

Council Office Bearers

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Dr. J. R. Nataraj
Vice Chairman

Mr. Prakash Balasubramanian
Gen. Secretary

Mr. P. T. Bindagi
Treasurer

Mr. Rahul Masurekar
Immediate Past Chairman

Dr. Priyanshu Bajaj
Editor, News Letter

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Chairperson's Message



Dear Readers,

Let me wish my ASM family **A Great, Prosperous, Blissful, Healthy, Energetic and a very Happy NEW YEAR 2023.**

As the year 2022 draws to a close, another year has passed. And with that, we all know what's in store: a chance to reflect on what we've done, what we've accomplished, and what's ahead.

I am writing to convey my very best wishes and sincere thanks to all of you as we wrap up an eventful 2022 and shift our momentum into the next calendar year. The past 12 months have been marked by noteworthy achievement and change. As we reflect on the past year, I believe that we have many reasons to have enormous pride in our accomplishments and look forward with enthusiasm to next year at ASM.

On this occasion, I would like to extend my heartiest congratulations to the newly formed team of office bearers of the India National Council. We are confident that the new team comprising of Sri. V. Babu Sathian as Chairman INC, Dr. J.R Nataraj as Secretary INC and Sri. P.T Bindagi as treasurer INC will certainly guide the regional chapters to fully realise their potential and capabilities by motivating and providing effective leadership. Further its a feather in the cap for the Bangalore Chapter as two of its office bearers, Dr. J. R Nataraj (Vice Chair-Bangalore Chapter) and Sri. P. T. Bindagi (Treasurer-Bangalore Chapter) are inducted into the India National Council thereby assuming dual responsibility at the regional and national levels. Let us all wish them Good Luck on their new journey.

Based on deliberations held to enlist opinions of the Chapters' members during one of our EC meetings last year, the Chapter decided to include Non-Metallic Materials also in its focus, a hitherto neglected area by our chapter. The result was a workshop called 'Plastic Clinic 2022' which was organised by ASM Bangalore Chapter in association with the Bangalore Chapter of 'Indian Plastic Institute', an event which turned out to be a key highlight of last year. Every year brings in its own share of ups and downs and we learn from our mistakes and try not to repeat the same. There are a lot of positives too. The chapter's performance and achievements were reviewed and new objectives and priorities are set for the upcoming period and we are committed to implement them. We have envisaged a great future for our chapter which will be possible only with your contribution, zeal, commitment, dedication which has been with us all these years. These are exciting times. I am very positive and hopeful that you shall stand behind me in all my future endeavours.

Together, let us conquer each and every challenge that comes in our way. I quote another maxim "take challenges as opportunities" Together, let us have a fantastic year ahead.

Jyothi Sriram

About ASM International

ASM International formerly known as the American Society for Metals was established in 1913 as a professional body of heat treaters. It has since evolved as an international professional body of material scientists, engineers, R&D professionals and academicians with the motto of collecting & disseminating knowledge on Materials and Processes. The worldwide network of more than 38,000 individuals is led by members, guided by members' needs and fueled by members' participation.

About ASM Bangalore Chapter

ASM Bangalore chapter is actively involved in dissemination of materials centric knowledge among working professionals, researchers and academicians. ASM Bangalore chapter began its activities in the year 2006. Since then it has dedicated itself in spreading information based on materials among various stakeholders. Bangalore is a strategic center for several major automotive, aerospace, defense & R&D institutes and thousands of engineering professionals and it is imperative to educate & connecting the community in the field of Metals & Material science Technology. Under the able leadership of present chairperson Mrs. Jyothi Sriram and capable Office Bearers, ASM Bangalore chapter is gaining wide popularity by activity involving and supporting the technological up-gradation of Engineering community.

The Prime Objectives of ASM Bangalore Chapter:

1. To disseminate materials centric information among professionals by organizing seminars, lectures, One/two days' workshops
2. To bring together Scientists, Intellectuals and Professionals working in the field of materials science to exchange ideas/knowledge/information.
3. To encourage and support student chapters among various Engineering colleges in the state of Karnataka and enlighten them, the importance of materials properties, selection and its application.
4. To Promote consultancy services by ASM members to solve industry problems in the area of materials.
5. To recognize and award ASM members for their contributions to field of materials science.

ASM Bangalore chapter has members with rich expertise and professional experience with deep insight to practical applications in the field of materials science & engineering. ASM Bangalore chapter offers consultancy in the broad areas of Material selection & Characterization, foundry practices, mechanical testing, forging, heat-treatment, failure analysis, Corrosion control, Nondestructive Evaluation (NDE), process simulation to name a few.

ASM Membership

A membership in ASM gives you every imaginable edge you seek in your career.

VISIT - <http://www.asmlrchapter.com/membership.php> - for Benefits and Forms

Or Call Membership Chair – Mr. Manohar Hegde – 9901964251 / Mr. K. L. Srirama - 9845699661

Or write ASM Bangalore Chapter : asmlr2015@gmail.com

Featured Articles:



m4p™ type13-X

Martensitic stainless steel for additive manufacturing helping the the oil and gas industry overcome modern challenges

Abstract

As the oil and gas companies seek to find sources of production in low-risk areas they are moving further offshore and deeper underwater. This has driven the demand for more corrosion-resistant materials, which are stronger and lighter than existing materials. Many of these materials, such as duplex and super duplex steels, martensitic stainless steels etc. are now widely used in conventional manufacturing processes. The additive manufacturing of such materials is, however, limited with most oil and gas additively manufactured components being produced out of the standard 316l and Ni-718.

In this white paper, we show the properties and characteristics achieved by additive manufacturing of one such material widely used in the Oil & Gas industry, a martensitic stainless steel, m4p™ type13-X. The material is widely employed for wellhead and valve applications for many years and this paper is an attempt to help its adoption in additive manufacturing.

Similar grades:

EN 1.4313, EN X3CrNiMo 13-4, AISI 415, ASTM CA6NM, UNS S41500

Introduction

Additive Manufacturing (AM) with its capability to produce components without the use of any additional infrastructure, for example, dies and tooling, makes it flexible to produce different components and aids local manufacturing. This aligns AM with Industry 4.0 and a growing multipolar world. It is now a mature and the fastest-growing manufacturing sector, reaching a total of 10 billion \$ in 2019 and projected to grow with an average compound annual growth rate (CAGR) of ~17.7% until 2027. Further, as companies move from using AM for prototyping to using it for production, the share of materials in the global market is projected to grow from 18% in 2018 to 27% by 2029. This opens doors for solving some of the problems with AM, where existing high strength alloys are not processable. In contrast, most alloys fit for manufacturing via AM do not have sufficient strength, by developing new alloys for use in additive manufacturing processes. A few such alloys already exist, for example, Al-containing stainless steel for use in tooling applications, **m4p™ Cxplus**, high-strength Al-Mg-Sc-Zr alloy, **m4p™ StrengthAl**. In this white paper, we show another approach to solving the problem of material availability in AM – making conventional materials available for AM. Here we show the properties of an additively manufactured conventional material widely used in the Oil & Gas industry.

For many years Cr-Ni martensitic steels have been used for the production of valves, impellers, water turbine components and other similar applications. The microstructure consists of a fine, lath martensitic structure as a result of low-carbon content along with approx. 4% Ni.

m4p™ type13-X is a soft martensitic stainless steel. It has high toughness, good corrosion resistance and resistance to cavitation, high shear strength, and good weld-ability.



Chemical composition

Element	Specification (wt.%)	
	Min.	Max.
Cr	12.00	14.00
Ni	3.50	4.50
Mo	0.30	0.70
C	-	0.05
Si	-	0.70
Mn	-	1.50
Fe	Rest	

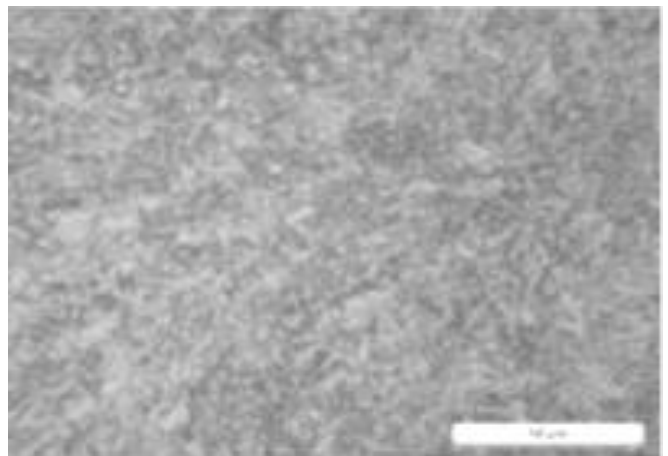
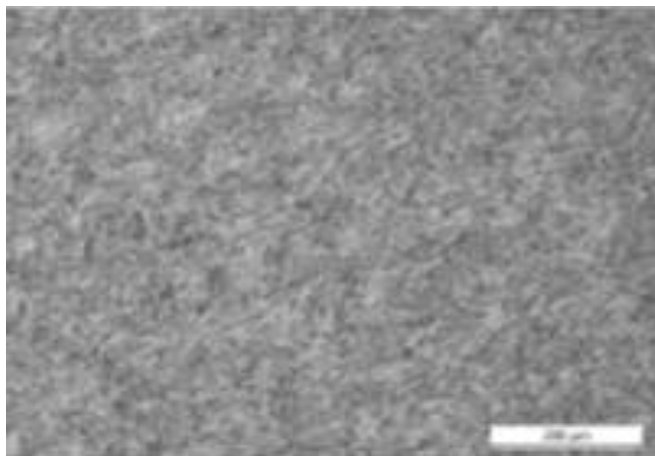
m4p™ type13-X is a Martensitic stainless steel and has a body centred tetragonal (BCT) crystal lattice. Carbon plays a major role in this steel grade, if the carbon content is high, there is an increase in strength and hardness but a decrease in both ductility and toughness.

The other major alloying element here is chromium with additions in the range from 12 to 14 weight percent. Molybdenum is added to reduce the temper embrittlement while Ni helps in achieving a microstructure free of δ -ferrite.

Microstructure

While using **m4p™ type13-X** a suitable heat treatment can be used to get the desired hardness and strength. The material is normally used in a hardened and tempered state where the microstructure consists of tempered martensite. Optimum corrosion resistance is also attained in this state along with good hardness and high toughness.

In the tempered state, the microstructure is nominally entirely martensite, although it may contain a considerable amount of retained austenite.



Heat-treated microstructure at the core of the sample. Uniform, fine-tempered martensitic microstructure is observed.

Tensile test

	Horizontal	Vertical	45° inclined
Tensile strength (MPa)	917	942	921
Yield Strength (MPa)	758	705	670
Elongation (%)	26	28	27
Area reduction (%)	68	68	69

Tensile properties mentioned here are average of three test values.

m4p™ type13-X is developed for processing using the standard laser powder bed fusion process. The material can be processed in most standard machines with bed temperatures <200 °C. High component densities up to 99.97% rel. Density can be easily achieved. We can even support with the starting parameters for this material with a build rate of 4.2 mm³/s.

Charpy impact test

	Horizontal	Vertical	45° inclined
Average absorbed energy (J)	124	121	127

Average of three test values is reported here. Samples were tested at -60 °C.

Conclusions

The test results show successful printing of a martensitic stainless steel alloy m4p™ type13-X using standard LPBF equipment and parameter set. The sample produced showed no cracking or open porosities. The relative density measured using Archimedes' method was 99.7%. The material showed good tensile strength along with high toughness.

These properties make this material well-suited for use in turbine components, valves, impellers and other similar application in the Oil & Gas and allied industry.



Contact m4p

Do you have any further questions on materials for additive manufacturing or the processing or properties of the m4p™ type13-X?

If so, we would be happy to help you. Our team of engineers and materials scientists work along with the largest AM service bureaus, research institutes and end customers to develop new and advanced materials designed for Additive Manufacturing. We also work on developing the process parameters for these materials using our in-house metal AM systems. With this background, we can claim that we have the relevant knowledge, the skill set, and the experience to support you with your material related projects for Additive Manufacturing.

Please reach out to our support team at sales@metals4printing.com or fill out the contact form at www.metals4printing.com/kontakt/

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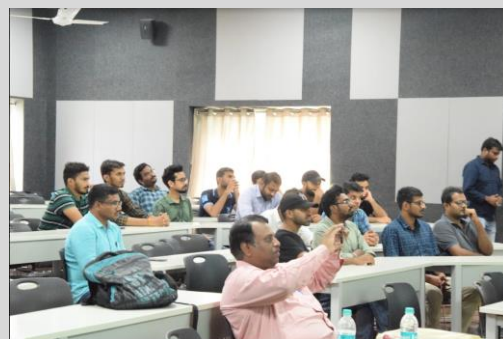
Calendar of Events

Special Events & Highlights

"Inauguration of Material Advantage Student Chapter at IIT Tirupati, Andhra Pradesh"

ASM BANGALORE CHAPTER inaugurated the installation of a MATERIAL ADVANTAGE STUDENT CHAPTER at the Indian Institute of Technology (IIT) Tirupati, Andhra Pradesh India. The Inauguration was scheduled on 11th October 2022 at TC1 Classroom at IIT Tirupati. Dr. Ajay Kumar from Department of Mechanical Engineering at IIT Tirupati has spearheaded the student chapter formation.

Mr. Babu Sathian, INC Vice Chair, addressed reg. Technical Talk and Benefits of membership in Professional Society among Students. Later, Mrs. Jyothi Sriram, ASM Bangalore Chapter Chairperson, addressed the Students. Dr. Ajay Kumar, Faculty Facilitator of MA IIT Tirupati, introduced the Student Office Bearers. This was followed by Presentation of Memento to Faculty Facilitator and student EC by Bangalore Chapter EC members and then Address was given by Department Chairman. The meeting concluded with vote of thanks to the Chair.





Technical Talks

ASM International Bangalore Chapter organized the “Technical Discussion Forum ” on the Topic - “ Problems in Testing of Material ” at Mahalaxmi Layout Club, Bangalore-560086. This was a hybrid meeting through Zoom Meeting.

Date / Venue

October 15, 2022 at Mahalaxmi Layout Club, Bangalore-560086.

ASM International Bangalore Chapter and Indian Institute of Metals Bangalore Chapter jointly organised an Online Tech Talk on the topic - “MicroSim: An indigenous phase-field software for microstructural simulations” BY Prof. Abhik N. Choudhury Associate Professor, Department of Materials Engineering Indian Institute of Science, Bangalore-560012, INDIA

Date / Venue

October 28, 2022 through Zoom Meeting



Annual General Body Meeting 2022

ASM International Bangalore Chapter organized its Annual General Meeting (AGM).

Date / Venue

November 10, 2022 @ Bangalore Golf Club.



ASM International Bangalore Chapter organized the INC Meeting. On this occasion Sri V. Babu Sathian took over as the Chairman of INC. Installation of New India National Council for 2022-2024 took place on this occasion.

Date / Venue

November 26, 2022 @ at Abraham Hall, Dept. of Materials Engineering, IISc, Bangalore-560012



Events Calendar 2021-23

1. Memberships	Drive by Headquarter / India Task Force
2. Monthly Technical Talks	To improve consistency and Participation
3. Student Outreach	<ul style="list-style-type: none"> a) Events for Students – Talks + Industrial Visits b) Membership & Student Chapter Formation c) Support in Projects / Training d) Material Camps
4. Major Events	<ul style="list-style-type: none"> a) One/Two Days Workshops / Seminars b) Annual Get-together c) Annual General Body Meeting d) Hosting of INC Meeting / Visiting ASM Leaders e) Support to other ASM Chapters / Local Associations in their events.
5. Technical Talk	Every 3 rd Saturday 5.00 pm
6. Executive Council Meetings	This Qtr. – October 15, 2022 ; December 24, 2022

ASM International Bangalore Chapter cordially welcomes the following New Members who have joined during the period – From 1st October 2022 to 31st December 2022:

Sl. No.	Names of the New Members
1	Mr. Srinivas Sathian, Process Pumps (I) Pvt. Ltd.
2	Mr. Vasanth Murugan, Salem Material Technology and Company
3	Mr. V. T. Bhanu Kiran, NCON Turbines, DOOSAN Power

SUSTAINING MEMBERS OF ASM (I) BANGALORE CHAPTER



Hexagon-MSD Software Corporation



Lakshmi Vacuum Technologies



Spectrum Tool Engineers Pvt Ltd



Air Force Technical College Bangalore

ASM International -Bangalore Chapter

 Visit www.asmlrchapter.com for more details about ASM Bangalore chapter and membership

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 Please mail your valuable suggestions/comments to: asmlr2015@gmail.com