# 3D METAL PRINTING EXPERIENCE AND TECH TOUR

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# WEBINAR SERIES

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PMA PRECISION METALFORMING ASSOCIATION

3D METAL PRINTING MAGAZINE

# Making the Business Case for Metal AM

**June 2021**

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**Enerpac**

# Agenda

- Intro (5 min)
- How a business Decides to Invest its Money (10 min)
- Where Metal Additive Wins (10 min)
- Putting it All Together (15 min)
- Other Considerations (10 min)
- Questions (10 min)

# Making the Business Case for Metal AM
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- 8+ Years Experience with Additive Manufacturing
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- Ironman Athlete
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# Poll Question: What is your Company's Total Investment into AM?

1. None
2. >$10K
3. $10K-$100K
4. $100K - $1M
5. $1M+

# Who is this Webinar for?

- Those of us working in Small Cap Companies
- Companies that are new to Additive Manufacturing
- Leaders Looking to Expand their Companies Additive Capabilities

# How a Business Decides to Invest Its Money (Capex Projects)

- **Capex Projects are often Locked in a Zero-Sum Game**
- **Develop a Business Case that can Compete**

*"not only does your project need to be a good use of capital, but it also needs to be one of the best uses of capital for that fiscal year."*

# Capex Project Planning

## Two Major Deliverables

- Finance Validated AFE Form (Authorization for Expenditure)
- Business Case Presentation Slide Deck
- Optional, but Highly Recommended: 3D Printed Sample Parts

# AFE – Documenting your Business Case

**AFE (Authorization for Expenditure):** A document that details a project's expenses and expected returns to the business which ultimately authorizes a group to spend a determined amount of money on said project.

## What Makes Up an AFE

- Expenses, both Capital and Operating
- Generated Value for the Business
- Depreciation Period for Equipment (3D Printer)
- Simple ROI (hard & soft savings)
- Signatures from Decision Makers

# Business Case Presentation

## Goals

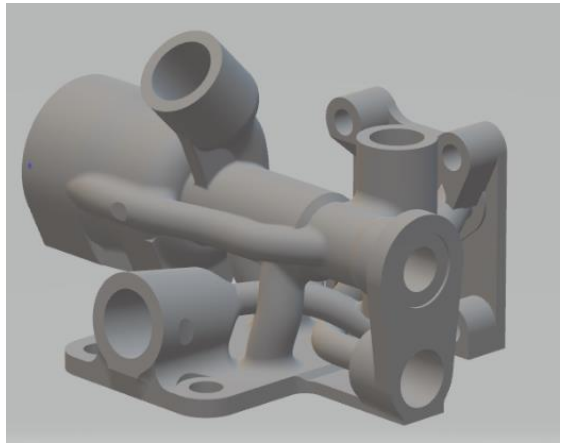
- Explain the technology
- Provide relevant use cases for your business
- Show a well thought through implementation plan
- Paint the picture for growth opportunities
- Go over total expense and ROI period

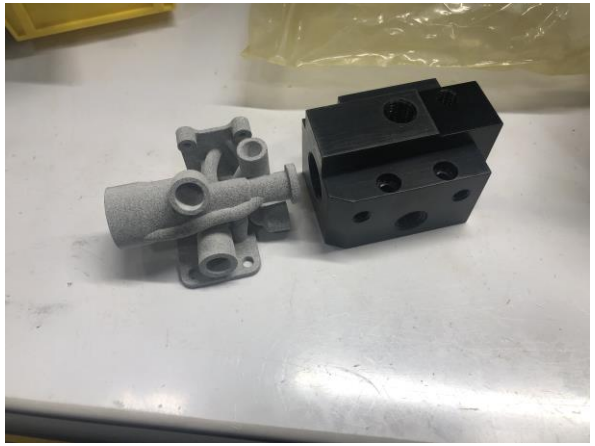
# Bring 3D Printed Samples

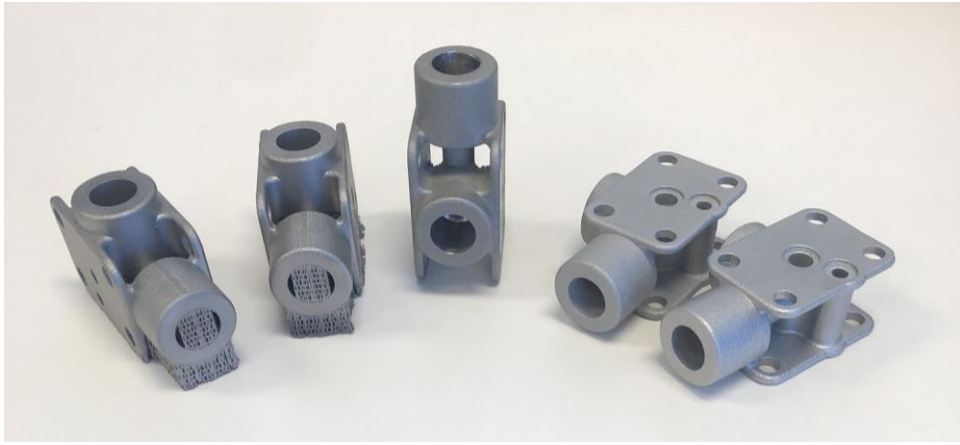
**3D Printed Metal Parts Help Sell the Technology as a Reality**

- Screenshots from CAD are ok
- Plastic models are better
- Metal parts are by far the best

**For Remote Meetings, Consider Mailing Samples to Stakeholders**







# Where does Metal 3D Printing Win?

- **Low Volume**
- **Custom**
- **High Complexity**
- **Rapid Turnaround**

# Examples of Opportunities for Metal Printing

- Long Leadtime Items
- Complex Parts that Suppliers Struggle to Produce
- Aging Product that Requires Continued Support
- New Products that Benefit from Design for Additive Manufacturing (DfAM)


Steel Printed Manifold Installed on Enerpac Economy Pump – Close Up

# Examples of Opportunities for Metal Printing Cont.

- Rapid Prototyping for NPD
- Jigs, Fixtures, Tooling for Manufacturing
- Short Term Production during Supply Disruptions
- Customized Solutions for Customers
- High Part Count Assemblies (look for simplification opportunities)


Steel Printed Manifold Installed on Enerpac Economy Pump – Close Up

# Putting it All Together

**Work with your Finance Team to Define what an Acceptable ROI looks like.**

- 2–4-year ROIs are typical

**Your Goal is to Build a Funnel of Projects that Provides an Acceptable ROI at the Right Time in the Fiscal Year.**

$$ROI\ [years] = \frac{Total\ Capex\ Spend\ [\$]}{Total\ Yearly\ Savings\ \left[\frac{\$}{year}\right]}$$

# Hard vs. Soft Savings

- **Hard Savings: A direct reduction in spending.**
  - E.g., you were paying $500 for some steel component, and you can now print it for $100.
  - If your company spent money on it last year and now its not, that's hard savings.

- **Soft Savings: An indirect reduction in spending or a cost avoidance.**
  - E.g., the cost to print a steel component is about the same as the cast version, but only has a 1-week lead time compared to the standard 12-week lead time.
    - In the above example, simply improving the lead time is very convenient for supply chain but doesn't directly reduce cost to the business.

# Putting it All Together

- **Your Business Case will Likely be a Mix of Hard and Soft Cost Savings**
  - Identify as much hard savings as possible
  - Fill in the rest with your soft cost savings

- **Identify Value Generation Ideas from the Entire Organization**
  - Ops
  - Engineering
  - Sales / Marketing
  - Customer Service

$$ROI\ [years] = \frac{Total\ Capex\ Spend\ [\$]}{Total\ Yearly\ Savings\ \left[\frac{\$}{year}\right]}$$

# Hard Cost Savings for Metal 3D Printing – Ops

## PPV Savings is a Trusted Hard Cost Saving Method

- Reduce the cost of material, total amount of material, or production cost to realize a PPV savings.

## Reduce Assembly or Manufacturing Time

- Reduce part counts, operations steps, etc.

## Reduced Shipping Costs

- Distributed digital inventory

$$Yearly\ PPV\ Savings\ [\$/year] = (Old\ Cost[\$] - New\ Cost\ [\$]) * EAU$$

# Hard Cost Savings for Metal 3D Printing – Engineering

## Additional Hard Cost Savings Methods

- Prototyping Costs
- Leadtime Reduction for Prototypes
- Specialized Processes for Specific Project Needs
- Reduced Development Cycle Times
- Jigs & Fixtures for Manufacturing, Develop Labs, etc.

# Soft Cost Savings for Metal 3D Printing

**Examples of Soft Cost Savings**

- Reduced Errors in Tooling and Fixtures
- Improved Robustness of Design
- Improved Lead times
- Improved Manufacturing Flexibility

- These are all examples of benefits to a business, but additional work needs to be done to show direct improvement to the bottom line before claiming a hard cost savings.
- Hard savings speak for themselves, soft savings require more explanation.

# Example ROI Calculation

## Example of a Hard Cost Saving ROI

- You Identify a steel manifold that currently costs $200 in materials, $100 in labor, and requires $25 in additional parts to complete the assembly. Your company purchases 5,000 units per year.
- You develop a 3D printed manifold design that reduces these costs to $80 and $50, and $10, respectively.

$$Original\ Total\ Cost = \$325$$

$$New\ Total\ Cost = \$140$$

$$Total\ Savings\ (PPV) = \ (325 - \$140) * 5000 = {}^{\$925K}/_{year}$$

- Your metal additive manufacturing center will cost $2.2M to setup. Therefore, your ROI is 2.37 years.

$$ROI = \frac{Total\ Investment}{Generated\ Value/year} = \frac{\$2.2M}{\$925K/year}$$

# Example ROI Calculation

## Example of an ROI that Uses both Hard & Soft Savings

- Let's say now the PPV savings is only $440K/year, this yields a 5-year ROI, which likely isn't going to justify purchasing the equipment on its own.

$$ROI\ [years] = \frac{Total\ Investment}{Generated\ \frac{Value}{year}} = \frac{\$2.2M}{\frac{\$440K}{year}} = 5.00\ [\text{years}]$$

- You've also identified a value generation of $750K/year that could be realized through a few different avenues including reducing lead times, satisfying additional custom orders, and providing more prototypes during the development phase. With a few slides making persuasive arguments for all 3 of these scenarios, now your ROI is 1.85 years.

$$ROI\ [years] = \frac{Total\ Investment}{Hard\ Savings + Soft\ Savings} = \frac{\$2.2M}{\frac{\$440K}{year} + \frac{\$750K}{year}} = 1.85\ [\text{years}]$$

# Other Considerations

- AFE's are not a single meeting, large spend projects require significant planning and socialization.
  - Identify a project sponsor early on.
  - Try to get decision makers on board before the final meeting
- Always prioritize hard savings, but don't leave out soft savings.
  - Even if a list of 5 parts completely sells the machine still include the soft savings you've identified.

# Other Considerations

- Setting up a fully functional additive manufacturing cell is a huge undertaking.
  - Pull together a team early on and give them a seat at the table.
  - Take time to become an expert in every aspect of the technology.
- Plan for everything to cost more and take longer than expected.
  - The best policy with sales engineers is trust but verify. They don't know your business or requirements for everything.
    - Get a validated quote for every single line item, and then make sure its still valid before your presentation.

# Questions?