SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF AUTOMOBILE ENGINEERING

19AUT303 – Additive Manufacturing and its applications

III YEAR / V SEM

Part orientation and support generation

Part orientation and support generation

What is part orientation and support generation

- Part orientation and support generation are two fundamental steps that significantly influence the outcome of your 3D printed creations.
- Understanding how to orient your object and generate supports effectively can be the key to unlocking the full potential of this revolutionary technology.
- Part orientation, is like selecting the perfect angle for a photograph, is the art of positioning your 3D model in the most optimal way within the 3D printer’s build volume.
- It’s about finding the right balance it influences the aesthetics, structural integrity, and the limitations of your chosen part.

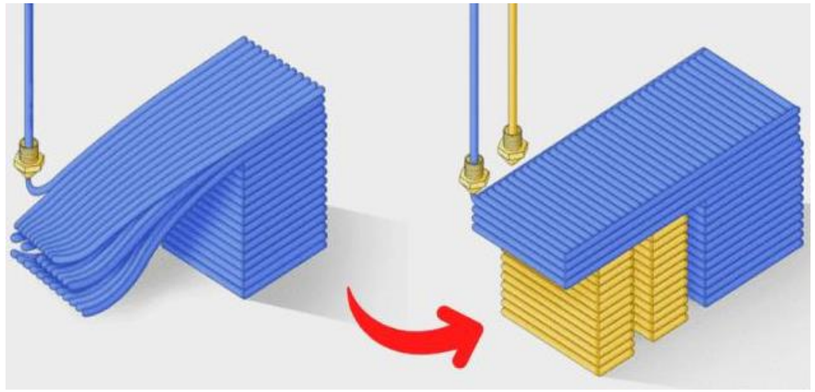
Part orientation and support generation

- On the other hand, support generation is the scaffolding of 3D printing, is like how a building's structure supports its form.
- Supports are temporary structures added during the 3D printing process to provide stability and prevent deformations or print failures.
- Supports are essential structures designed to uphold and stabilize overhangs and complex geometries during the printing process. They prevent the material from sagging or collapsing mid-print, ultimately ensuring the fidelity of your design.
- Support generation can be a manual or automatic process, with your slicing software generating supports based on your model's geometry.
- The key is striking the right balance, using enough support for stability without overdoing it, which can make support removal a laborious task.

Part orientation and support generation

Overhangs and Support Minimization

- Minimizing overhangs (unsupported horizontal surfaces) as much as possible. Overhangs can lead to print defects. Orienting the part to reduce overhangs can improve print quality,
- In some cases we can’t avoid overhanging structure based on the product’s design support structure plays a vital role.
- At the same time considering that reduction of support structure will also reduce the time for final finishing proces using thick unnecessary support leads to waste of time and material



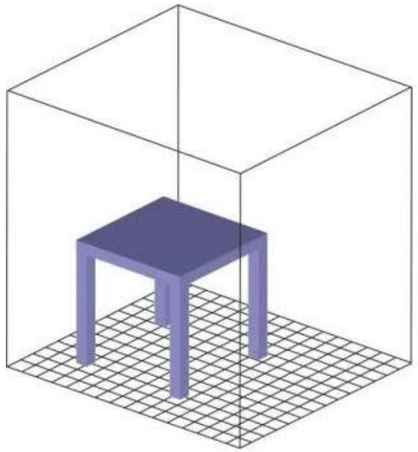
Part orientation and support generation

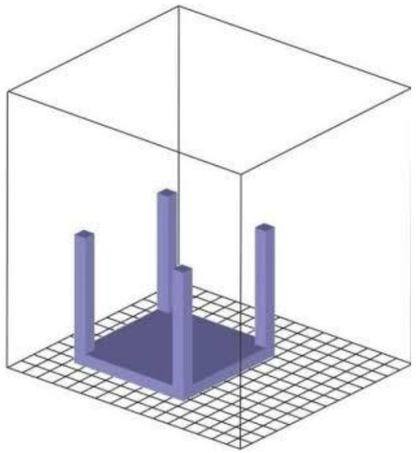
Printing surface and layer adhesion

- consider the surface on which the object will be printed. The build platform is typically the bottom surface of your object. It should be as flat and even as possible to ensure proper adhesion and stability during printing.
- Think about how the layers will be built. Some orientations may result in better layer adhesion, which can improve the overall strength of the part.
- It’s typically a flat, rigid surface on the 3D printer where the first layer of your object adheres during printing.
- Ensuring that the printing surface is clean, level, and properly prepared is crucial for successful 3D printing
- Common printing surfaces include heated beds, glass plates, and specialized build surfaces like PEI sheets or BuildTak. The choice of printing surface material can affect adhesion, print quality, and ease of part removal.

Part orientation and support generation

- Layer adhesion refers to how well successive layers of 3D printing material bond together during the printing process.
- Strong layer adhesion is essential for creating durable and structurally sound 3D prints.
- Proper settings such as the right nozzle temperature, print speed, and layer height are critical to achieving good layer adhesion.
- Inconsistent or poor layer adhesion can result in weak parts that are prone to breaking apart, especially in functional or load-bearing applications.

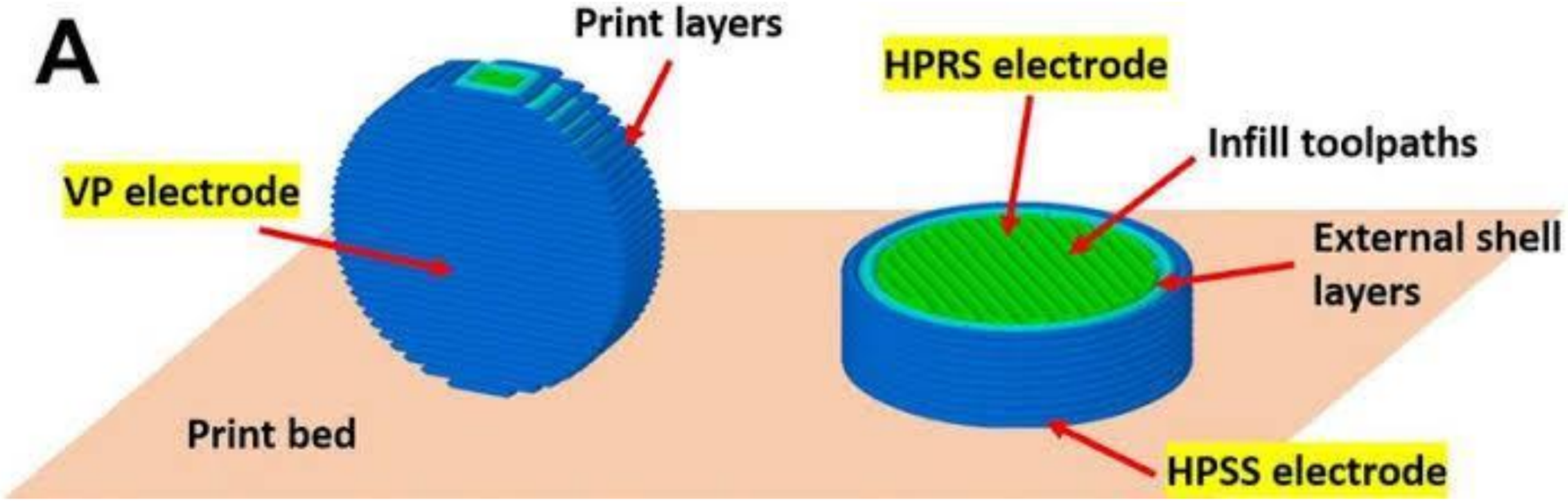




Part orientation and support generation

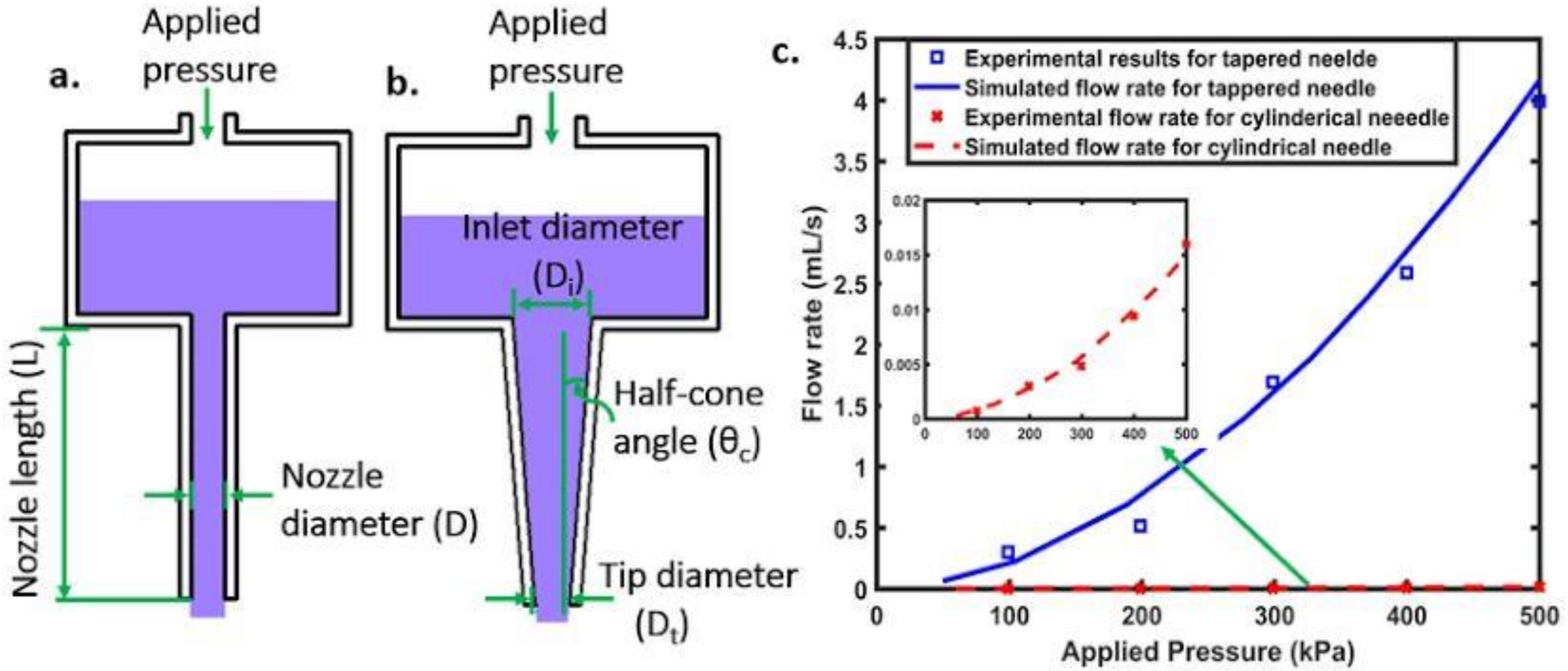
Print time and material flow

- Part orientation can significantly impact print time. Vertical orientations often result in longer print times compared to horizontal ones. Balance print speed with your other considerations.



Part orientation and support generation

- Consider how the chosen orientation affects the flow of material from the nozzle. Some orientations may require more intricate movements of the 3D printer's extruder, which can affect print quality.



Part orientation and support generation

How to find correct part orientation

1. Model Analysis
2. Printer Specifications
3. Identify Overhangs
4. Consider Print Material
5. Consider Print Time:
6. Position Flat Surfaces
7. Utilize Support Structures Wisely
8. Test and Iterate
9. Use Slicing Software


Thank
you!