AMSI
ADDITIVE MANUFACTURING SOCIETY OF INDIA

3D PRINTING INSIGHT

PRESIDENT'S REPORT

We are excited to present the June 2024 issue of the '3D Printing Insight' newsletter, a joint effort by the Additive Manufacturing Society of India (AMSI) and the Indian Women in 3D Printing organization (IW3DP). AMSI proudly unveils its new logo and outlines five key objectives for the next five years:

- **MADE IN INDIA – MADE FOR THE WORLD:** Foster the development of industry-grade additive manufacturing machines, materials, and software in India for global markets.
- **Enhance 3D Printing Applications:** Work towards expanding the applications of 3D printing across various sectors in India.
- **Skilling and Upskilling:** Offer industry-driven skill enhancement courses in 3D printing, additive manufacturing, Industry 4.0, and digital twin platforms.
- Mentoring and Incubation: Provide guidance and support for startups and incubators in the additive manufacturing domain.
- Global Networking: Facilitate connections with global additive manufacturing industries, organizations, and academic institutions through technology showcases and conferences.

Furthermore, We're pleased to announce the 13th International Conference & Exhibition on 3D Printing and Additive Manufacturing (AM 2024) on October 24-25, 2024, in Bangalore. This event will foster collaboration, networking, and knowledge exchange on the latest global advancements in 3D printing. Join us at AM-2024!

We thank our corporate and academic members for their unwavering support in fostering a thriving 3D printing technology ecosystem in India with AMSI. We look forward to seeing you at the AM-2024 conference and exhibition on October 24-25, 2024, at The Lalit Ashok, Bengaluru.

Sincerely,
Dr. L. Jyothish Kumar
President, AMSI

3D PRINTING INSIGHT

CHAIRWOMAN'S REPORT

Dear Members and patrons of Indian Women in 3D Printing,

It is with immense pride and gratitude that we present to you the newsletter for the month of June 2024. This newsletter showcases our organization's remarkable achievements.

Firstly we are glad to share that IW3DP signed an MOU with AMTRON – Assam Electronics Development Corporation Ltd (Government of Assam Undertaking) to advance 3D Printing technology in North East India. This collaboration aims to develop 3D Printed products for local markets and provide livelihood opportunities for women, driving economic empowerment.

Furthermore, we expanded our student chapter to Vidya Vardhaka College of Engineering, providing cutting-edge 3D Printing training to the next generation of professionals. This becomes our seventh student chapter.

In another milestone, we successfully acquired the trademark for Indian Women in 3D Printing, protecting our brand identity and reinforcing our commitment to excellence and innovation.

As we reflect on the past year, we are reminded of our organization's incredible potential. When women unite, driven by a shared vision and passion, we can achieve remarkable feats. With the continued support of our members, partners and patrons we will continue to break barriers and inspire generations to come. Thank you for being part of this transformative journey.

Together, let us shape the future of 3D Printing and create a more inclusive and innovative world

Sincerely,
Dr. Kavya Shree K
Founder Chairwoman

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ORGANISATION UPDATES FOR THE YEAR 2023-24

INDIAN WOMEN IN 3D PRINTING

Glad to announce IW3DP has officially obtained a trademark for its brand from TradeMarks Registry, Government of India Trade Marks Act, 1999

प्रपत्र आरजी - 2
Form RG - 2
क्रमांक No. 3432236

व्यापार चिन्ह रजिस्ट्री, भारत सरकार Trade Marks Registry, Government Of India
व्यापार चिन्ह अधिनियम, 1999 Trade Marks Act, 1999
व्यापार चिन्ह के रजिस्ट्रीकरण का प्रमाणपत्र | Certificate of Registration of Trade Mark
(धारा 23 (2), नियम 56 (1)) | Section 23 (2), Rule 56 (1)

व्यापार चिन्ह संख्या / Trade Mark No. : 5876282
दिनांक / Date : 02-04-2023
अ. संख्या / J. No. : 2123

प्रमाणित किया जाता है कि व्यापार चिन्ह / जिसका प्रतिरूप इसके साथ संलग्न है, वह ..... के नाम से ..... वर्ग में ..... संख्या के अधीन दिनांक ..... को ..... के संबंध में रजिस्ट्रीकृत किया गया है।

Certified that Trade Mark / a representation is annexed hereto, has been registered in the name(s) of :- INDIAN WOMEN IN 3D PRINTING SOCIETY, No.42, BSK III Stage, III Phase, III Block, 9th Cross, Bangalore – 560085, Karnataka, India. A Registered Society, (Society)

In Class 41 Under No. 5876282 as of the date 02 April 2023 in respect of

Goods and service as annexed

Trade Mark as annexed

आज वर्ष 20..... के ..... माह के ..... वें दिन को मेरे निर्देश पर मुद्रांकित किया गया
Sealed at my direction, this 02nd day of March , 2024

व्यापार चिन्ह रजिस्ट्री मुंबई
Trade Marks Registry MUMBAI

व्यापार चिन्ह रजिस्ट्रार
Registrar of Trademarks

IW3DP welcomes its 7th Student Chapter at Vidya Vardhaka College of Engineering, Mysore

IW3DP signs MOU with Assam Government for developing an ecosystem for 3D Printing among women in North East India.

IW3DP Welcomes Ms. SWARNA PD to the organisation

Swarna P D
Secretary & Project Manager
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No. 42, BSK III Stage, III Phase, III Block, 9th Cross, Bengaluru 560085
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ORGANISATION UPDATES FOR THE YEAR 2023-24

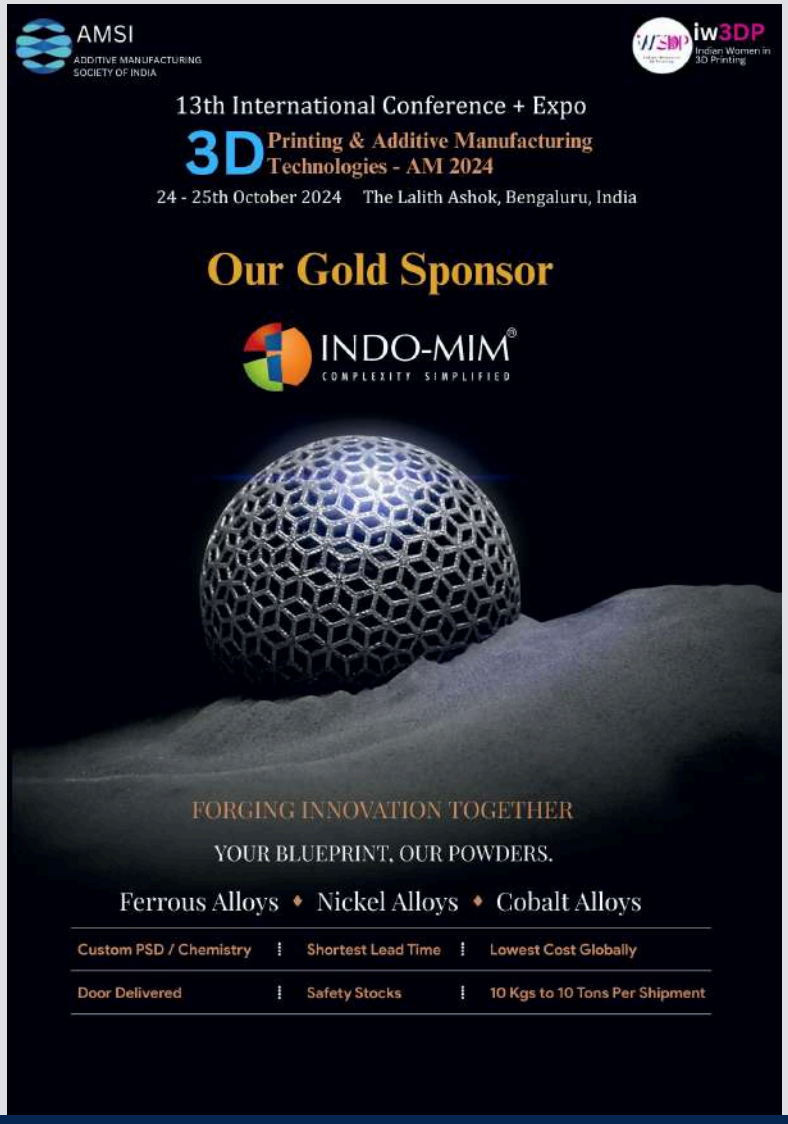
ADDITIVE MANUFACTURING SOCIETY OF INDIA

AMSI signs MOU with City College of Engineering for Skill Enhancement and Training in Digital Twin, AR - VR & 3D Printing Technology.

UPCOMING EVENTS

INDO-MIM hosts a world-class Vacuum-Melting Inert gas metal powder production facility with a production capacity of 1200 TPA. It is India's largest inert gas metal powder production facility that produces powders for metal injection molding (MIM), additive manufacturing (Laser-bed fusion & Binder-Jet), thermal spray, and welding applications. Powder chemistry includes stainless steels, alloy steels, tool steels, nickel & cobalt superalloys.

https://www.indo-mim.com



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INDO-MIM®
COMPLEXITY SIMPLIFIED

Customized metal powders for additive manufacturing: The INDO-MIM Approach

Atomization is a century-old technology that manufactures metal powders for industrial applications using various powder consolidation techniques. Atomization are of two main kinds – Water and gas atomization processes – these are widely used because of productivity, flexibility, and cost. The manufacturing industries actively pursued powder metallurgy processes in the 1970s for manufacturing components on a large scale and the water atomization process took the lead. Gas atomization technology has also existed for a long time, however it is seriously sought for large-scale production only post-commercialization of the additive manufacturing (AM) process.

The AM process, particularly laser powder bed fusion (LBPF) technology, demands spherical and narrow particle size distribution powder for better flowability and good packing efficiency. This quality is achievable by gas and plasma atomization processes. Though there are many gas atomization processes (air melting gas atomization, vacuum melting gas atomization with crucible and without crucible), the process selection purely depends on the industry application.

For commercial and general automotive and industrial engineering applications where the gaseous content is not critical, the air-melting gas atomization process is widely preferred because of cost advantages. When the scale of criticality increases in powder quality, this technique shifts to vacuum melting (with or without a crucible) since it gives a highly clean and less gaseous content powder that is preferred for high temperature and highly sensitive applications.

At INDO-MIM, we manufacture metal powders for vacuum melt and air melt gas atomization processes to produce a high-spherical powder that is suitable for metal injection molding, and additive manufacturing (LBPF and Binder-jetting processes). We manufacture 120+ variants of powder with the capability of customized chemistry and size distribution.

Being a strong metallurgical company with three decades of experience in the powder metallurgy industry, we have succeeded in developing powder that is suited for end application with excellent quality assurance. Our system is capable of handling ferrous, nickel, cobalt, and its alloy powder. We have been serving global customers in diverse application segments.

Now we have named our powders for easy understanding based on their applications. For example, INDO-SPHERE powders for Additive manufacturing and INDO-FUSION powders for Thermal Spray application.
For more information about the powder variants, specification and composition do visit: **https://www.indo-mim.com/powder-materials/**
For further inquiries, you can reach us at **infohq@indo-mim.com**. Visit **www.indo-mim.com** for more information.

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TECHNOLOGY NEWS

Wipro 3D and ISRO jointly pave the Way for Sustainable Space Exploration through Additive Manufacturing

Dr. V Narayanan, Director of Liquid Propulsion Systems Centre (LPSC), a lead center of ISRO lauds Wipro 3D for achieving phenomenal Milestone in Rocket Engine Manufacturing.

Bangalore, India - May 31, 2024 – Wipro 3D, in collaboration with the Indian Space Research Organisation (ISRO), celebrates a pathbreaking achievement in space technology with the successful manufacturing of the PS4 3D-printed rocket engine powering the 4th stage of the Polar Satellite Launch Vehicle (PSLV). .

[Image: PS4 3D-Printed Rocket Engine]

Its adaptability for different kinds of spacecraft missions is enhanced by its ability to support multiple restart capability and payload adapters.Through the adoption of Design for Additive Manufacturing (DfAM) and Laser Powder Bed Fusion (LPBF) technology, Wipro 3D and ISRO collaborated to consolidate the multiple and diversified PS4 engine intricate components into a single unified production unit, enhancing production efficiency and structural integrity.

Dr. V Narayanan, Distinguished Scientist and Director of Liquid Propulsion Systems Centre (LPSC), ISRO lauded the accomplishment during his recent visit to the Wipro 3D facility. The Polar Satellite Launch Vehicle (PSLV) is an expendable launch system designed to place earth observation and Scientific satellites into precise orbits enabling multiple applications like remote sensing, oceanography, cartography, mineral mapping, disaster warning, etc. To ensure accurate orbital placement, the PS4 stage is equipped with advanced navigation, guidance, and control systems. The PS4 engine, traditionally manufactured through conventional machining and welding, underwent a revolutionary redesign using Additive Manufacturing technology.

This significant milestone provides the space industry with a transformative leap forward in space manufacturing enabling Additive Manufacturing technology to redefine traditional production processes. Dr. V Narayanan, Director LPSC, ISRO, expressed, "Wipro 3D's expertise in Additive Manufacturing has been instrumental in realizing our vision for sustainable space exploration. The successful integration of the 3D-printed PS4 engine into our mission marks a significant milestone for ISRO and sets new standards of advanced manufacturing in the space industry..

"**Yathiraj Kasal**, GM & Business Head, Wipro 3D, expressed, "We're honored to collaborate with ISRO on this pioneering project, highlighting the potential of advanced manufacturing in Space. This partnership not only advances ISRO's 'Make in India' initiative but also promotes domestic innovation and manufacturing. It is an honour and a privilege to manufacture the PS4 engine for the PSLV vehicle. We are eagerly awaiting the successful second round of testing to fly high alongside ISRO."

He continued, "With ISRO's backing, this project embodies their commitment to sustainable and cost-effective space missions, facilitating rapid design iterations and enhancing launch efficiency. We extend our sincere gratitude to Dr.V Narayanan and the exceptional ISRO team for their trust in us. As we enter into the project's next phase, we are totally dedicated to providing unwavering support to ensure its success."

The 3D-printed PS4 engine, featuring integral complex cooling channels, prioritizes sustainability and efficiency in its design, with minimal material wastage and post-print machining operations. Rigorous testing of the hardware at the state of the art facilities at ISRO Propulsion Complex in Mahendragiri confirmed the engine's performance under real-world conditions, meeting the design safety and efficiency standards.

The key performance metrics of the ISRO 3D-Printed Rocket Engine extended duration test included optimal chamber pressure, fuel management, combustion efficiency, and specific impulse (Isp). ISRO's adoption of additive manufacturing offers superior precision, minimal resource utilization, and significant reductions in material wastage and production time

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Sogeti High Tech Additive Manufacturing for the New Airbus A350 XWB.

A350 XWB Cable Routing – From Design to Component in Two Weeks

The moment when a completely new commercial aircraft takes to the skies for the first time is always special – and this was especially true of the **Airbus A350 XWB**. As a child of the new millennium, it was clear from the very beginning that development work would focus on innovative materials and production processes – the goal was no less than to build the world's most efficient aircraft. As a technology of the future, additive manufacturing was another possibility that needed to be considered during development. As part of a pilot project, experts from Sogeti High Tech succeeded in developing a cable mount on the front spar of the vertical stabilizer for the passenger aircraft in record time, taking only two weeks from the initial sketch to the finished part. EOS technology and expertise were a pivotal aspect of this development process.

"Getting an existing component 'AM-ready' in just two weeks meant that we had to succeed at the first attempt. The excellent, proactive collaboration with EOS made this ambitious undertaking possible – with outstanding results."

Challenge :-

Time-critical development and production of a cable routing mount for a camera in the vertical stabilizer of the A350 using additive manufacturing.

The project specifically involved producing a cable routing mount for the latest Airbus model. The mount was ultimately needed for the power supply and data transportation of a camera located in the vertical stabilizer, providing a view of the outside to passengers and orientation on the ground to the pilots. The product requirements document called for a functionally operational component suitable for series production. This task was entrusted to Sogeti High Tech, a wholly-owned subsidiary of Cap Gemini S.A., which is listed on the Paris stock exchange.The particular challenge in this case was the short lead time of just two weeks. The entire development had to be completed within this time frame: From analysis of the part and of the current installation set-up, a parameter study aimed at optimizing the topology and its interpretation, and the design and production of the finished part. The mount also needed to have as few support structures as possible to avoid post-processing.

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In addition, the specifications for the component called for integration of the snap-on cable holder, weight reduction, and compliance with the strict requirements for subsequent aviation industry certification. The conventionally produced component was made up of formed sheet metal parts and numerous rivets – more than 30 individual parts in total. The plug connectors in the upper area were made from plastic, and thus from a different material than the other individual parts of the mount. The aim was to develop an integrated solution consisting of a single part that also included the plug connectors, thereby significantly reducing construction and installation times. The weight reduction target for additive manufacturing was determined by a parameter study based on topology optimization.

Solution :-

Reduction to a single component and manufacturing on an EOS M 400 minimizes production time to 19 hours. For the new component, Sogeti High Tech followed the tried-and-tested development process for designing additively manufactured parts. The project kicked off with an analysis of the existing, conventionally produced component in terms of the upcoming manufacturing process – with an extremely positive outcome.

The component's functionality, material, and previously complex structure made it an ideal candidate for powder-bed-based 3D printing technology from EOS. The design freedom offered by this technology allows complex structures to be produced in a single piece, meaning that a weight-saving design can be selected without neglecting functional integration.

This analysis then allowed the so-called design space – the space that the cable-routing mount may occupy – to be defined. The aluminum alloy AlSi10Mg, which is ideal for thin-walled, complex structures, was chosen as the material. The interfaces to the external areas remained the same, forming the non-design space, meaning that no changes needed to be made to them. The defined loads were taken as the boundary conditions for topology optimization in the parameter study, providing the basis for a new design. As is customary, CAE software was used for the topology optimization calculations; in by contrast, a dedicated solution for designing structures with free-form surfaces was used for the re-design.

Sogeti High Tech created the design itself. In order to meet the lead time of two weeks, EOS calculated the build time and optimized parameters from the topology optimization results using the software EOSPRINT. This created the CAE implementation for the manufactured part while also taking into account the possibilities and limitations of the manufacturing process and the need to avoid support structures.

Results :-

Thanks to the cooperation between Sogeti and EOS, it was possible to develop a component optimized for additive manufacturing that fully exploits the design freedom afforded by DMLS technology while at the same time taking account of its restrictions. This allowed plug connectors for cable routing to be integrated into the design and local reinforcement to be incorporated in specific critical areas in order to optimize the structure.

Self-supporting apertures and struts within the component help to keep the effort and hence the post-processing costs to a minimum. Additionally, the mount can be produced extremely fast, whenever it is needed. Manufacturing – which is performed on an EOS M 400 with layer thicknesses of 90µm – only takes 19 hours instead of the 70 days previously required.This corresponds to a reduction in the production time well in excess of 90 %. This is largely because the many individual steps and formerly 30 parts have been brought together in a central component that can now be produced in a single run. In addition, the individual parts no longer need to be constructed and held in stock, which can be expensive. Storage for the entire component assembly is now also much more straightforward.

Sogeti was not only able to save a huge amount of time in production, but also in development. The entire process from the initial sketch to the finished component took only two weeks. This is a phenomenal lead time. At the same time, the design also means greater weight efficiency.
Whereas the conventionally manufactured original part weighed 452 grams, the additively manufactured cable mount weighs just 317 grams – and it is well known that the aviation industry counts every single gram in the interest of cutting fuel consumption to a minimum. The customer, Airbus, was more than satisfied with the results.

The Result at a Glance :-

- ·29 Single Parts Functional integration
- ·90% Reduction of production time
- ·135 Grams Reduction of weight

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