SPI Lasers

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Rapid Prototyping
Adding Real Value in Industry

1 What is rapid prototyping?

Rapid prototyping as a technology emerged in the late 1980's and has been used ever since

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Rapid prototyping uses 3D computer aided design models (CAD) in the production process

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Parts and prototypes, etc. are built up gradually layer by layer over a period of minutes/hours/days – depending on the complexity of what is being made

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Layers are typically created by:

1. **Lasers cure a layer** →
2. **Lasers cut a layer** →
3. **Lasers sinter a layer** →
4. **Materials are ejected from a specially made nozzle**

2 Benefits of rapid prototyping

Ability to deliver complex and precise prototypes – Highly complex and precise designs can be produced using RP techniques

Cost reduction – This is achieved in many ways:

- **Wastage reduction**
- **Tooling cost reduction**
- **Production cost reduction**

Design integrity evaluation – If there is a fault in design, rapid prototyping usually leads to an earlier diagnosis

One-offs – Rapid prototyping (as the name suggests) is ideal for one-offs and prototypes

Small batches – Rapid prototyping's lower cost supports small batch production

Time savings – As implied by the word "Rapid" time is saved (including time of products to market):

- **Rapid production of prototypes, tools, models – whatever is needed**
- **Bottleneck elimination – remove production bottlenecks with rapid prototyping initiatives**
- **Reduced testing time**

3 Rapid prototyping processes

The main rapid prototyping processes are detailed below:

- **3D Printing / Additive Manufacturing**
- **Fused deposition modelling (FDM)**
- **Laminated object manufacturing**
- **Laser sintering**
- **Solid ground curing**
- **Stereolithography**

4 Materials which can be used in rapid prototyping

Many materials can be used in rapid prototyping; here are just a few examples:

- **Food**
- **Metal powder**
- **Paper**
- **Plastics**
- **Polymers**
- **Wax**

5 Rapid prototyping in the news

Automotive

Ford Motor Company (and many others) use rapid prototyping techniques to save $millions per year compared to traditional manufacturing techniques

Food

Saarioinen , Finland saved money off manufacturing sauce bottles and also were able to make faster alterations to bottle durability

Medicine

Instrumentation Laboratories saved $600K per year and $50K in one-off mould rework costs by using a Fused deposition modelling (FDM) rapid prototype technique rather than traditional manufacturing methods

Sporting Goods

The XO Heart Shield for Basketball players prototype was developed in just a week

6 SPI Lasers and rapid prototyping

For organisations creating metal-based prototypes, SPI Lasers can offer many process performance advantages:

- Faster pulse rise times - shorter pulses delivered higher throughput and finer processing
- Power stability at switch on leading to less instability seen in work-piece
- Temporal pulse shaping. This is highly desirable as the process uses individual pulse in 'point & shoot' or continuous vector mode
- Back reflection protection because even for powders some users may report issues
- In process monitoring. Using the back reflection signal from PIPA fibre provides a unique opportunity for real time non-invasive process monitoring

To find out how SPI Lasers can improve your Rapid Prototyping processes please contact us on 01489 779 696 or visit www.spilasers.com

Sources
http://www.inside3dp.com/5-companies-using-rapid-prototyping-advantage/
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