



Hybrid Technology Impacting Machine Tools

3-D Technology and Fiber Lasers
Bring Big Changes to Machine Tools



New Technologies

- The two new technologies impacting the machine tools market are:
- 3-D or additive manufacturing
- Fiber lasers

- Before we begin we need to understand a little more about these technologies

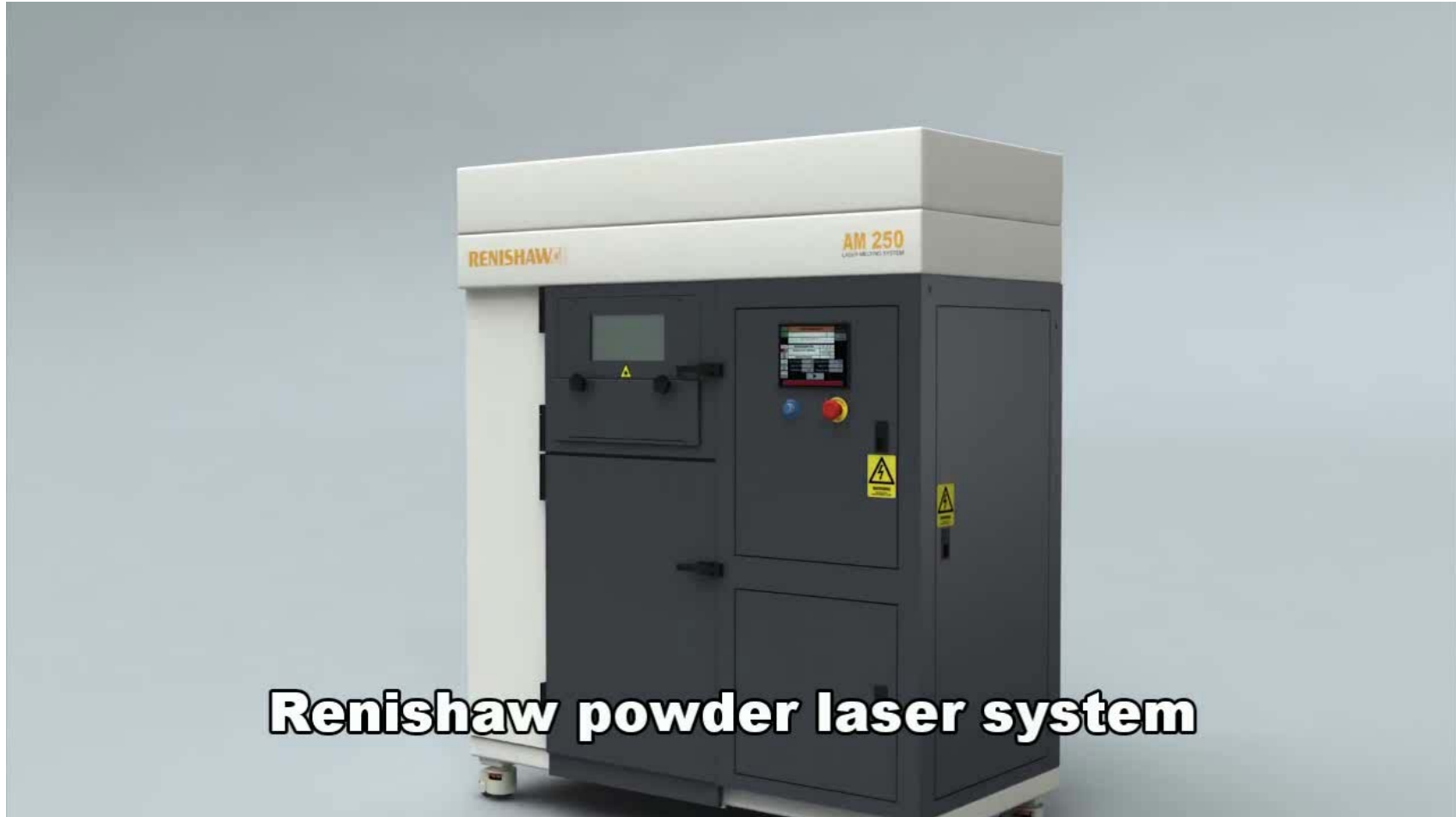


Additive Manufacturing

- Additive manufacturing also commonly known as 3-D printing.
- There are several techniques which are used in additive manufacturing.
- Powder layers fused by laser. This involves a wide range of metal powders.
- This has evolved into a jet of metal powder in a gas stream with laser fusion.
- Lets review these two techniques



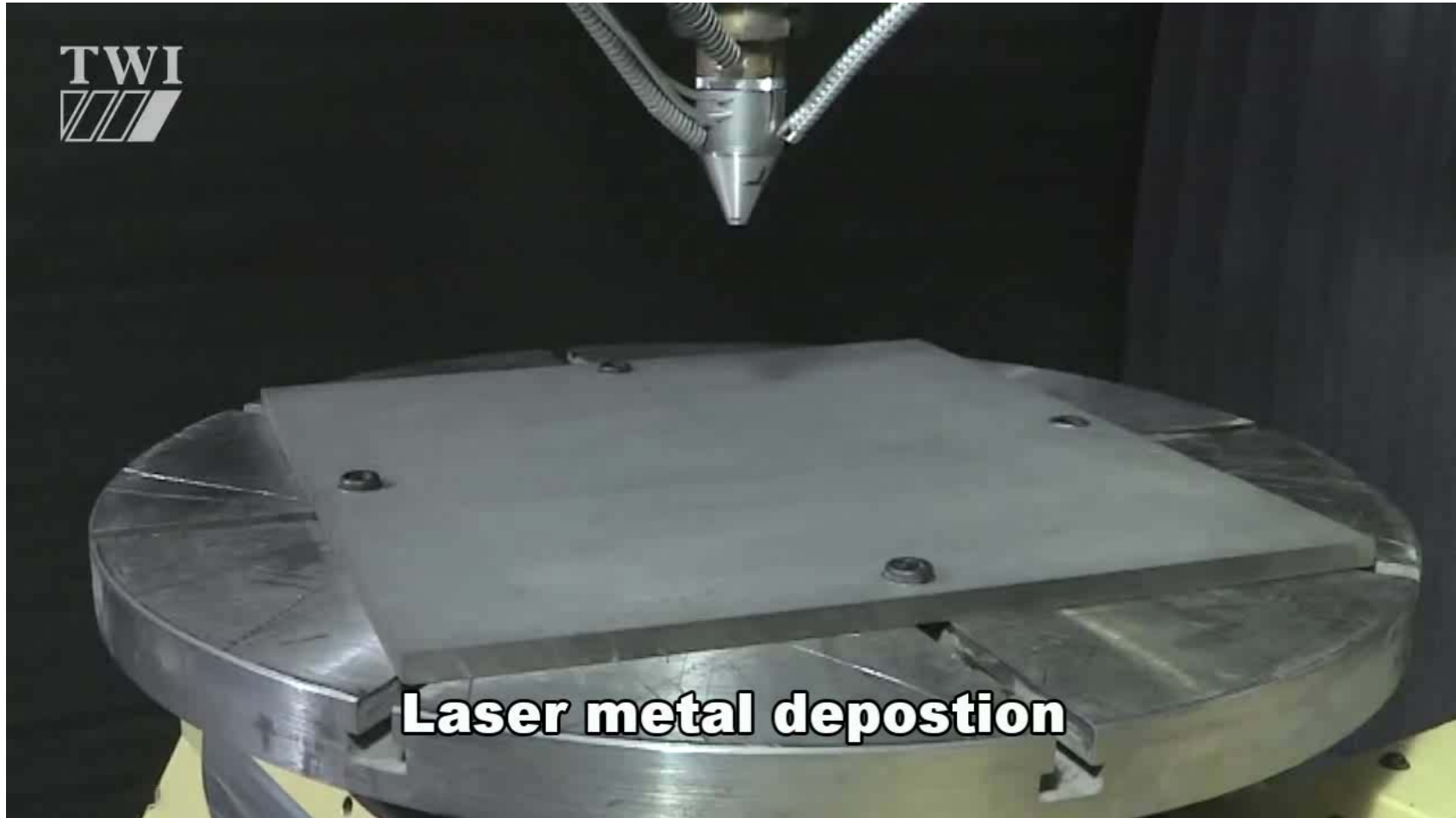
Powder System Video



Renishaw powder laser system



Laser Jet Video





Additive Manufacturing

- These two techniques both have disadvantages:
- Both these techniques are slow.
- Both are expensive.
- The powder system can produce any geometry.
- The laser jet is faster but has limited geometry.
- Finished products may need to be finished and heat treated afterwards.



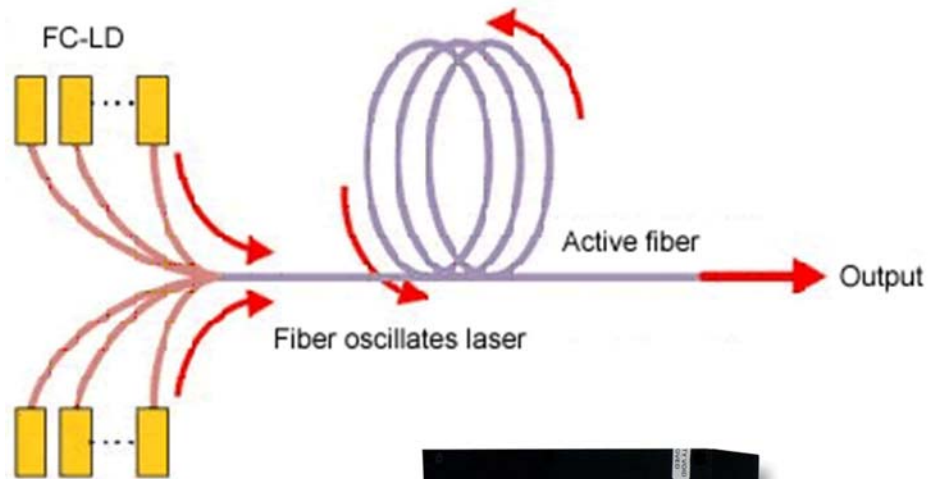
Fiber Laser

- Fiber laser has come into the metal working industry in the last five years. It has mainly been used for cutting.
- It is much cheaper than CO2 laser.
- It has a much longer useful life than the CO2 laser.
- It is physically much smaller and has less power requirements.

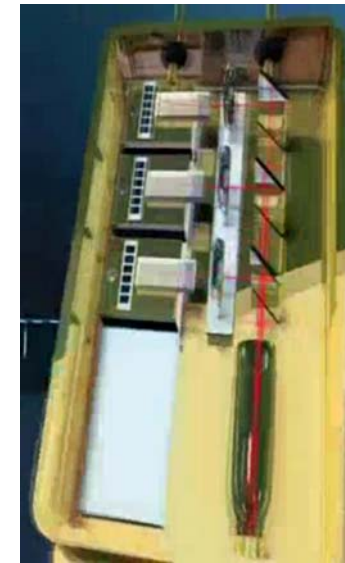


Fiber Laser

Fiber system layout



Fiber module



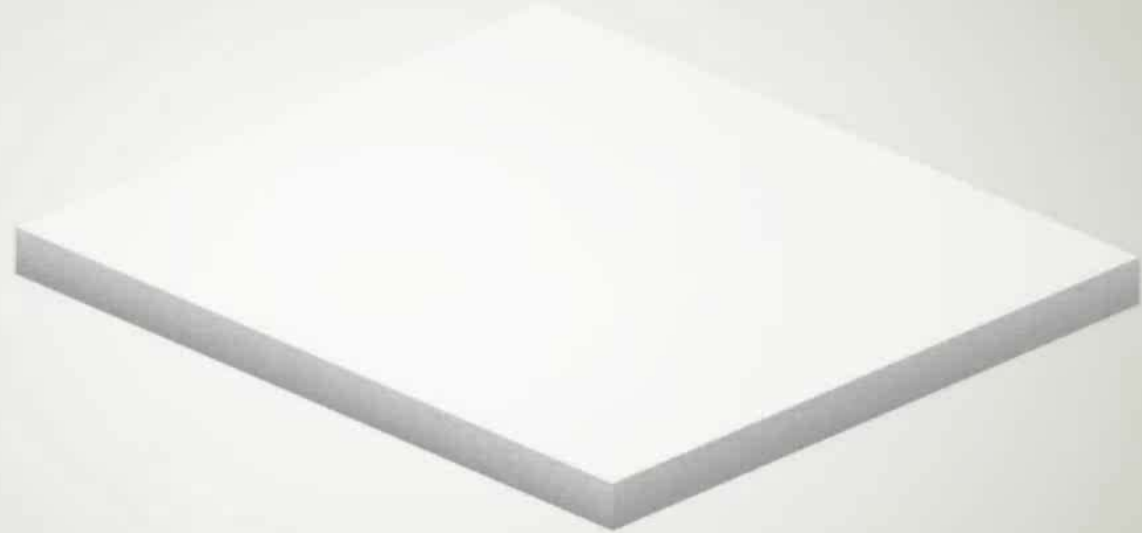
View inside module



How Laser Works



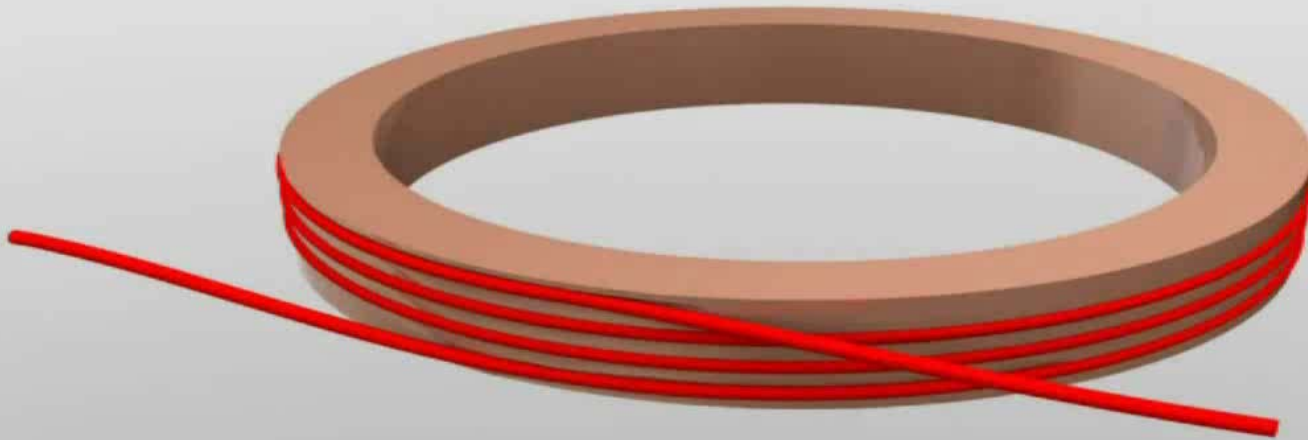
THE LASER



How laser works



How Fiber Laser Works



Yb-doped double-clad WDM fiber

How fiber laser works

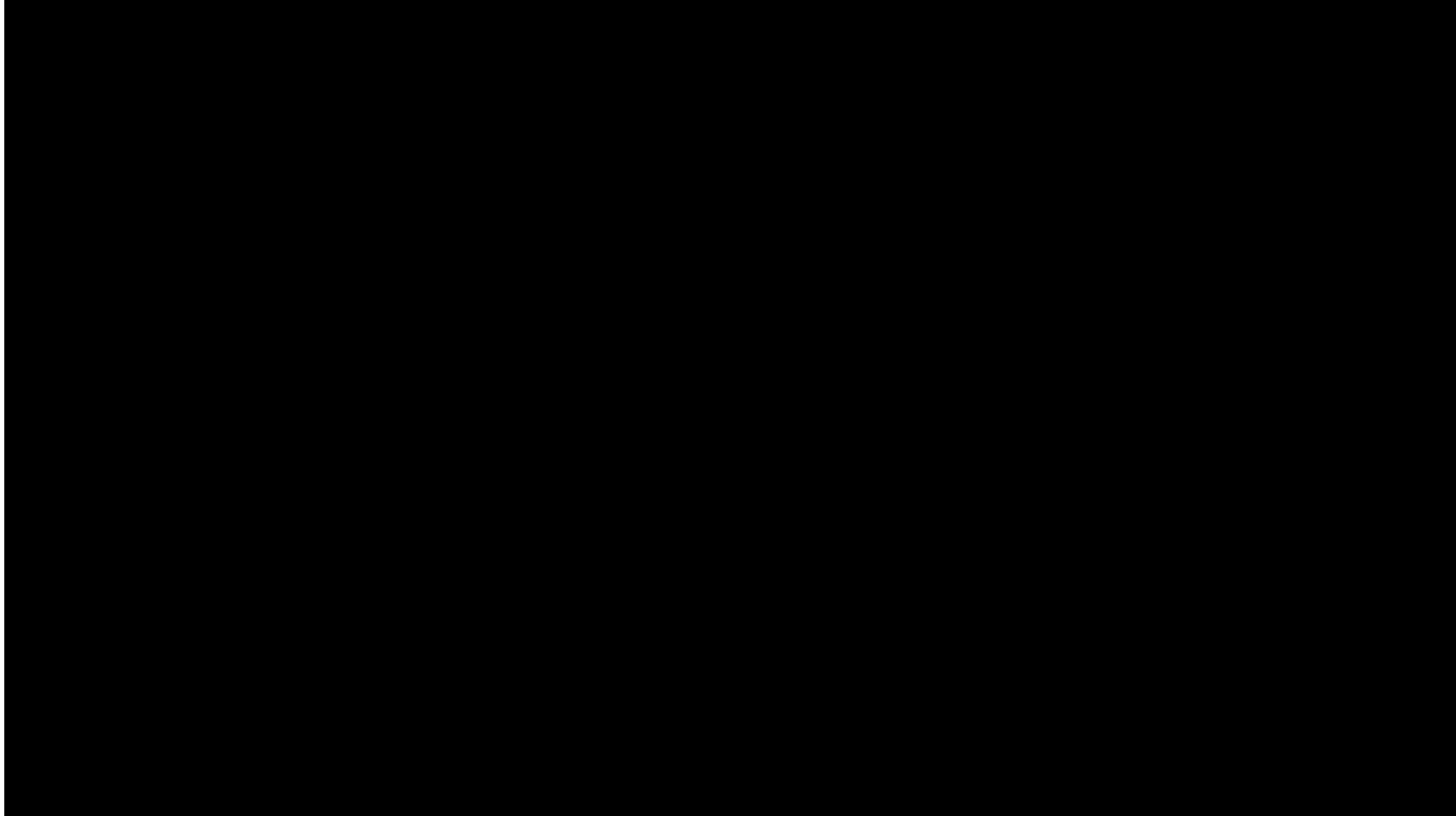


Hybrid Technology

- To find the best balance of features.
- Additive manufacturing enhanced with fiber laser jet deposition is being combined with traditional chip removal.
- The major 5-axis machine tool manufacturers are using fiber laser jet deposition.
- Mazak provides an add on to existing 5-axis machines.
- DMG Mori Seiki is creating a new 5-axis system.



DMG Mori Seiki Video





Mazak Video



INTEGREX i-400 AM

Additive/subtractive machining demonstrations



DMG Mori Seiki Video



DMG Mori Seiki additive & milling



Conclusions

- The advantages of these systems:
 - Increased production speed.
 - Additive and milling on the same machine.
 - Heat treating may still be required.
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- Going forward these technologies will be coming to 5-axis machining centers.
 - It too soon to know what the impact will be on the secondary machine tool market.



Presenter

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