1925, Caterpillar Inc. has been helping our customers build a better world – making sustainable progress possible and driving positive change on every continent. With 2019 sales and revenues of $53.8 billion, Caterpillar is the world's leading manufacturer of construction and mining equipment, diesel and natural gas engines, industrial gas turbines and diesel-electric locomotives. Services offered throughout the product life cycle, cutting-edge technology and decades of product expertise set Caterpillar apart, providing exceptional value to help our customers succeed. The company principally operates through three primary segments – Construction Industries, Resource Industries and Energy & Transportation – and provides financing and related services through its Financial Products segment.

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We assure continues service and technical support to our customers in terms of 24 x7. We now, request you to kindly send us your valuable enquiries for your requirements to enable us to submit our proposals . We enclose some of our customers name for your reference.

Yours faithfully,

for MAXWARM ENGINEERIN

G.SAJIKUMAR/CEO
Mob:09840081163

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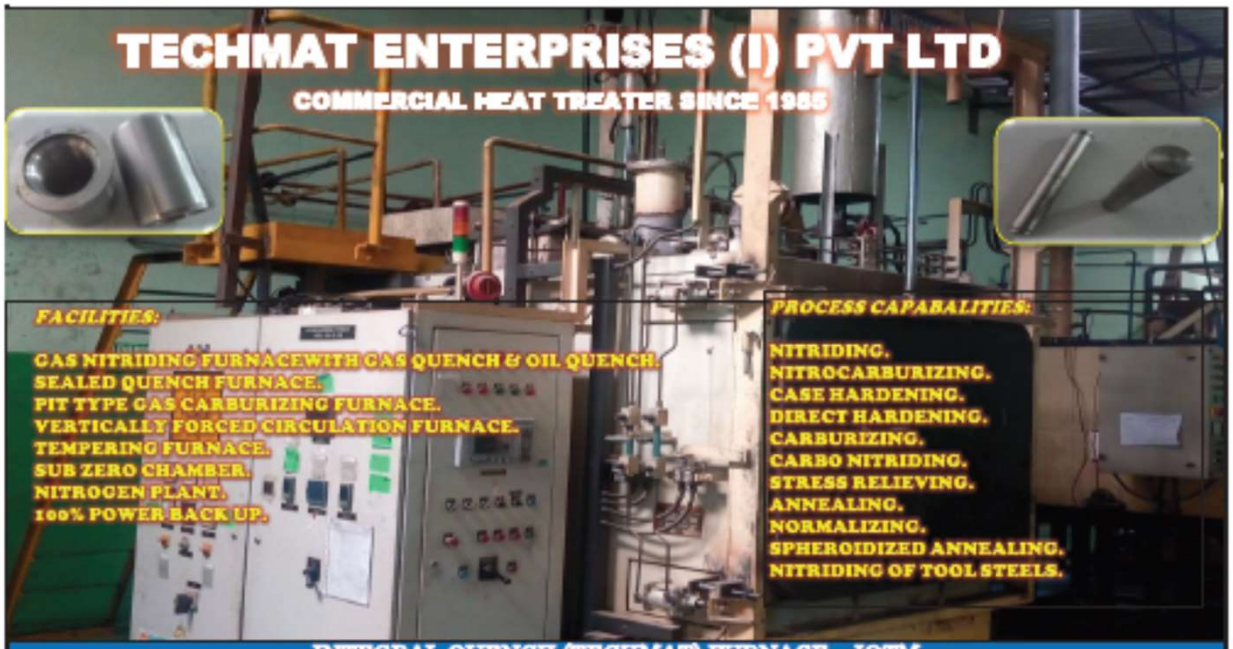
Industrial Estate ,
Ambattur, Chennai ,
Tamilnadu – 600058.

E Mail : customercare@ahtpl.com ; web : www.ahtpl.com

For Further Details pls contact : 9840835500 ; 9840935500

About Our Corporate Members



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Other key features	- Fully automated. - Multi process capability. - Cost competitive. - Compact & Portable. - Quick change over process / quenching media.
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Application:
- To check the hardenability of steel.
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SRMIST
ASM INTERNATIONAL CHENNAI CHAPTER
MATERIAL ADVANTAGE
75TH INDEPENDENCE DAY
WORKSHOP ON
"FRONTIERS IN MATERIALS"
DATE : 14TH AUGUST 2021
TIME : 2:00 PM - 8:00 PM (IST)
Zoom link to join the meet
https://zoom.us/j/98695004799?pwd=WEpDUVdIbkp1T1pxOTVQNkJPVnBtUT09
Meeting ID : 986 9500 4799
Passcode : 123582
Registration is free of cost
PROGRAMME SCHEDULE
2:30 PM - 3:00 PM (IST): Inaugural Session
Prof. M Kamaraj, Chairman, ASMICC
3:00 PM - 4:00 PM (IST): Lecture 1
Prof. Christopher Berndt, Swinburne University of Technology, Australia
Topic: Advances in Thermal Spray Coatings and Applications
4:00 PM - 5:00 PM (IST): Lecture 2
Dr. M Sathya Prasad, Ashok Leyland, Chennai
Topic: Materials & Manufacturing for Future Mobility
5:00 PM - 5:30 PM (IST): Break
5:30 PM - 6:30 PM (IST): Lecture 3
Dr.Debashish Bhattacharjee, Tata Steel Ltd., Kolkata
Topic: New Materials for 21st Century
6:30 PM - 7:30 PM (IST): Lecture 4
Prof. Zi-Kui Liu, PennState University, USA
Topic: Designing and Tailoring Frontier Materials Processing and Properties
7:30 PM - 8:00 PM (IST): Concluding Session
Dr. U Kamachi Mudali, Trustee-Elect, ASM International, USA
Organized by
ASM International Chennai Chapter
Material Advantage Student Chapters
(NIT Trichy & SRMIST)
For any queries, contact Dr. A Vinoth :
9842788830
vinotha@srmist.edu.in
Coordinators
Prof. M Kamaraj, Chairman, ASMICC
Dr. Shushanta Kumar Panigrahi, Joint-Secretary, ASMICC
Dr. Shubrajit Bhaumik, EC, ASMICC
Dr. A Vinoth, Faculty Advisor, Material Advantage, SRM Institute of Science and Technology, Chennai
Dr. V Karthick, Faculty Advisor, Material Advantage, NIT Trichy


75TH INDEPENDENCE DAY
ASM INTERNATIONAL CHENNAI CHAPTER
Platinum Jubilee Independence Day
Special Lecture on
"PLATINUM JUBILEE & BEYOND: MATERIALS DEMAND AND ISSUES"
DATE : 15TH AUGUST 2021
TIME : 11:00 AM - 12:30 PM (IST)
Zoom link to join the meet
https://zoom.us/j/93511483497?pwd=dEczZG1nTXRlV1BGQlRnSWR6VDNkdz09
Meeting ID : 935 1148 3497
Passcode : 585628
Registration is free of cost
Organized by
ASM International Chennai Chapter
SPEAKER DETAILS
DR. U. KAMACHI MUDALI
FNAE, FIIM, FNASC., FIICHE, FNACE, FASM, FAPAM, FIE, HFECSI, HMUDCTAA, HMIIM, FASCH, FICS;
VICE-CHANCELLOR, VIT BHOPAL UNIVERSITY &
HONORARY PROFESSOR OF PRACTICE, IIT MADRAS;
FORMERLY, DISTINGUISHED SCIENTIST,
DEPARTMENT OF ATOMIC ENERGY;
CHAIRMAN & CHIEF EXECUTIVE, HEAVY WATER BOARD (HWB), MUMBAI
Abstract: Since independence in 1947 India has steadily progressed in the materials domain, and has made significant production of metals and alloys required for various applications in industry and society. During the last 10 years, the roadmap for the production of new materials and higher production of conventional metals and alloys in both Ferrous and NonFerrous categories has yielded good results, with India making steady competition with global partners. The materials journey upto independence, till Platinum jubilee, and far beyond, is addressed by the speaker in this presentation based on the facts and figures available in public domain.
Biography: Dr. U. Kamachi Mudali has made pioneering contributions to production of heavy water and specialty materials; advanced materials & coating technology development; corrosion science, engineering and technology; materials, process and equipment development for reprocessing applications; failure analysis, consultancy and societal contributions; for 36 years during his service at DAE. Dr Mudali has 465 Journal publications, 5 patents, and 9500 citations with an h-index of 43 and i-10 index of 245. Dr. Mudali has co-edited 20 Books/Proceedings, Associate Editor of Journal of Electrochemical Society of India and Editor-in Chief of IIM-Springer Book Series and CII-Corrosion Management Committee Booklet Series. He has guided/coordinated 162 UG/PG/PhD degree projects of students from various academic institutions. He is recognised in the World's Top 2% scientists from India in the field of Materials, and is a Fellow of 12 professional associations including 3 from abroad, and Honorary Member of Indian Institute of Metals (IIM) and UDCT Alumni Association, Mumbai. Dr. Mudali is decorated with several distinguished recognitions from India and abroad including: Distinguished Alumnus Award from IIT Bombay where he did M.Tech (Corrosion Sci & Engg.) in 1984, and PSG College of Technology, Coimbatore where he did MSc (Materials Science) in 1982, GD Birla Gold Medal and Metallurgists of the Year Award from IIM & GoI, Best Scientist Award from TNSCST, Chennai, MASCOT National Award, Excellence & Meritorious Awards in Corrosion from NACE India and NCCI, Karaikudi, Vasvik Award, Indian Nuclear Society Medal, Homi Bhabha Science and Technology Award of DAE, Outstanding Faculty Award from HBNI University, Frank Newman Speller Award of NACE International, USA, the highest recognition and first Indian to get in the field of corrosion. Dr. Mudali was Visiting Scientist and widely travelled to USA, Germany, Russia, France, UK, Japan, Malaysia, Israel, Bulgaria, Canada, and Singapore. Dr. Mudali was the President of IIM during 2019-2020, and is currently the Trustee Elect of Board of Trustees of ASM International, USA for 2021-2024, and formerly Chairman of ASM International, Chennai Chapter.