ASM INTERNATIONAL Pune Chapter

75 Azadi Ka Amrit Mahotsav

HAPPY

Independence Day

15TH OF AUGUST

ASM INTERNATIONAL Pune Chapter

Chapter News Letter

Issue No. 36 | August 2022

EDITORIAL . . .

Dear Friends,

It gives me great pleasure to launch this special newsletter on the occasion of 75th Independence Day celebration. As a part of Har Ghar Tiranga' campaign under the aegis of Azadi Ka Amrit Mahotsav we brought the Tiranga home and hoisted it not only as an act of personal connection to the Tiranga but also our commitment to nation-building. We remember Shri. Pingali Venkayya, the architect of the Tiranga. As materials science professional it is interesting to know that the various materials which can be used to make tiranga is cotton, wool, silk, khadi and polyester and we all know that our flag consists of India saffron, India green, white and Navy blue colour.

We had our AGM and Annual day recently with a special lecture from Shri Pradeep Goyal and he was also kind enough to write the foreword for this newsletter edition. We have created this publication with the intention of role of materials in our country's growth and the technical article on "Progress of India in Metallurgy" by Mr. Udayan Pathak, FASM is published wherein the focus is on materials and processes for Steel and Aluminium Industry, Nuclear fuel, Aerospace & Defence program. I am sure you will feel proud and happy reading this article.

Our chapter also received the congratulatory message from David B. Williams, PhD, ScD, Vice President and President-elect, ASM International and Dr. A K Tiwari, Chairman ASM India National Council. Their views on the ASM activities are published herewith. We have also listed upcoming schedule of events and invite you to wholeheartedly participate.

Mr. A V Warghade & Mr Shrikant Kulkarni are featured in know our member column. I express my gratitude to the team who contributed in this newsletter, without which there wouldn't have been this special newsletter issue. Finally, I encourage all of our readers to take part in our chapter activities to the best of your abilities.

Happy Reading

Dr. P K Ajeet Babu
Editor

Message From David B. Williams

PhD, ScD, Vice President and President-elect, ASM International

Please accept my congratulations to India as it celebrates its 75th year of independence and also to the Pune Chapter of ASM International for creating a special issue of its Newsletter.....

Continued on Page No. 3

Message From Pradeep Goyal

I am delighted to learn that you have planned to publish a special newsletter on the auspicious occasion of celebration of **Azadi ka Amrut Mahotsav** on 15th August 2022.

This is a historic moment in our lives! On this occasion we must....

Continued on Page No. 4

Message From Dr. A. K. Tiwari

Chairman,
ASM India National Council

I am extremely happy to learn that ASM Pune Chapter, India is coming out with a special News Letter on very auspicious occasion of 75th Independence Day of our great Nation, ...

Continued on Page No. 5

From Chairman's Desk

Udayan Pathak, FASM

It is matter of pride that we are celebrating 75 years of Independence. ASM Pune Chapter is releasing a special News Letter on this occasion. I am happy to have received special messages from ASM President....

Continued on Page No. 6

Message to the ASM International Pune Chapter From David B. Williams, PhD, ScD, Vice President and President-elect, ASM International

Please accept my congratulations to India as it celebrates its 75th year of independence and also to the Pune Chapter of ASM International for creating a special issue of its Newsletter commemorating this noteworthy event.

As a metallurgist, I am well aware of the long history of metallurgical expertise in India. I have had the personal good fortune to visit the Ashok Stambh (otherwise known as the Iron Pillar) when I was in New Delhi several years ago. It is as impressive a sight as it is a metallurgical achievement. To create such high-purity wrought iron over 1500 years ago (predating similar technology in the rest of the world by many centuries) is a testament to Indian metallurgists' deep understanding of forging and ironmaking. It should be no surprise that ASM has recognized this achievement as a Historical Landmark.

David B. Williams

Metalworking in India predates Ashok Stambh by over a millennium with archaeological evidence of iron smelting as early as 1500 BCE. Indian steel technology was exported around the Middle East, leading to the famous blades forged in Damascus and Toledo and used by Roman soldiers. Not content with smelting a single metal, copper, zinc (and therefore brass), tin (and hence bronze) were worked over 2000 years ago and, of course, gold and silver were used by the rulers in the region. The Mughals in particular were renowned for their metallurgy and Emperor Akbar introduced a uniform metal coinage as early as the 17th century, again predating similar efforts around the world.

There are many other such examples throughout the history of India, but I would be remiss if I didn't note that modern metals and materials have helped India lead in areas as diverse as space and nuclear technology. I was privileged to meet Dr. APJ Abdul Kalam when he visited the University of Alabama in Huntsville 13 years ago. We talked about the role of materials in ISRO's development of its own launch vehicles. Indian leadership in space has continued with the Indian Mars mission which is notable for the significant role of women scientists like Tessy Thomas, Moumita Dutta, Nandini Harinath and Ritu Karidhal.

Every time I interact with the Pune Chapter, I am struck by its commitment to include women scientists and engineers. I know this trend will continue, not just in Pune but across all ASM's chapters around the world, especially as Mr. Pradeep Goyal takes on the role of Senior Vice President of ASM International this coming September.

I look forward to working closely with Pradeep as we work to grow the global reach and the diversity of ASM international, The Materials Information Society. We are your essential resource in this digital age!

Message From Pradeep Goyal

My dear Colleagues of ASM Pune Chapter

I am delighted to learn that you have planned to publish a special newsletter on the auspicious occasion of celebration of Azadi ka Amrut Mahotsav on 15th August 2022.

This is a historic moment in our lives! On this occasion we must remember those who made the supreme sacrifice for the nation. Many of us may not be fortunate to see the Azadi ka Shatabdi Mahotsav. It is incumbent upon us to leave behind a legacy that our future generations will remember about us.

We are all aware of the burning issue of climate change that is confronting the world. Is it not our bounden duty to leave behind a world which is better than what we inherited? As materials science professionals we should be constantly working on ways to mitigate this issue in our own special way.

India is one of the fastest growing economies of the world despite the number of setbacks faced during the last few decades. The clarion call by our Hon Prime Minister to make India Atmanirbhar has galvanized the entire nation to manufacture in India for the world. This was evident in the way we collectively tackled the COVID pandemic with the help of our scientists, small and large manufacturing companies, and our medical fraternity.

Pradeep Goyal

The very same fervor is now evident in the way the industry has taken up the developments in space, railway, defense, agriculture, infrastructure, renewable energy, and other sectors. New developments in materials, processes and products are paving the way for a robust economy. Our own consumption in the country is fueling this growth.

The country has large number of laboratories and industries doing significant research and development in the field of materials science. It is time that we as ASM members get involved in bringing all the stakeholders on a common platform to showcase the prowess of our country. It is a difficult challenge, but I am confident that we can do it collectively. Let us make a beginning with the large student community engaged in materials science and support them in every possible way. The ecosystem of startups has also mushroomed, and they need our support.

I wish you all a very happy celebration of this festival of Independence.

May your families be safe and healthy.

Jai Hind

ASM INTERNATIONAL Pune Chapter

ASM International Pune Chapter

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

Message From Dr. A. K. Tiwari

Dr. A K. Tiwari
Chairman ASM India National Council

I am extremely happy to learn that ASM Pune Chapter, India is coming out with a special News Letter on very auspicious occasion of 75th Independence Day of our great Nation, under the Govt. of India initiative "Azadi Ka Amrit Mahotsav".

This newsletter will be a milestone in the history of ASM Pune Chapter. This Newsletter is highly relevant for providing the valued information pertaining to

progress of Material, Automotive safety etc. especially post-Independence.

As Chairman of ASM India Council I take this opportunity to convey my gratitude to all Pune Chapter Members, Editorial Board, and Chapter Officials.

With best Wishes

KNOW OUR MEMBER

Mr. A V Warghade

Designation: Director

Present Organisation / consultant / others: Alloy Master Technologies Pvt Ltd

Function: Mfg. of alloy castings

Contact information (Mobile, E-mail) and other details if any: 9702955501,

avwarghade@alloymaster.net

Education details: B.E. Mechanical

Work experience: 15+ years of experience in laboratory management and mfg. of metals standards

Area of expertise: Analytical chemistry, spectrometric standards and NABL Assessment as an assessor

Business Details If Any: Manufacturing & supply of alloy castings to OEM duly finished with machining as per requirement

Mr Shrikant Kulkarni

Designation: AGM Metallurgy & Heat-treatment in Amtek Auto. (Last organization). After that worked in Poona forge as Metallurgical consultant for 5 Years

Present Organisation / consultant / others: NA

Function: To control entire Metallurgical activities, along with Heat-treatment. New part developments. Enhance customer expectations & relation.

Contact info. : shrikant.Kulkarni2005@yahool.com

Mobile: 7507775736

Education details: Completed graduation from Pune University

Work experience: Total 42 years' experience in Metallurgy & Forging Heat-treatment

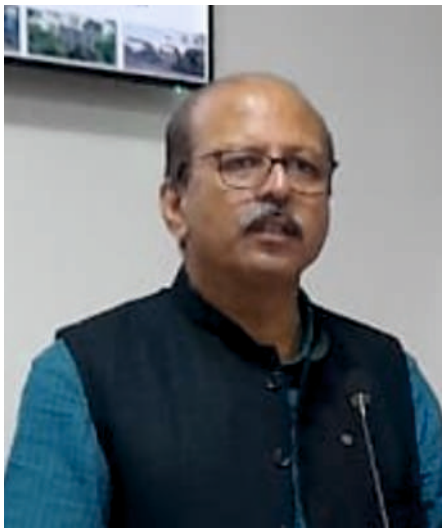
Area of expertise: Forging Heat-treatment, Heat-treatment furnace design, Maximum utilization of Heat-treatment furnaces, Analysis of field failure components.

Business Details If Any: NA

From Chairman's Desk:

It is matter of pride that we are celebrating 75 years of Independence. ASM Pune Chapter is releasing a special News Letter on this occasion. I am happy to have received special messages from ASM President – David Williams, ASM INC Chairman Dr Ashok Tiwari and Sr Vice-President – Elect ASM International for this special News Letter.

Our country has a rich heritage of Metallurgy since Vedic Era. The metallurgical skills were part of the DNA of Tribal communities like Agarias from Central India. Wootz steel originated in the mid-1st millennium BCE in South India, in present-day Tiruchirappalli, Kodumanal, Erode, Tamil Nadu. There are several ancient Tamil, North Indian, Greek, Chinese and Roman literary references to high carbon Tamil steel. In later times, Wootz steel was also made in Golconda in Telangana, Karnataka. The steel was exported as cakes of steely iron that came to be known as "Wootz". This knowledge was passed on from generation to generation by Gurukul education system. Gender equality and respect for women were integral part of this system. The honour of firing furnace and starting the campaign was exclusively given to women folk.



Udayan Pathak, FASM

Due to the adoption of Macaulay education system by British Rulers, these skills slowly got limited to a very narrow section of the tribal community. Now India is again strengthening its position in the field of metallurgy and related processes. LCA Tejas, Combat Vehicles, Artillery Guns, Main Battle Tanks are such glorious products. On the other hand, India's Power Generation from Lean Thorium is another metallurgical wonder. Support from Low Cost Development of Metals and Processes in India lead to the success of Indian Mars Program 'Mangalyaan' in amazing one third the global cost. Today India is established as Low Cost, High Accuracy and High Success Satellite Launch Global partners. I am glad to note that detailed articles covering these Indian success stories are covered in this issue.

Our Chapter Celebrated Annual Day & Chapter Awards Function which was well conducted by Students from Cummins College of Engineering, Nagpur. I am proud to share with you that we formally inaugurated Materials Advantage Chapter in Govt. Polytechnic, Nagpur. Our veteran member, Dr. Prabhakar Renavikar, FASM gifted around 60 valuable technical books to Cummins College of Engineering, Nagpur as goodwill gesture. We conducted special campaign for opening Materials Advantage Chapters in Nagpur & Amaravati with lead from Yogesh Dandekar. Five renowned engineering colleges were contacted. We expect to start new Materials Advantage Chapter during the current the Academic Year.

Our Finance Committee with the lead from Hemant & Nita found out cost effective method of transferring Membership Fees to Head Quarter using CHIP account. The team ensured compliance of both Indian & US applicable laws.

While we are moving ahead with so many activities, I have noticed that many new and young members are yet to volunteer in Chapter activities. Please reach out to Mr Lious Vaz or Nita for volunteering.

Best wishes for festive season ahead.

dts | dynamic technology systems

GLEEBLE Thermal Mechanical Simulators

Thermal-Mechanical Simulator Solutions

A Complete Line of Systems to Advance the State of the Art in Material and Processing Research

Whether you need to characterize new materials, optimize existing processes, explore new production techniques, or simulate the conditions of new applications. Gleeble system will help you costs, shorten development times, and open the door to new ideas, processes and profits.

BRUKER

Elemental Analysis - Precise and Reliable!

Competence in Elemental Analysis

- Stationary Spark-Spectrometers
- Mobile & Portable Spark-Spectrometers
- Analysis Automation
- CS/ONH Analyzers

Thermo SCIENTIFIC

Thermo Scientific Niton XRF Analyzer

The Niton XL2 – the practical solution from the pioneer in handheld XRF instrumentation.

- Analyze metal alloys for scrap recycling or final product QC
- Carry out grade control, plant operations, and near-mine exploration
- Screen electronics and consumer goods for lead

Micro Materials
Excellence in Nanomechanics

Nanomechanical & Nanotribological Tests

- Nanoindentation (both quasi-static and dynamic)
- Nano-impact and fatigue
- Nano-scratch and wear
- Nano-fretting

Authorised Distributors:

dts | dynamic technology systems

Branch Office
• Mumbai • Pune • Nagpur • Kolhapur • Ahmedabad
• Rajkot • Delhi • Kolkata • Chennai • Coimbatore
International
Srilanka • Bangladesh • Nepal • Dubai

101, New Udyog Mandir No. 2,
Mogul Lane, Mahim (W), Mumbai 400016.
Maharashtra, INDIA. Tel: 022 24464748
email: mumbai@dts-india.com
website: www.dts-india.com

Report of Activities and Initiatives carried out at Nagpur and Amravati for ASM International and Material Advantage Student Chapter

Dr Prabhakar Renavikar, FASM and Mr Udayan Pathak, FASM visited Nagpur and Amravati during 7th and 10th Aug 2022. The visit was primarily focussed on Formal Inauguration of Materials Advantage Chapter at Govt. Polytechnic Nagpur, gifting books to MKSSS's Cummins College of Engineering for Women, Nagpur, meeting eminent persons from Nagpur for their support to spread ASM activities in and around Nagpur.

As a part of this drive, following visits and interactions with various institutes from Nagpur were very fruitful. Discussions held with their faculties, HoDs, Studnets and Director / Principals.

1. **Department of Metallurgy and Materials Engineering of VNIT hosted networking dinner** on 7th Aug. 2022. In spite of heavy rains Dr. Pramod Padole, Director VNIT Nagpur, Dr Atul Vaidya, Director, CSIR NEERI Nagpur, Dr. Manoj Daigavhane, Principal G P Nagpur, Mr. Dipak Kulkarni Ex Principal, G P Nagpur, Dr. Jatin Bhat, HoD MME VNIT Nagpur, Professors from Cummins College of Engineering for Women, Nagpur and Professors and Student Representatives from MME Deptt VNIT Nagpur joined dinner. During networking discussions took place about the activities of ASM International and ASM Pune Chapter as well as how it can help Engineering Institutes.

   Dr. Atul Vaidya, Director NEERI agreed to deliver talk on 'Environmental Aspects & Challenges in Metallurgical Industry' for ASM Pune chapter.

Group photo after dinner at VNIT

2. **St Vincent Palloti College Engineering and Technology, Nagpur**

   A brief about ASM activities was given to Dr Surendra Gole, Principal. He organised presentation and discussions about ASM Int Pune Chapter student's activities with faculty from Department of Mechanical Engineering and HoD, Dr. Pramod Lanjewar. Mr Udayan Pathak, FASM and Prof. Yogesh Dandekar gave present. Dr. Surendra Gole expressed that he would need support from ASM specifically for Academic Audit and importance of MoU for NAC and NIRF procedures.

   We expect formation of MA Chapter in the institute in current academic year.

3. Government Polytechnic, Nagpur

Formal inauguration of MA Chapter at Govt. Polytechnic, Nagpur was done in the presence of Dr Prabhakar Renavikar, FASM and Mr Udayan Pathak, FASM, Yogesh Dandekar, Dr. Deepak Kulkarni (Ex Principal, G P Nagpur), Kishor Meshram, HoD Metallurgy Department, Ms Vanshree Humne, Faculty Advisor and student were present. Charter was handed over to Vice Principal and HoD Metallurgy.

Handing over the Charter of the MA Chapter at Govt Polytechnic, Nagpur

Dr. Kishor Meshram, HoD Metallurgy welcoming Dr. Renavikar

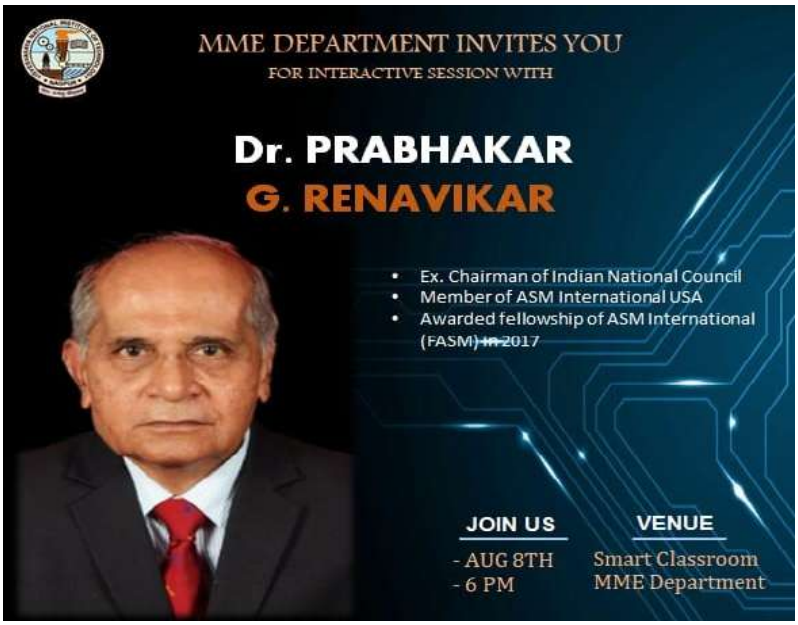
Dr. Kishor Meshram, HoD Metallurgy welcoming Mr. Udayan Pathak

Dr. Kishor Meshram, HoD Metallurgy welcoming Prof. Yogesh Dandekar

Dr. Prabhakar Renavikar addressing the gathering

4. Interactive session at MME Department VNIT Nagpur

MME Department VNIT Nagpur arranged a talk by Dr P G Renavikar, FASM for their faculty and students. Dr Renavikar shared his experience in industry and explained about career in Material Science. Mr Udayan Pathak FASM briefed about activities of ASM Int Pune Chapter and appealed to start MA Chapter at VNIT Nagpur.



Publicity of the program in VNIT

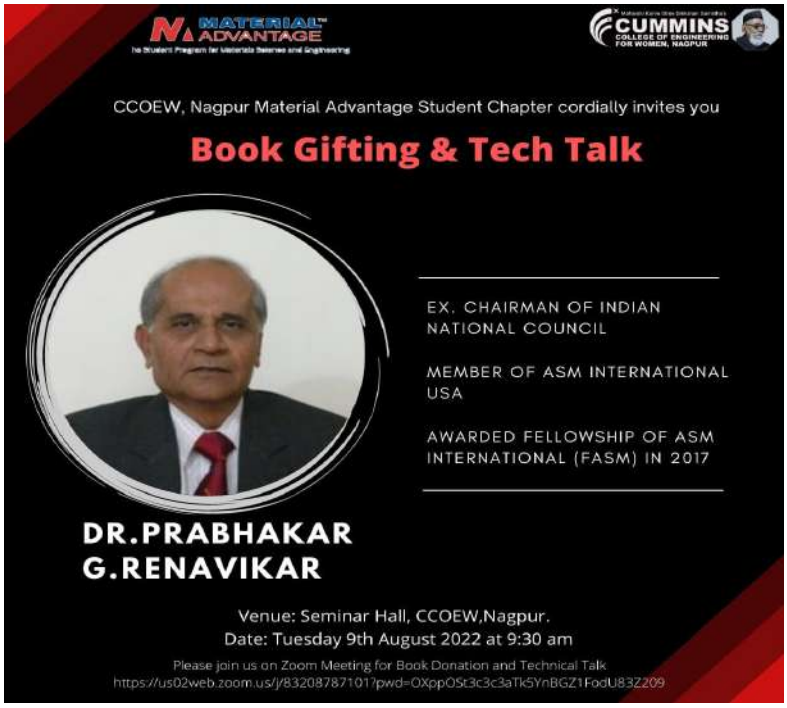
Dr Jatin Bhat welcoming Dr Renavikar

Dr Jatin Bhat welcoming Mr Udayan Pathak

Udayan Pathak and Dr. Renavikar addressing gathering, Dr. Jatin Bhat HoD giving closing remarks

5. Book gifting ceremony at Cummins College Nagpur

Dr P G Renavikar gifted 55 books from his personal collection to Cummins College Nagpur. Formal Book Gifting Ceremony was held at the college on 9th Aug 2022, followed by A Technical Talk by Dr P G Renavikar. Principal Dr Bharatbhushan Joshi along with faculty and students participated in this event.



Publicity of program at Cummins College

Lamp lighting and floral tribute

Principal Dr B P Joshi felicitating Dr P G Renavikar

Dr Renavikar delivering Tech Talk

Book Gifting to Library of Cummins College

Group photo with student members of MA Chapter and staff of Cummins College

6. Visit to Government Engineering College Amravati

Discussions with Principal Dr. Ashsih Mahalle and Dr. Nilay Khobragade of Mechanical Engineering Department Government Engineering College Amravati was very responsive. Mr Udayan Pathak, FASM and Prof. Yogesh Dandekar during discussions and presentation explained about ASM Int Pune Chapter activities and details of MA Chapter. Due to heavy rains, students could not reach college. One more presentation in front of students is expected in coming month. We are expecting to start activities of MA Chapter and institutional membership in the college. Being Autonomous Institute ASM assured them support to nominate Industry Experts as their BoS members and support in Academic Audits.

Dr Ashish Mahalle enquired about possibility of Life Membership for Institution. Udayan Pathak expressed his inability due to current structure. But he agreed to take up with ASM and will revert back.

7. Visit to G H Raisoni University

Mr Udayan Pathak, FASM and Prof. Yogesh Dandekar visited G H Raisoni University Amravati and presented ASM Int Pune Chapter activities and details of MA Chapter to Campus Head Mr. Prashant Awachat and Dr. Sachin Karale, HoD Mechanical Engineering Department and staff of the University. We are expecting to start activities of MA Chapter and institutional membership in the college.

With Mr Prashant Awachat Campus Head

8. Visit to Dr Ram Meghe Institute of Technology, Amravati

Mr Udayan Pathak and Prof. Yogesh Dandekar visited Dr Ram Meghe Institute of Technology, Amravati and presented ASM Int Pune Chapter activities and details of MA Chapter to HoD, Mechanical Engineering, Dr A D Shirbhate and staff of Mechanical Engineering Department. A presentation in front of students is expected in coming month in the institution. We are expecting to start activities of MA Chapter and institutional membership in the college.

Few more visits are planned to Engineering Colleges in and around Nagpur affiliated to RTM Nagpur University and SGB Amravati University.

Discussions held with administration department of SEZ MIHAN Nagpur to explore possibility of arranging various Training Program for companies in MIHAN, as well as getting their contacts for membership. The proposal will be discussed in their next meeting with senior management for approval and other details.

AGM AND ANNUAL DAY OF PUNE CHAPTER

The annual General Body meeting was held on 28th of July 2022, at Poona Club.

The Chairman Mr. Udayan Pathak, FASM welcomed the Members. Mr. Louis Vaz, Secretary, presented his secretarial report. Mr. Hemant Zaveri presented the budget report. Both were accepted by ASM members, attending the AGM. Ms. Ruta Barve, Jt. Secretary proposed a vote of Thanks.

AGM was followed Annual Day and Chapter Awards Night. On the background of Covid -19 Pandemic, we could not celebrate Annual Day as a big event, last year. We celebrated the same as a very low key event. This year around 60 members & Special Invitees were present in off line mode and many more from India and abroad joined the function online, Joanne Miller, Drew Fleming, Debbie Aliya, Diana Essock, Shruti Dubey, Mr S Sudarshan, Dr A K Tiwari, Mr Mahesh Kori are few names that joined online.

Mr. Pradeep Goyal, FASM, Sr. Vice President ASM International was the Chief Guest for the Annual Day. He was felicitated on being nominated as Sr. Vice President. On this occasion he delivered a technical talk on **Developing Greener Technologies with microwaves**. The talk was very well received by the audience. The Newsletter was also released by Mr. Goyal.

Udayan Pathak welcomes Pradeep Goyal

Dr.Manoj Rathod felicitated

Newsletter Release

Chapter Awards to D.G.Chivate Yogesh Dandedkar and Ruta Barve

On behalf of Awards Committee, Mr B R Galgali announced Chapter awards **Mr.D.G.Chivate** received the Chapter Award for **Vibrant Students' Outreach activities**. **Prof. Yogesh Dandekar**, was given Chapter Award for **Starting new MA chapters and the First MoU** with Govt. Polytechnic Nagpur. Ms.Ruta Barve was given award for re-establishing technical lecture series. **Mr. Anshuman Ganeriwala**

was given Chapter award for outstanding work for **refurbishing and complete makeover of our Chapter Website** and timely updating. Mr Galgali also mentioned specifically about **Ms Jaswandi Gotmare** and **Mr Nilesh Sakle** for their outstanding work in **Women @ Materials Engineering** and **Membership Development** respectively. Dr.Manoj Rathod (ASM member) was felicitated on being appointed as Deputy Director, COEP. As usual new Members were felicitated and formally welcomed.

A brief presentation about Chapter activities was given by Udayan Pathak. In line with suggestion from Prof Ravi Ravindran, Chairman ASM India Task Force, three student members Ms. Amanjeet Kaur from MKSS's Cummins College of Engineering Nagpur, Mrudula Madhav Deosthali from PVG College of Engineering & Technology Pune and Aditya Gajbhiye from Govt. Polytechnic Nagpur were co-opted on Executive Committee of Chapter. Pune Chapter is the **first Indian Chapter** to have students' representation in Executive Committee.

Ms. Amanjeet Kaur

Mrudula Madhav Deosthali

Aditya Gajbhiye

The compering of Annual Day event was done by MA Chapter members, Amanjeet Kaur and Ms. Tannu Kanojiya from CCOEW Nagpur and Ms Vibhavari Saitwal from PVG College of Engineering and Technology, Pune. Next year onwards, MA Chapters will take full responsibility of organising Annual Day.

The Annual Day concluded on a very high note with the networking dinner.

Volunteer yourself for your Chapter!

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

Trusted & Preferred Service Provider in the field of Material Testing - ABAN TECHNOLOGIES.

ibg
Eddy Current Technology

Structure Test

100 % inline structure
crack non-destructive
grinder burn

Crack Detection

100 % inline structure
crack non-destructive
grinder burn

Micro-Vickers Hardness Tester
DURASCAN G5 0.00025 - 62.5 Kgf

EMCO TEST
YOUR FACTOR OF SAFETY

Universal Hardness Tester
DURAVISION G5 0.3 - 3000 Kgf

hardness testing machines

Knoop
Rockwell
Portable Vickers
Brinell

for more details:

aban TECHNOLOGIES

4 - Latakunj, Plot No. 10 Chintamani Society,
Karvenagar, Pune 411052 - Maharashtra - INDIA
Call: +91 74474 33035 • Web: www.aban.co.in

Progress of India in Metallurgy

Udayan Pathak, FASM

India has a reach heritage of Metallurgy, since Vedic Periods. Ashok Stambh (Iron Pillar) in New Delhi is a classic example of Indian capability to produce non – rusting Wrought Iron, Oriental India exported Steel which was forged into blades at Damascus and Toledo which were used European Soldiers. There are so many examples.

Strengthening the same tradition, Modern India achieved many milestones. The metallurgical industry has played a significant role in India's economic growth. India produces 95 minerals, 4 fuel related minerals, 10 metallic minerals, 23 non-metallic minerals, 3 atomic minerals and 55 minor minerals including building and another type of minerals (FICCI, 2018). The mineral production in India has shown significant growth at CAGR of 5.72% between 2013-14 and 2017-18 to reach an estimated amount of US $ 17.62 billion in 2017 -18 (Indian Brand Equity Foundation, 2018).

The steel industry of India

The metallurgical industry in India can be segmented into various sub-industries such as aluminium, Copper, lead, iron, zinc, steel etc. Among the various industries, the steel and aluminium are the key industries that have displayed a substantial growth in the past few years. Steel Industry is acting as a key industry because all other industries depend on the iron and steel industry for machinery. Moreover, steel is required to manufacture a wide variety of engineering goods and defence equipment. In terms of the growth of the steel industry, India has emerged as the third largest steel producer with a production of 101.4 million tons of crude steel in 2017 (International Trade Administration, 2018). In addition to this, India is also the largest producer of steel mica in the world. Furthermore, the growth of iron core production in the country increased from 129.32 million tons in 2015 to 210, 47 million in 2017.The steel industry in India also contributed about 2% of India's GDP and employed about 16 Lakh people in FY 2018. Despite the Covid-19 pandemic setback, contribution of Steel industry is slightly more than 2% providing more than 20 Lakh employment. Projections indicate by 2031 Indian steel industry will generate 35 lakh jobs.

Bhilai Steel Plant

Rail Rolling Mills

Goa region has huge deposits of mostly lean Haematitic and some Magnetite with Iron content 55-58%. With conventional Indian Steel making practice it is uneconomical. So these iron ores are exported to Japan. Currently Research is being done for application of Micro-wave as cost effective solution for Iron Extraction. The results are encouraging, even the quality of slag was analysed at CSIR-CGCRI, Kolkata indicating high quality of glass properties in slag.

Sheet Steel Rolls

Steel Long Products

Steel Authority India Limited (SAIL) is largest public Sector Steel producing company. Post-independence many Integrated Steel plants were established in India with Technical Collaboration & Knowhow from various countries. IISCO is the First Integrated Steel plant which started producing Iron with Open top Blast Furnace. SAIL has many technologies like Blast Furnace, Basic Open Hearth, Bessemer & Linz and Donawitz converters. Today, SAIL produces 50 products, 500 grades and 5000 dimensions with saleable steel production capacity to around 21 million tonnes per annum.

Table: Details about SAIL Plants.

Integrated Steel Plants		
Plant	Location	Products
Bhilai Steel Plant (Russian Collaboration - 1959)	Chhatisgarh	Rails (13/26m), Long Rails, (65-260m), Blooms, Billets, Slabs, Channels, Joists, Angles, TMT Rebars, Wire Rods, Crane Rails, Plates, Pig iron & Coal Chemicals
Durgapur Steel Plant	West Bengal	Blooms, Billets, Joists, Narrow Slabs, Channels, Angles, TMT Rebars, Wheels & Axles, Pig iron & Coal Chemicals
Rourkela Steel Plant (German Collaboration-1955)	Odisha	Plate Mill Plates, HR Plates, HR Coils, Slabs, CR Sheet/ Coil, Galvanised Sheets (plain & Corrugated), ERW Pipes, Spiral Weld pipes, CRNO, Pig iron & Coal Chemicals
Bokaro Steel Plant (Soviet Union – 1965)	Jharkhand	Hr Coils, Slabs, HR Sheets. Plates, CR Coils. Sheets, GP Sheets. coils, GC Sheets, Galvannealed Steel, HRPO, Pig iron & Coal Chemicals
IISCO Steel Plant (1870)	West Bengal	Wire rods, Bars & Rebars, Joists, Channels, Angles, Blooms, Billets, Universal & Special section (Z-bar, MS Arch), Pig iron & Coal Chemicals
Special Steel Plants		
Salem Steel Plant	Tamilnadu	Cold Rolled Stainless Steel, Hot Rolled Carbon & Stainless Steel Products, Micro-Alloyed Carbon Steel
Alloy Steel Plant	West Bengal	Alloy Steel Squares & Rounds, Wear Resistant Plates, Forgings, Carne Wheels, Forged Rolls/ Plates, Special Quality Slabs & Stainless Steel Slabs (low Ni, 300 & 400 series)
Visvesvaraya Iron & Steel Plant	Karnataka	High Quality Rolled & Forged Alloy & Special Steel Products

During 1970's govt. policy encouraged setting up of Mini Steel Plants. Many companies based on Electric Arc Furnace & Induction Melting came up in India. FIRTH India Steel, Ravindra Steels, FACOR, Maharashtra Electro smelt were to name a few. Due to various reasons many of these steel plants could not sustain. Steel production was controlled in India by Government till 1990. The Indian steel industry was de-licensed and de-controlled in 1991 and 1992 respectively. Today there are about 650 mini steel plants in India. Apart from these mini steel plants, about 50 major Iron & Steel Plants are operational.

Table 2: List of major units

Name	Location	Operator
Alloy Steel Plant	Durgapur, West Bengal	SAIL
Bhilai Steel Plant	Bhilai, Chhattisgarh	SAIL
Bokaro Steel Plant	Bokaro Steel City, Jharkhand	SAIL
Chandrapur Ferro Alloy Plant	Chandrapur, Maharashtra	SAIL
Durgapur Steel Plant	Durgapur, West Bengal	SAIL
Electrosteel Limited(ESL)	Bokaro, Jharkhand	Vedanta Resources
Essar Steel India Limited	Hazira, Gujarat	ArcelorMittal
IISCO Steel Plant	Asansol, West Bengal	SAIL
JSL Stainless	Jajpur, Odisha	Jindal Stainless Limited
Jindal Steel and Power Limited	Raigarh, Chhattisgarh	Jindal Steel and Power
Jindal Steel and Power Limited	Angul, Odisha	Jindal Steel and Power
JSW Steel	Hospet, Bellary, Karnataka	JSW Steel
JSW Steel	Tarapur, Boisar, Maharashtra	JSW Steel
JSW Steel	Dharamtar, Maharashtra	JSW Steel
MECON (company)	Ranchi, Jharkhand	MECON (company)
Monnet Ispat & Energy	Raigarh, Chhattisgarh	JSW Ispat Special Products Limited
Nagarnar Steel Plant	Jagdalpur, Chhattisgarh	National Mineral Development Corporation
Neelachal Ispat Nigam Limited	Kalinganagar, Orissa	MMTC Ltd
Rourkela Steel Plant	Rourkela, Odisha	SAIL
Salem Steel Plant	Salem, Tamil Nadu	SAIL
Tata Steel Limited	Jamshedpur, Jharkhand	Tata Steel
Tata Steel Limited	Kalinganagar, Odisha	Tata Steel
Tata Steel Limited	Dhenkanal, Odisha	Tata Steel BSL
VISA Steel Plant	Kalinganagar, Odisha	VISA Steel
Visakhapatnam Steel Plant	Visakhapatnam, Andhra Pradesh	Rashtriya Ispat Nigam Limited
Visvesvaraya Iron and Steel Plant	Bhadravati, Karnataka	SAIL

The Aluminium Industry

The aluminium industry in India is strategically well -placed and is one of the largest producers in the world with discernible growth plans and prospects for the future. India's rich bauxite mineral base renders a competitive edge to the industry as compared to its counterparts globally. The Indian aluminium industry in India scaled lofty notches since the establishment of the first manufacturing company, namely, Indian Aluminium Company (INDAL) in 1938. In 2004, all business activities of INDAL have been merged subsequently with Hindalco Industries Limited (Hindalco). Four major primary producers, National Aluminium Co. Ltd, Hindalco Industries Ltd, Bharat Aluminium Co. Ltd and Vedanta Aluminium Ltd (VAL)

are at the forefront of aluminium production. The primary producers have a strong presence in the sheet business and are enlarging their roles in the foil segment. The primary producers are also in the extrusion segment in which a large number of secondary manufacturers participate with fragmental capacities.

Nuclear Fuel

Another major Metallurgical Development is India's three stage nuclear program Dr. Homi Bhabha conceived of the three-stage nuclear programme as a way to develop nuclear energy by working around India's limited uranium resources. Thorium itself is not a fissile material, and thus cannot undergo fission to produce energy. Instead, it must be transmuted to uranium-233 in a reactor fuelled by other fissile materials. The first two stages, natural uranium-fuelled heavy water reactors and plutonium-fuelled fast breeder reactors, are intended to generate sufficient fissile material from India's limited uranium resources, so that all its vast thorium reserves can be fully utilised in the third stage of thermal breeder reactors.

Bhabha summarised the rationale for the three-stage approach as follows:

The total reserves of thorium in India amount to over 500,000 tons in the readily extractable form, while the known reserves of uranium are less than a tenth of this. The aim of long range atomic power programme in India must therefore be to base the nuclear power generation as soon as possible on thorium rather than uranium. The first generation of atomic power stations based on natural uranium can only be used to start off an atomic power programme. The plutonium produced by the first-generation power stations can be used in a second generation of power stations designed to produce electric power and convert thorium into U-233, or depleted uranium into more plutonium with breeding gain. The second generation of power stations may be regarded as an intermediate step for the breeder power stations of the third generation all of which would produce more U-233 than they burn in the course of producing power.

Thorium Based Power Plant

Thorium Based Fast Breeder Reactor

Atomic Energy Commission of India collected lot of factual data during Atom Bomb Experimental explosion to capture data for accurately predictive simulations.

Materials and Processes for Aerospace program

Indian Space Research Organisation (ISRO) built India's first satellite, Aryabhata, which was launched by the Soviet Union in 1975. In 1980, ISRO launched satellite RS-1 on-board its own SLV-3, making India the seventh country to be capable of undertaking orbital launches. SLV-3 was followed by ASLV, which was subsequently succeeded by development of many medium-lift launch vehicles, rocket engines, satellite systems and networks enabling the agency to launch hundreds of domestic and foreign satellites and various deep space missions for space exploration.

ISRO has the world's largest constellation of remote-sensing satellites and operates the GAGAN and NAVIC satellite navigation systems. It has sent two missions to the Moon and one to Mars.

The agency's goals for the near future include expanding its satellite fleet, landing a rover on Moon, sending humans into space, development of a semi-cryogenic engine, sending more uncrewed missions to the Moon, Mars, Venus and the Sun, and deployment of more space telescopes in orbit to observe cosmic phenomena and space beyond the Solar System. Long-term plans include development of reusable launchers, heavy and super heavy launch vehicles, deploying a space station, sending exploration missions to the outer planets and asteroids and crewed missions to moons and planets.

PSLV Rocket

Tejas Light Combat Aircraft

It's matter of pride that today, India has emerged as World's Low Cost and high accuracy Satellite Launching capable country. It is estimated that three years capacity of ISRO is already booked. The materials needed for this program can be classified as **Metallic Materials** like Mg, Al, Al-Li, Ti, aero steels, Ni, intermetallic, bronzes and Nb alloys); **Composites** GLARE, PMCs, CMCs and Carbon based CMCs); and Special Materials. India has developed very high capability in these areas along with joineries, surface engineering and corrosion.

Materials for Defence Programs

With very insulting and shameful defeat with China in 1961, India Defence program took totally new look. Defence Research & Development Organisation (DRDO) was strengthened. DRDO established in 1958 from the amalgamation of the then already functioning Technical Development Establishment (TDEs) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO). DRDO was then a small organisation with 10 establishments or laboratories. Over the years, it has grown multi-directionally in terms of the variety of subject disciplines, number of laboratories, achievements and stature.

Today, DRDO is a network of more than 50 laboratories which are deeply engaged in developing defence technologies covering various disciplines, like aeronautics, armaments, electronics, combat vehicles, engineering systems, instrumentation, missiles, advanced computing and simulation, special materials, naval systems, life sciences, training, information systems and agriculture. Several major projects for the

development of missiles, armaments, light combat aircrafts, radars, electronic warfare systems etc. are on hand and significant achievements have already been made in several such technologies. Major Technology Clusters are – Aeronautical Cluster, Micro Electronic Devices, Computational Systems & Cyber Systems, Missiles & Strategic Systems, Life Sciences, Electronics & Communication Systems, and Naval Systems & Materials.

Defence Combat Support Platform 12 x 12 Vehicle.

Cast Axle Beam for Combat support Platform

Various special Steels and other defence with ultra purity and very clean steels meeting stringent AMS standards were developed by Mishra Dhatu Nigam and High Energy Materials Research Laboratory. Tata Motors developed Main Combat Vehicles up to 12 X 12 configuration. For better ground clearance, Cast Axle Beam in TML Patented High Strength High Ductility S G Iron. Today India is one of the Defence Materials Exporting country.

Many Corporate Sustaining Members of ASM are contributing in this sector to name a few Bharat Forge, Tata Motors. L&T etc.

Advanced Towed Artillery Gun DRDO – BFL - TATA

Vajra T Gun by L&T

UPCOMING SCHEDULE OF EVENTS

Month	Topic	Speaker	Date
September 2022	Materials For Next Gen. Armament	Kashinath Deodhar	15-09-2022

Cleanliness Analysis for Contamination Estimation

Particle Size Analysis System

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

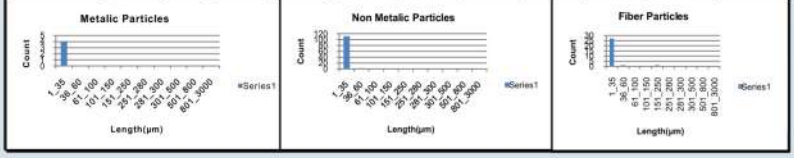
Model - CLEAN-EST

PARTICLE TEST REPORT.

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

Particle Size Analysis

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



35 Yrs in Service

METATECH INDUSTRIES

www.metatechind.com

Corporate Office : 476, Narayan Peth,
Cosmos Bank Building,
Off. Laxmi Road, Pune - 411030. India
Tel.: +91-20-24450530 / 312 |
Fax : +91-20-24450312
Email : meta@metatechind.com

ASM INTERNATIONAL Pune Chapter

Azadi Ka Amrit Mahotsav