

July 2020



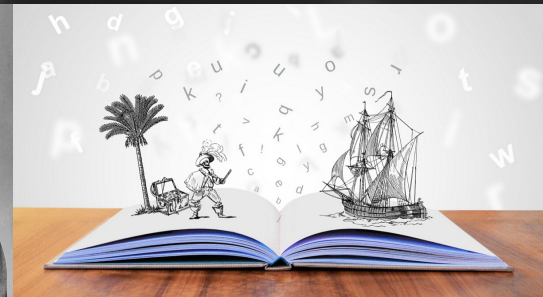
Issue 03

Project Engineering Management Ltd

ENGINEERING PERSPECTIVES

Today's trending topics in engineering

Monthly newsletter



TRENDING - 3D PRINTING CAN SAVE MONEY AT HOME

Each month, we will discuss a theme that is trending in the engineering world.

This month, our thoughts on how you can print everyday items to save some money at home.

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Q&A - WITH MATT PYBUS

Q&A session with industry innovators and influencers. Matt talks about his experiences working with digital strategy across a range of sectors and organisations and some of the challenges he faced.

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GUEST POST STUART MARTIN

After spending time working in various industries over his career, Stuart shares his lessons learned 'Managing Innovation' and some useful tips for improving innovation processes.

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A GUIDE TO ADDITIVE MANUFACTURING (3D PRINTING)

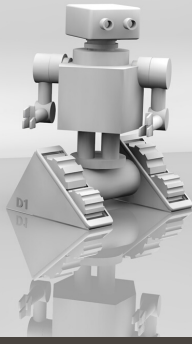
PEM Ltd Virtual Training Solutions

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3D PRINTING CAN SAVE YOU MONEY AT HOME

by Matthew Laskaj, Company Director - Project Engineering Management Ltd.

It is well known that 3D printing or Additive Manufacturing (AM) has huge potential benefits for a business. Whether that be through rapid prototyping, design and manufacture of end user parts or to manufacture fixtures and moulds for injection moulding or other traditional techniques.

I want to talk about a slightly different potential benefit you might not have thought about. Today's top tip – how 3D printing can save you money at home with relatively no printing experience.

This article is based on research carried out in 2017 by Emily E. Petersen and Joshua Pearce titled “Emergence of Home Manufacturing in the Developed World: Return on Investment for Open-Source 3-D Printers”. The question: by 3D printing a number of ‘average household items’, would it be cheaper to buy them from a shop or to print them ourselves? For the study, 26 household items were selected, printed in 3mm PLA thermoplastic by an FDM (material extrusion) printer and the costs compared to a purchase of both a low and high price range.

A few points to note: 1) I say ‘average household items’ loosely here because if you look down the list of items, you will soon realise that most average households would not buy most of these items. However, it is a useful base case to demonstrate the potential. 2) the printer chosen for the study was the Lulzbot Mini, at a cost of \$1250USD (£1000GBP) which was incorporated into the cost per print.

The 26 items chosen were available as both download (through Yeggi.com) and from online retailers. Some examples included: spoon holder, carpet corner support, bathroom wine glass holder, tool holder, soap holder, snowboard bind plate, cutting table, solder stand, speaker grill, coin holder, shower head, seatbelt guide, GoPro mount, Canon lens hood, replacement belt clip for insulin, figurine, iPhone6 case, deathstar model.

See what I mean by useful? The criteria set was ‘widely considered to be a common product purchased or owned by an average American’ and ‘printable in PLA plastic’.

So down to the interesting part. Regardless of the objects chosen, the results might surprise you. Operating cost was estimated by measuring power during printing with a multimeter (0.01 kWh/g), using average kW/h cost in America (\$0.1267 /kWh), PLA cost (\$24/kg) and printed mass was weighed and printer life was 5 years.

Totals were: 104m filament, 737g (\$17.71), 100h print time, 7.26 kWh (\$0.92) equalling **\$18.63 over 6 months** (1 item per week) or less than \$40 per year over 5 years.

In comparison, total purchase cost for the **cheapest was \$278.57 and most expensive was \$1376.03**. Substantial savings if indeed you wanted all of these items. Return on investment for cheapest was 2.4 years, the highest price items was less than 6 months.

Conclusion and tips:

The projected savings clearly demonstrate the potential of using a 3D printer in the home, depending on the volume of items produced.

- Consider the purchase of a consumer friendly, easy to use printer if you are inexperienced. There are some excellent ones starting at around £300.
- Even 3 years after this study, the cost of the Lulzbot Mini printer remains unchanged but potentially there are cheaper printers of equal/better quality providing even better cost benefits.
- Online ‘free to use’ websites are increasingly adding new models available for home use. I believe these will only gain in popularity as more people get into the home use market. Look at thingiverse.com, youmagine.com just for starters
- If you selected items you actually would need, and particularly larger and more complex items, the savings will be much higher
- Learn to design your own parts. There is free software and plenty of courses to choose from
- Be careful of failed parts. This can be quite a high proportion if just starting out and using lower end printers.
- Consider outsourcing your prints if you don’t want to spend money on a printer or the time to learn it. See sites like shapeways or protolabs.

Q&A WITH

Matt Pybus.

This interview is taken from our recent webcast.

To see the full video interview, go to our YouTube channel in the link below.



1. Tell me a little bit about yourself and how you ended up working in the digital world??

When I was at university I learnt ship design on drawing boards initially but quickly moved to CAD. That was my baptism of fire that this digital thing is going to catch on after initially being a bit of a Luddite. After working for Lloyds Register, I got involved at a senior level with Cape and Oceaneering and saw the value of having data at your fingertips.

Working as Operations Director in fabric maintenance, we put together a sharepoint site to manage the workflow from enquiry to signing off the workpack which replaced the use of spreadsheets. The benefit was a streamlined process, you could see where the processes were being held up and you had evidence and traceability on the steps were being carried out.

While at Babcock I was asked "what do you think of big data?" to which I said that there was a future in it and we should look at it for asset integrity. So I looked at the analytics Babcock performed with the frigates and saw what they could do with data, pull it apart, analyse it so that engineers could make informed decisions; which was quite astounding. That's what really got me interested.

2. There is a lot of hype at the moment around how the world is changing and how digital technology is needed to improve how we work. How do you see the trends moving forward in industry?

There is probably a misconception that you have to plug yourself into the matrix and go 100% digital in one go. Digital strategy and digital transformation are not a standalone, to succeed they need to enable your business strategy.

For your business strategy you need to know what your objectives are, you need the objectives set and you need to then look at how digital technologies can enable that strategy moving forward and help you achieve those objectives.

It may mean that you have a better collection of data or an automation system for your production facility. It may be that you just need to convert part of your business to a digital business.

A lot of companies just digitalise their e-commerce element so that customer engagement and billing and revenue cycles are all within the digital arena.

"When I was at uni I did a yacht design course and was asked - does this mean you will get a computer?"

3. If someone was just starting out on their own digital transformation journey, or needs to re-evaluate an existing one, what advice would you give them, what should they be doing?

You have to write the digital strategy and understand what you want to achieve. Pick one objective of your business strategy and think, right, how can I use digital technology to improve that element of my business strategy.

Then go to marketplace, have a look at what technology is out there and document what you want to achieve to reach a specific objective. Start that journey and consider it as a project. Make sure you have the right resources to do it, or outsource your resources if needed. Not everybody is proficient in coding, you can use a company who sells off the shelf products so understand what companies are out there that can add value for what you are trying to achieve.



"INNOVATION MANAGEMENT"

Written by Stuart Martin, Project Management and Engineering Director



Last month I reflected upon the subject of "Design Management" and some of the experiences I had which shaped my leadership thinking over the years in the energy sector. This month I will turn to a closely related topic, "Innovation Management" and share some of the lessons I have learned. I hope my deliberations may provide a touchstone or two for those stakeholders in innovation management.

After graduating I was very lucky to join a world leading OEM in the electrical and instrumentation sector www.weidmuller.com. The product range was, even back then, huge. A glance at the portfolio now reveals a vast array of new products and many more variations on older designs and models. As I think back now we had no formal innovation management strategy and yet the developments seemed to arise almost organically and with ease ; both volume of new products and market penetration. So, how did Weidmuller successfully pull off this continuous surfeit of developments and innovation – here is my take?

"Innovation is an evolutionary process, so it's not necessary to be radical all the time".
— Marc Jacob

The 3 key factors in our ability to innovate:

1. Detailed technical and commercial comprehension of client needs
2. Where the next technological challenge would arise form in terms of standards and Regulations - sometimes known as "enforced innovation"
3. We had leadership that promoted and supported raw idea generation and transformation to manufacture

Observations and lessons learned :

1. Most importantly there is no substitute for getting in front of clients and hearing what they want. I can say hand on heart we had very few, "white elephants " from this source and having a high calibre BD team in the field was a prime mover in uncovering opportunities.
2. The innovation process requires non-judgemental participants capable of coping with illogical and random thoughts which cannot always be analysed by cause and effect or fishbone techniques.
3. Innovation teams still require control of timeline and budget constraints. Finding a leader who is both creative (and therefore wholly integrated in the process) but who can project manage effectively is a critical success factor.
4. Real breakthrough or technology disruptors are few and far between. Wiedmuller have always added value and innovated congruently by product line extensions and life extension designs. Pushing the envelope is and apposite analogy.
5. Innovative ideas must be capable of scrutiny and robust challenge. In the early days of the project it's fair to have free-thinking but building in constructive feedback loops which are then acted upon are needed to ensure of getting it right first time.

Some innovation projects can be de-railed or impaired by such factors as intra-department politics, scarce funding / resources and sniping nay-sayers. Having an authorised Project Sponsor with sufficient clout, seniority and buy-in to fight the corner is vital (see point 3). The project sponsor will also ideally be capable of stakeholder management, brave enough to kill off a no-hoper idea , (drowning puppies I have heard it called) can extract sense and logic from brainstorm and value all contributions equally.

The process of innovation management can probably be mapped as a conventional stage model based on PRINCE 2 as below and my observations generally follow the sequence.

Innovation Management – Innovation Process

Result oriented service innovation process

