“I am a **role model leader** who wants to empower employees to achieve new heights. I want to foster an **inclusive** environment. I will accomplish this by leading with **transparency** and by guiding my team to be the best versions of themselves.”



Confidence



Clarity

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Audience

- Comprised of various skillsets within Materials & Process Engineering (M&P):
  - Interns
  - Early career engineers
  - Lab management
- Mixed audience
- 5-10 attendees in person, in a conference room

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Attention-Getting Opening



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Attention-Getting Opening





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Executive Summary



Purpose

- Educate on the importance of optical microscopy



Motivation

- Understand the material itself
- Understand the fabrication process



Actions

- Prepare samples and evaluate images
- Propose solutions to production issues

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Agenda

- Microscopy Overview
- Preparing Samples
- Imaging
- Evaluating Images

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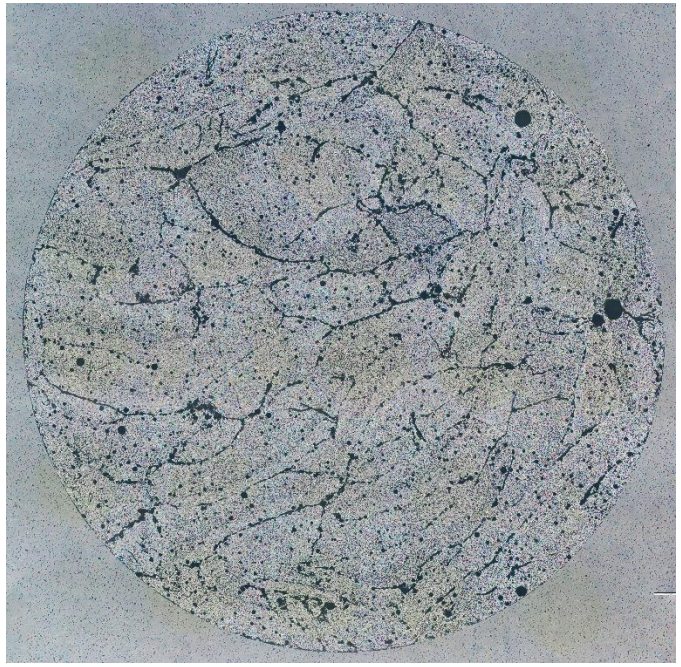
Microscopy 101

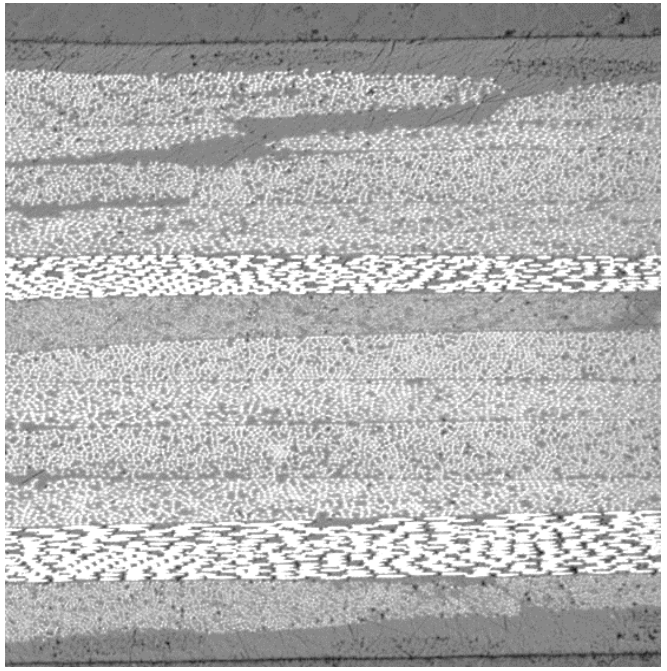
"H" = Highlight the Point,
"O" = OK, So What
"R" = Relevant Information

Technique that uses a light-based microscope to generate magnified images

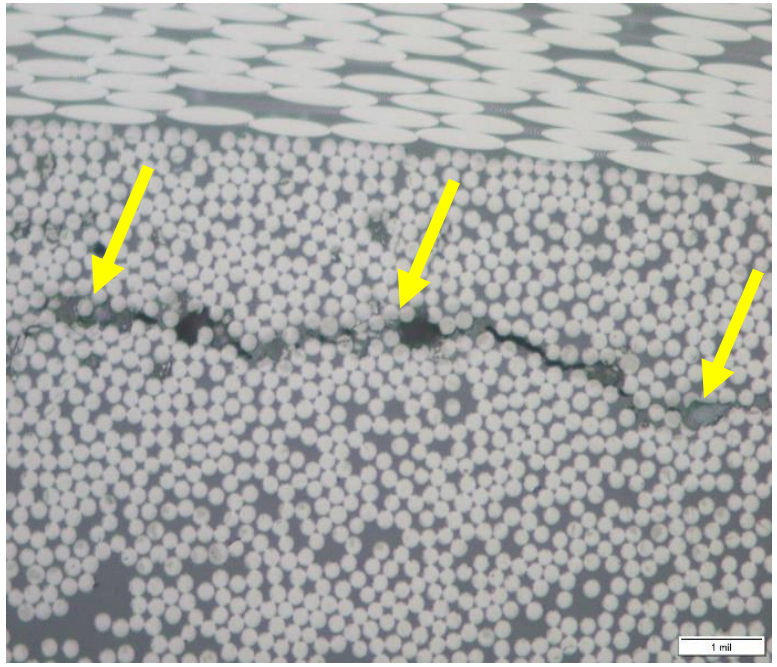
Microscopic Level = Insight into Material Composition + Material Behavior



Porosity & Voids



Ply Verification



Failure Analysis

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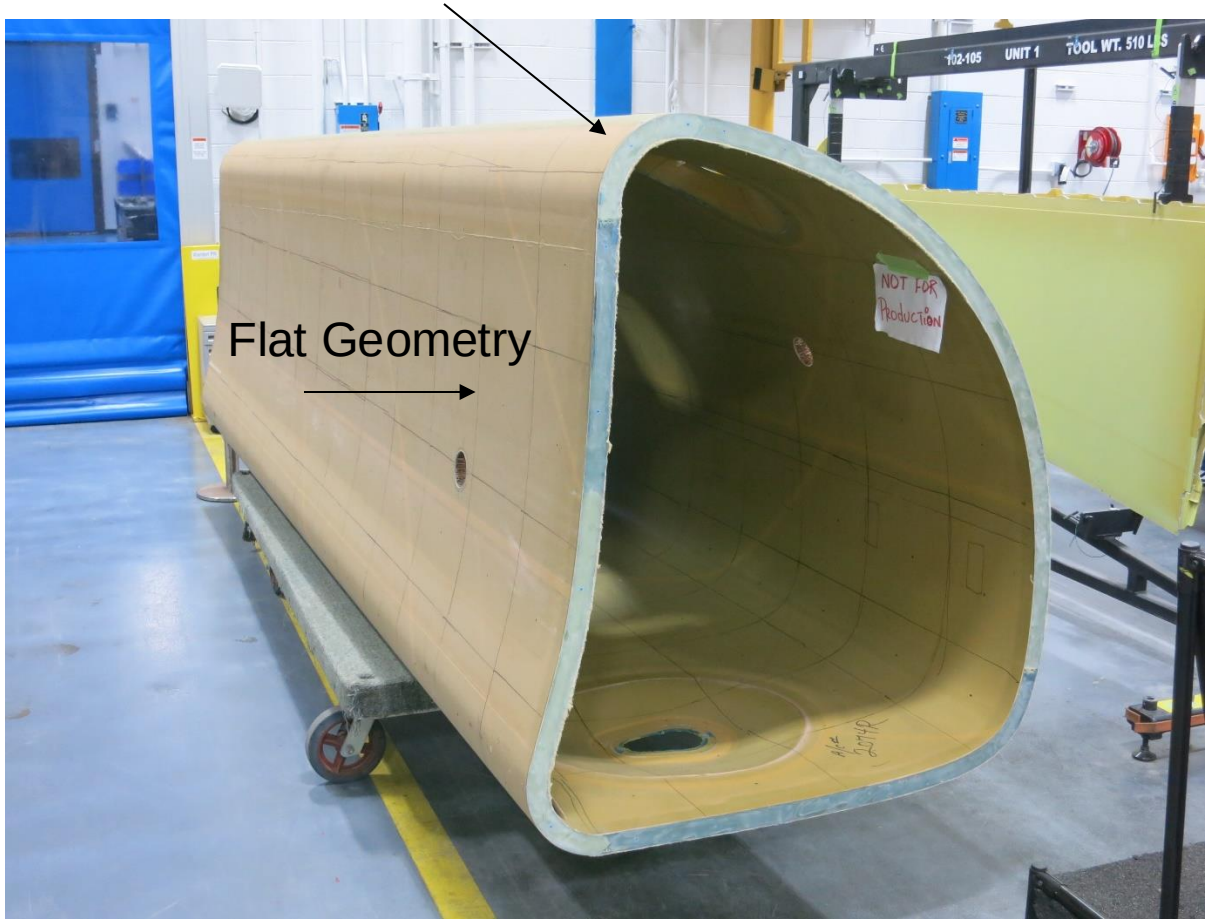
"H" = Highlight the Point,
"O" = OK, So What
"R" = Relevant Information



Identify

- Identify locations to evaluate
- Know the fabrication process (autoclave or press cure)



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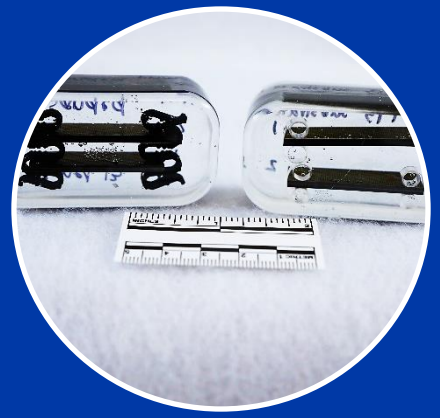
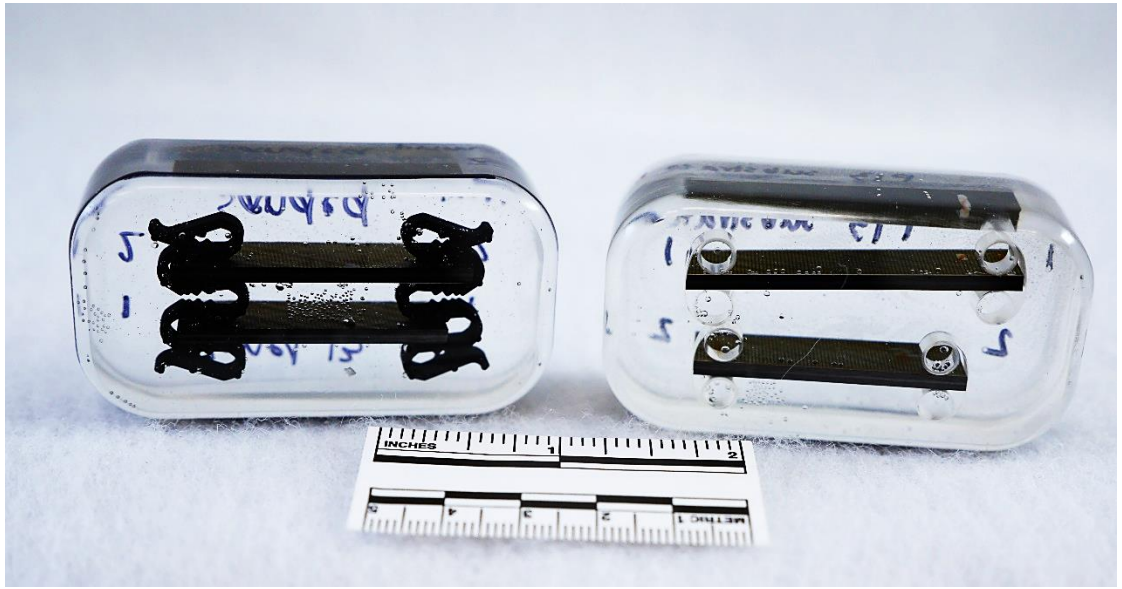
"R" = Relevant Information



Mount

- Sample should be 1-2 inches in length
- Use an acrylic-based potting compound & stabilize sample





~ 1 in

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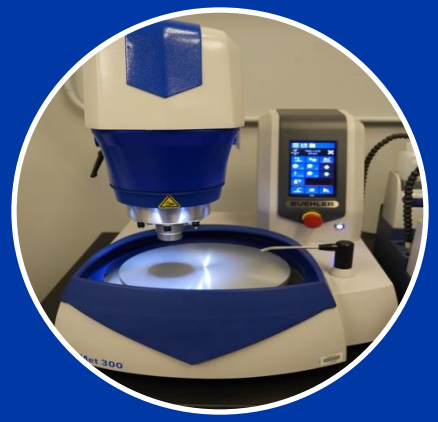
"R" = Relevant Information

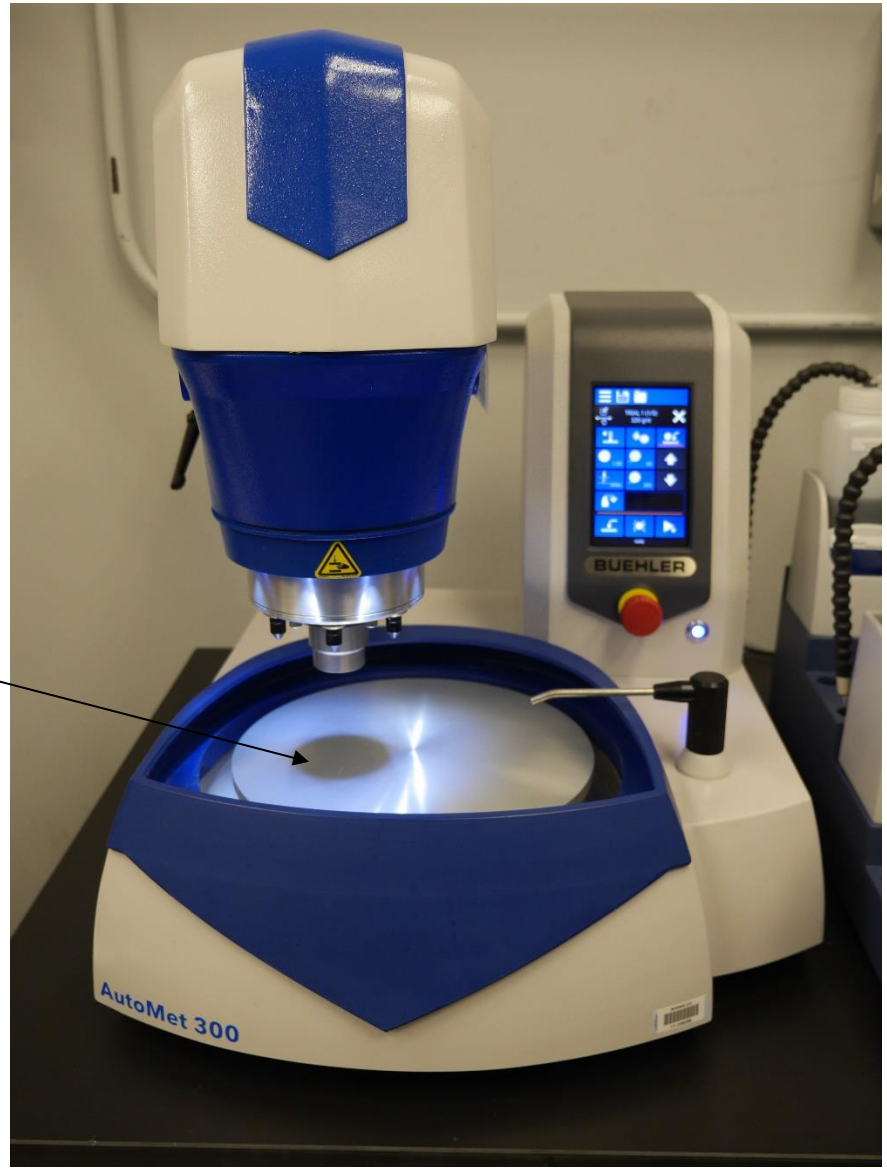


Polish

- Use a manual or automated polisher to polish the surface
- Grit levels will start rough and will end up buffing step

1) Apply grit paper here

2) Samples will be polished on this surface



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Imaging

"H" = Highlight the Point,
"O" = OK, So What
"R" = Relevant Information





Use an **inverted metallograph** or **optical stereoscope**

- Magnification lenses range from 2.5x to 200x

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Evaluate Images: Example

"H" = Highlight the Point,
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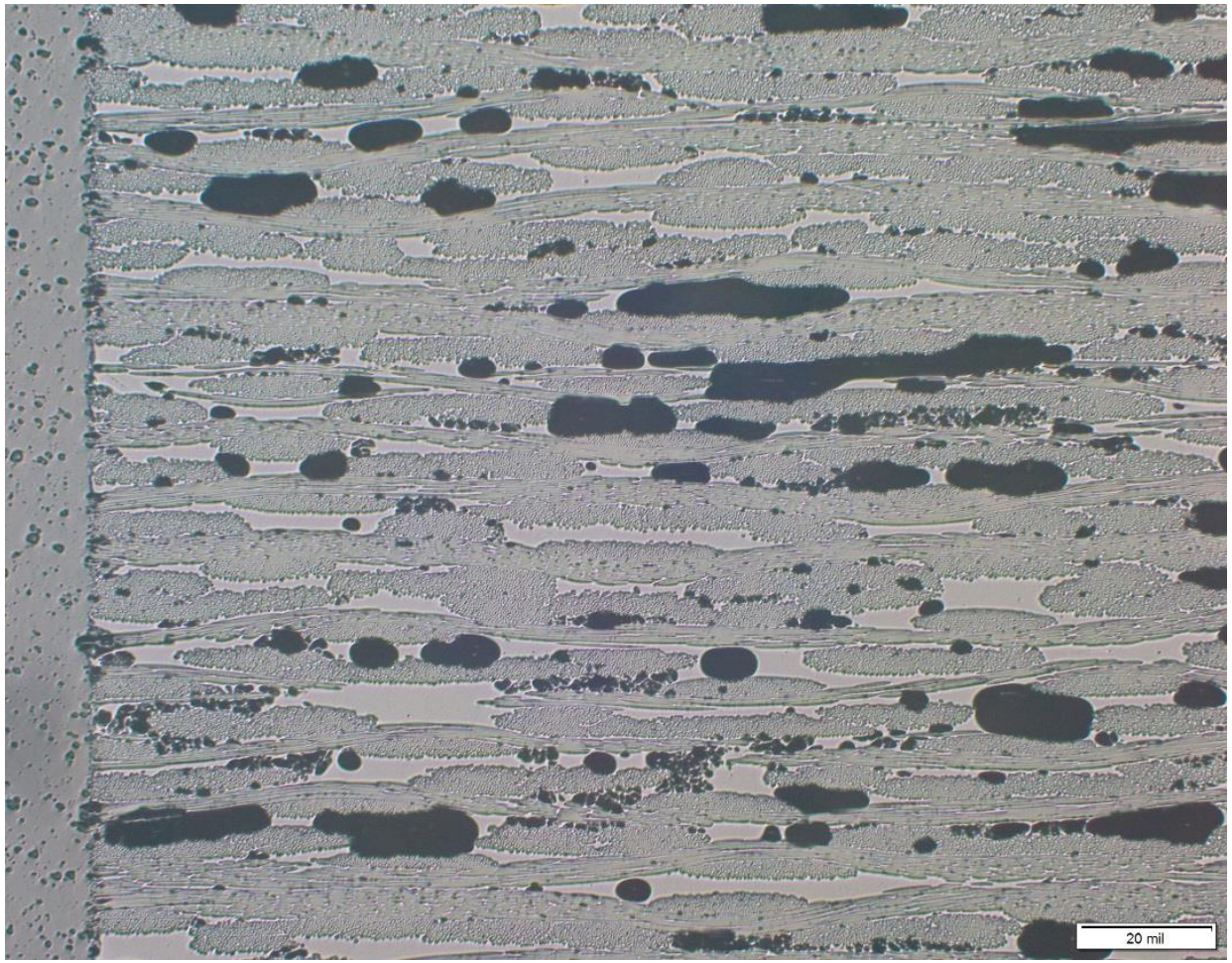

- Porosity & voids

- Considerations:
  - Is the fabrication process introducing voids into the part?
  - Or is it a material specific issue?

M&P Solution
Change process for how air is removed from the part, through debulking

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"R" = Relevant Information
“E” = Ease to Finish Strong





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Finish Strong



"Research is creating new knowledge"
– Neil Armstrong

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