



**ASM** Pune  
INTERNATIONAL Chapter



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## Chapter News Letter



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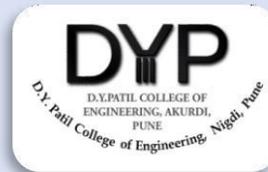
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**Sanket S. Chikshe**  
ASM Faculty Advisor, PVGCOET, Pune

## WHAT IS ASM?

**ASM International** (formerly known as the **American Society for Metals**) is a professional organization for materials scientists and engineers. It serves as a global hub for **materials science, engineering, and metallurgy**, promoting research, education, and industry collaboration.

ASM provides access to a wealth of **technical resources, journals, conferences, and training programs**, helping professionals stay updated with advancements in **materials, manufacturing, and failure analysis**.

The society plays a key role in fostering innovation and supporting engineers in developing high-performance materials for ASM International, originally known as the *American Society for Metals*, is a global community of **materials engineers, scientists, researchers, and industry professionals**. Founded in **1913**, ASM has grown into one of the most respected organizations in the field of **materials science and metallurgy**.

ASM is all about **advancing materials knowledge and connecting people** who work with metals, polymers, ceramics, and composites. Here's what makes it important:

1. **Knowledge & Research** – ASM publishes technical handbooks, journals, and case studies that help engineers and scientists stay up to date with the latest advancements in materials.
2. **Education & Training** – The organization runs training programs, certifications, and online courses (including NPTEL) to help students and professionals sharpen their skills.
3. **Networking & Industry Collaboration** – ASM brings together experts from **academia, research, and industry**, creating opportunities for learning and career growth.
4. **Conferences & Events** – They organize global events where professionals share insights on **metallurgy, manufacturing, failure analysis, and advanced materials**.
5. **Innovations in Additive Manufacturing** – ASM has been at the forefront of **3D printing and advanced manufacturing**, supporting research and real-world applications in aerospace, automotive, and biomedical industries.

**EDITORIAL**

Dear ASM Members and Esteemed Colleagues,

It brings me great joy to present this edition of our ASM Newsletter, where we showcase not only the advancements we've made but also the spirit of innovation and collaboration that defines our community. As we continue to make strides in materials science, this newsletter stands as a testament to the hard work and dedication that all of you have put into pushing the boundaries of knowledge. This issue brings together a series of remarkable technical articles from our talented students, faculty and industry collaborators. These articles highlight cutting-edge research, emerging trends and the exciting opportunities within materials science. I encourage you to dive deep into these works and explore the concepts that are shaping the future of our field.

Furthermore, I'm proud to highlight the technical talks and workshops organized under the ASM banner at our college. These events have not only created a platform for knowledge exchange but have also opened doors to valuable networking opportunities with industry professionals and academic leaders. It has been truly inspiring to witness students, researchers and professionals come together for thought-provoking discussions that bridge the gap between theoretical research and real-world applications. As we move forward, let us continue to build upon these initiatives, staying focused on fostering a spirit of collaboration, curiosity and excellence. Our collective efforts make ASM a thriving hub for knowledge, innovation and positive change in materials science. I look forward to the exciting developments in the months to come and am confident that we will continue to make a significant impact in the field.

Thank you for your unwavering commitment and passion for advancing our shared mission.

Warm regards,

**Prof. Sanket Chikshe**

*Assistant Professor, PVG's College of Engineering and Technology & GKPIOM, Pune*

## TECHNICAL ARTICLE

# DESIGN AND DEVELOPMENT OF FILAMENT MAKING DEVICE FOR 3D PRINTING MACHINE

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### INTRODUCTION:

In this paper, the design of a filament making machine has been presented. The machine's design has been completed, and the filament making machine has been fabricated according to the design objectives. Input materials (Polymer) like Polylactic Acid (PLA) and Acrylonitrile Butadiene and Styrene (ABS) are used in the form of granules and pellets. Ceramic band heaters are used to melt the input materials. The melting point of PLA (180 °C) and ABS (105 °C) materials is controlled by using temperature controller and sensors.

Barrel screw are used for feeding the input materials longitudinally along the screw. The screw has three zones feed zone, melt zone and metering zone. The filament quality is dependent on the screw speed in relation with pressure and temperature ranges. Plastic filament extruder produces plastic filament of different diameters (1.75mm and 3mm) by using corresponding dies. For different diameters, different die is used but the existing convectional machine are modified with changes as per the requirement we can produce to different diameters filaments together using single stroke or single processing stroke of machine.

The filament prices are increasing day by day. To overcome this problem faced by manufactures and small workshop owners, the filament making machine has been created. This project focus on designing and fabricating a portable filament making machine which draws 1.75mm or 3mm diameter filament of PLA and ABS materials. The arrangement for plastic extraction is as shown in figure-1.

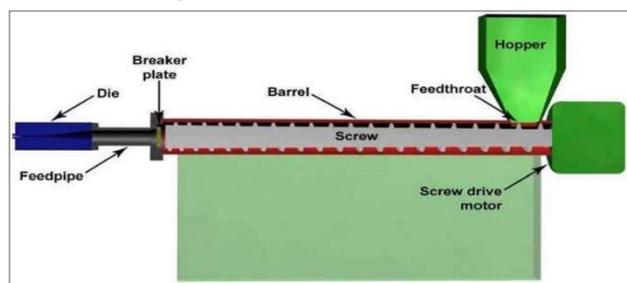


Figure 1: Plastic Extrusion

**OBJECTIVES OF WORK:**

The objectives of the work are as follows:

- Designing and developing a plastic filament extruder for 3D printing
- The focus was specifically on creating a 1.75 mm diameter filament from ABS pellets.
- Developing a 3D printing filament making extruder that can be used by small scale manufacturing units, companies, colleges who have a portable 3D printer in-house.
- Performing design calculations to support the development of a filament extrusion machine.

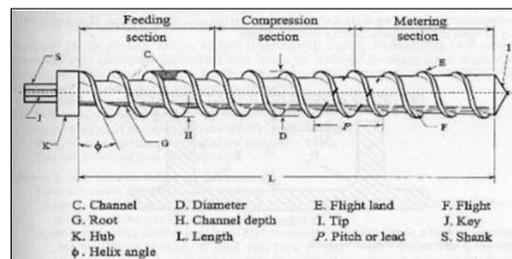
**SYSTEM DESIGN:**

**Screw:**

The diameter to be worked with was decided to be 38 mm, and for the relation between the length and the diameter, a 12/1 ratio has been chosen. The smallest diameter of 38 mm has been considered due to its reasonable price and precise usefulness. In addition, we took 12/1 for the relation L/D because we considered 300 mm the maximum length keeping a light screw in terms of weight, taking into account that if the relation L/D is bigger, the price will be lower. Therefore, the first parameters of the screw have been defined as D = 38 mm and L = 300 mm.



**Figure 2: Wiper motor and 2SW60**



**Figure 3: Screw Geometry Details Helix**

**Angle:**

One of the first things to be determined for the extruder is the helix angle of the screw. For general purpose screws, the gap between 2 crests or the pitch (t) usually coincides with the diameter. So, t=D=15mm So the helix angle is

$$\phi = \tan \dots\dots\dots$$

$$\phi = \tan^{-1} \frac{15}{\pi * 15}$$

$$\phi = 17.65$$

### Ridge Width:

The width of the ridge is defined by the diameter of the screw as it exists a relation between them,  $e=0.12*D$  So  $e= .12*15$   $e = 1.8$  mm

### Screw Lengths:

For amorphous thermoplastic, the feeding zone is between 20% and 25% of the screw length, the compression zone between 32% and 38% and for the metering zone between 40% and 45% . We grounded our decision of the zone's lengths on the percentage from the total length that normally each zone has. The percentages used in each zone are obtained as follows:

Feeding Zone Length:  $L1 = 0.217 * 300 = 65$ mm

Compression Zone Length:  $L2 = 0.348 * 300 = 105$ mm

Metering Zone Length:  $L3 = 0.435 * 300 = 130$ mm

### Channel Depth and Screw Clearances:

The clearances inside the screw and with the cylinder have also been defined by the chosen diameter. The channel depth  $h1$  is the space between the cylinder and the soul of the screw. It is related with the screw diameter with the equation  $h1 = 0.2 * D$ ,  $h1 = 3$  mm.

The filler clearance is the space between the thread and the interior surface of the cylinder. It should be small enough to avoid the backpressure while extruding. The equation to calculate it is:  $\delta = 0.002 * D$   $\delta = 0.03$ mm

The depth of the channel at the end of the screw is defined by the compression ratio (Z). The compression ratio relates the depth of the channel at the beginning and at the end of the screw.

### Barrel or Cylinder:

Just as for the screw, the material chosen for the cylinder is steel F-174, for the same reasons. The cylinder must also be able to handle with high temperatures and be hard enough to resist degradation due to the friction generated between the inner face of the cylinder and the plastic flow. The cylinder is the part in charge of keeping the material inside while going throughout the screw. For this reason, its inner diameter is the sum of the screw diameter and the clearance calculated above, to a total of 25.05 mm. Considering the tolerance and the availability of standard tubes, the 1" ID tube has been selected to meet our requirements for the cylinder.

### Barrel Extension

Barrel Extension material is same as Barrel for the same reasons. It is manufactured by turning operation. It is welded to the end of the Barrel. This extension is used to couple barrel piece to die and to give sufficient thickness to fit the secondary heater. In addition, 4 mm thick aluminum strainer is attached to smoothen the flow and 3/8" nut to control the flow.

### Motor:

The motor for the system is a 30 RPM motor with stall torque of 30 Nm (100 N-cm). This motor is controlled by a PWM (Pulse Width Modulation) speed controller. This controller is wired in series with the power source from 12 V supply and the motor. This was the simplest control system. It is a variable speed control system with the RPM is selected by varying the duty cycle. Wiper motor operating at the 6.5A current & 12V power which has output rotating speed of 30 rpm with rated Torque of 13Nm

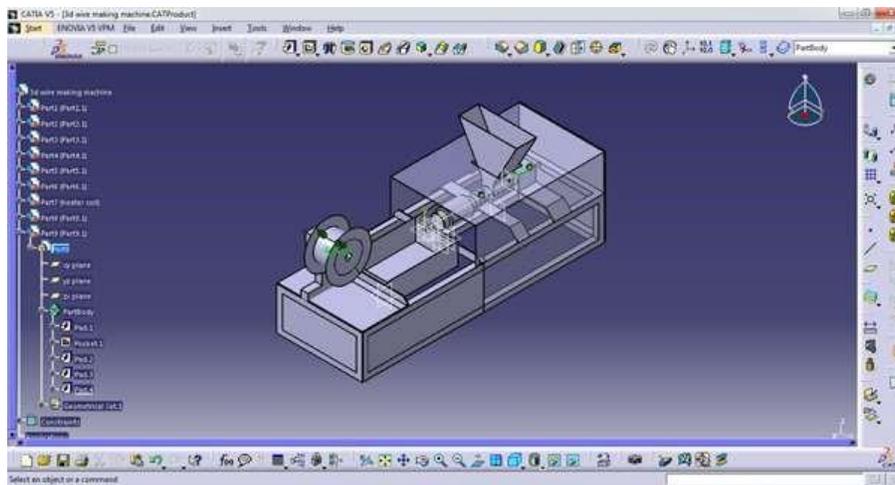


Figure 4: 3D Design of machine in CAD

### CONCLUSION:

3D printing is the future of manufacturing in coming time. The filament used in 3D printer is very important and its market price is increasing day by day with demand. Authors have presented a design of filament making machine for the 3D printer in this paper. The objective was to use Polylactic acid, Acrylonitrile Butadiene and Styrene as a material for filaments. These materials have melting point below 200 degrees and hence they can be controlled by using temperature control. This machine will be useful for the small industries to enhance cost effectiveness. The machine is designed to produce the filament of 1.75 mm diameter.

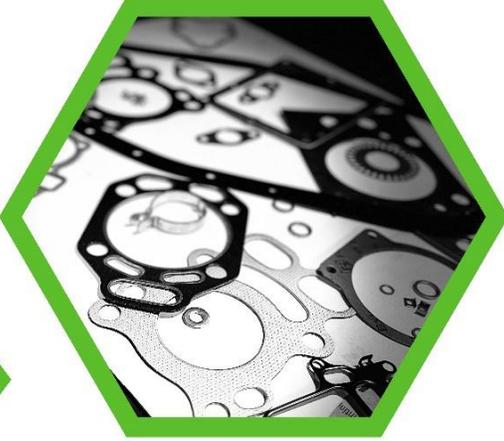
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**INDUSTRIAL VISITS AND TECH TALKS**

**Technical Talks held under ASM-**

**1. International conference on Smart Materials and Additive Manufacturing**

An International Conference on "Smart Materials and Additive Manufacturing" was held on 6th November 2022 at the College Auditorium, PVGCOET & GKPIOM, Pune. Organized by PVG’s ASM Student Club in association with the ASM Pune Chapter and MESA, the event featured guest speakers Dr. Navin Manjooran, FASM Chairman, Solve Technology and Research, USA, and Dr. Pierpaolo Carlone, Professor of Manufacturing, University of Salerno, Italy. The event was graced by chief guests Mr. U. B. Pathak, Chairman, Mr. R. Gupta, Vice Chairman, and Mr. D. G. Chivate, Head of Outreach Committee from ASM International Pune Chapter, along with PVG’s leadership.

Dr. Manjooran highlighted, “Additive manufacturing with Artificial Intelligence is like turning dust into gold,” while Dr. Carlone remarked, “Technology is transferred from generation to generation.” The event was a success, garnering appreciation from the ASM Pune Chapter and attracting students and faculty from engineering colleges across Pune. The full event was streamed live on YouTube.

The newly formed PVG’s ASM Materials Advantage Club is exploring a range of opportunities, including technical events, intercollege competitions, and international conferences. The club also plans to address important topics like mental health and environmental issues, aiming to create a technology-driven society. Through its efforts, the club strives to foster personal growth and societal impact.



**Glimpses of the International Conference at PVG COET, Pune**

## 2. Project competition

The engineering project competition held on May 5th, 2023, at PVG College in Pune, organized by the ASM Students' Club, was a vibrant event that highlighted the creativity and technical expertise of engineering students. The competition featured a wide variety of projects across different engineering disciplines, including mechanical analysis, thermal, design, metallurgy, where students presented their innovative solutions to real-world challenges.

A highlight of the event was the panel of industry expert judges, who meticulously evaluated each project. The judges assessed the projects based on innovation, technical complexity, practicality, and the overall quality of the presentations. In addition to providing constructive feedback, the judges offered valuable suggestions for further improvements, encouraging the students to refine their ideas and enhance the technical and practical aspects of their projects.

The event not only provided students with the chance to showcase their work but also gave them the opportunity to receive expert advice from working professionals in the field. It emphasized the importance of both technical knowledge and effective communication, as participants had to present their work clearly to the judges and audience. Overall, the competition was a great success, fostering learning, creativity, and collaboration while allowing students to gain important insights for future development.



Participants of project competition presenting their projects to the industry experts at PVG COET, Pune

## 3. Ansys software training

The ANSYS software training workshop, organized by the ASM Student Chapter, took place at PVG College of Engineering, Pune, from January 15 to 19, 2024. The workshop aimed to provide third-year engineering students with an in-depth understanding of the ANSYS software, a powerful tool widely used for simulation, modelling, and engineering analysis in industries like aerospace, automotive, and manufacturing.

The workshop was led by Mr. S. Ghadyalji, an expert trainer from Dassault Systems, a company known for its innovation in simulation technologies. Mr. Ghadyalji, with his extensive experience in the field, introduced the students to the various modules and features of ANSYS. He focused on helping the participants gain hands-on experience with the software, emphasizing its practical applications in solving complex engineering problems.

Key topics covered during the workshop included:

- **Introduction to ANSYS Software:** Students were first introduced to the software's user interface, its capabilities, and its wide range of applications in engineering analysis.
- **Structural Analysis:** The participants were trained on how to use ANSYS for static and dynamic structural analysis. This included creating models, applying boundary conditions, running simulations, and interpreting results to ensure design integrity.
- **Thermal Analysis:** The workshop also covered thermal simulations, teaching students how to analyze heat transfer, thermal stresses, and other temperature-dependent behavior in materials and systems.
- **Advanced Simulation Techniques:** Mr. Ghadyalji shared insights into more advanced simulation techniques, such as multi-physics simulations that combine structural, thermal, and fluid dynamics, and how these can be applied in real-world engineering problems.
- **Hands-on Experience:** Throughout the workshop, students worked on practical exercises and case studies that allowed them to apply the concepts they were learning in real time. They modelled engineering systems, ran simulations, and analyzed the outcomes, with guidance from the expert trainer.

The objective of the workshop was not only to teach students how to operate the software but also to deepen their understanding of how simulations can improve the design process, reduce costs, and optimize performance in real-world engineering projects. The event concluded with a Q&A session, where students had the opportunity to clarify doubts and further discuss applications of ANSYS in various engineering domains. The workshop provided valuable exposure to industry-standard tools, significantly enhancing the students' skills and preparing them for careers in engineering and technology sectors.



Shrirang Ghadyalji, Industry Expert conducting workshop on Solidworks at PVG COET, Pune

#### **4. Technical value-added course on GD&T and CMM**

The technical workshop on Geometric Dimensioning and Tolerancing (GD&T) and Coordinate Measuring Machines (CMM) was held at PVG College of Engineering, Pune, from January 15 to 19, 2024. This workshop, organized under the ASM Student Chapter, was aimed at second-year engineering students, providing them with essential knowledge and hands-on experience in key manufacturing and measurement techniques used in the industry.

Mr. Momin, an expert trainer from Accurate Industries, conducted the sessions, bringing his practical expertise to the students. The workshop covered two main topics: GD&T and CMM, both of which are fundamental for precision manufacturing, quality control, and product design.

#### **Key topics and sessions included:**

##### **Introduction to Geometric Dimensioning and Tolerancing (GD&T):**

The students were introduced to the principles of GD&T, a symbolic language used to specify the geometry and tolerances of parts and assemblies in manufacturing.

Mr. Momin explained the significance of GD&T in ensuring the proper fit, function, and assembly of parts. Key concepts such as tolerance types, datums, features of size, and geometric controls like flatness, roundness, and angularity were discussed in detail.

##### **Practical Applications of GD&T:**

The students learned how GD&T principles are applied in engineering drawings and specifications. Case studies and real-world examples were shared to demonstrate how GD&T improves precision and reduces errors in the manufacturing process.

##### **Introduction to Coordinate Measuring Machines (CMM):**

The workshop included a detailed session on Coordinate Measuring Machines, which are used for precise measurement and inspection of parts and assemblies. Students learned about the different types of CMMs, their working principles, and the importance of CMMs in ensuring the accuracy of manufactured products.

Mr. Momin explained how CMMs are integrated into the quality control process, helping detect defects and ensuring that parts meet the required specifications.

##### **Quality Control and Inspection:**

The workshop emphasized the role of GD&T and CMM in quality control processes, illustrating how these techniques help achieve high standards in manufacturing. The event concluded with a Q&A session where students had the chance to ask questions and clarify concepts. This technical workshop significantly enhanced the students' understanding of GD&T and CMM, preparing them for future roles in the manufacturing and engineering industries.



**Inauguration ceremony of skill development program and visit to Accurate Gauging Industries Ltd, Pune**

### 5. Additive Manufacturing (3D printing workshop)

A workshop on 3D Printing was held at PVG College in Pune on 10th August 2024, under the ASM Student Club. The event provided an insightful introduction to 3D printing technology for students and enthusiasts. Mr. Pushkar Suryawanshi from 3D Shikshan was the expert speaker, guiding participants through the basics of 3D printing.

The session covered various 3D printing technologies, such as FDM (Fused Deposition Modeling), SLA (Stereolithography), and SLS (Selective Laser Sintering). Mr. Suryawanshi explained the working mechanism of 3D printers, from 3D model design using CAD software to the actual printing process. He also discussed the materials commonly used in 3D printing, including PLA, ABS, and resin.

Additionally, the advantages and disadvantages of 3D printing were highlighted. The advantages included rapid prototyping, customization, and the ability to create complex designs that would be difficult or impossible with traditional manufacturing methods. The disadvantages included limitations in material options, potential high costs for high-quality prints, and the speed of production for large-scale manufacturing.

As a token of appreciation, participants were given 3D-printed keychains after the workshop. The event received enthusiastic feedback, leaving attendees with a deeper understanding of both the potential and the challenges of 3D printing technology.



**Keychains given to participants as appreciation.**



**Industry Expert conducting the workshop** 13

## WELCOMING NEW TEAM MEMBERS ONBOARD

We are excited to welcome our newest members to the American Society for Metals (ASM International). As a global network of materials professionals, ASM thrives on collaboration, knowledge-sharing, and innovation in metallurgy and materials science. Our new members bring diverse expertise, ranging from industry leadership to cutting-edge research, and we are eager to see their contributions enrich our community. We encourage all members to connect with them, share insights, and collaborate on advancing materials science. Let’s extend a warm ASM welcome and support their journey within our organization!

<b>Our chapter appreciates the efforts of our organization team of MA Chapter Members-</b>	
<b>New Members</b>	
Aryakee Sorte	Shruti Nath
Nikita Diwane	Amit Joshi
Jyoti Kumari	Harsh Yadav
Shivani Sanas	Bhaskar Chavan
Rugved Dharmadhikari	Ayush Patil
Shreeyash Joshi	Soham Dandane
Tanmay Lele	Manomay Bhosale
Shrutika Mane	
<b>Existing Members</b>	
Atharva Tikore	Pranav Sonawne
Aditya Kulkarni	Shraddha Kore
Prathmesh Satpute	Atharva Adkar
Kunal Chavan	Tanish Navale
Arya Bhalkikar	Sharwil Deshpande
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Malhar Jagtap	Om Tidke



## MESSAGE TO THE SOCIETY

At **ASM International**, we believe that materials are the foundation of innovation, shaping everything from the infrastructure we rely on to the cutting-edge technologies that define our future. As the world's leading professional organization for materials science and engineering, we are committed to advancing knowledge, fostering collaboration, and supporting professionals in metallurgy, materials research, and related disciplines.

For over a century, ASM International has been a hub for scientists, engineers, educators, and industry leaders who are dedicated to pushing the boundaries of materials performance. Our society thrives on education, research, and technological advancements, bringing together experts to solve complex challenges in aerospace, automotive, biomedical, energy, and countless other industries.

We believe in the power of knowledge-sharing, mentorship, and continuous learning. Whether you are a student exploring materials science, a seasoned professional seeking the latest advancements, or an industry leader driving change, ASM International is your gateway to growth, innovation, and excellence.

Join us in our mission to inspire progress, strengthen industries, and build a more sustainable future through the power of materials. **Together, we are shaping the future of science, technology, and engineering.**

### 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](mailto:asm.pune@gmail.com)



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