

## What drives engineers to choose online manufacturing?

*The future of manufacturing is distributed, accessible and online. Over the past several years, the online manufacturing industry has demonstrated its potential for disrupting global production and supply chains, opening doors for engineers. But what's causing buyers to turn from traditional to online manufacturing in the first place?*

There has been no radical innovation in the manufacturing industry for years. It's the definition of an evolutionary, rather than a revolutionary industry. As a result, many companies have been excluded from engineering-intensive industries – think aerospace, automotive and medical – due to large barriers to entry.

The rise of 3D printing in the past decade however showed the potential that new technologies can have on this old guard. By giving engineers the ability to test their prototypes quickly and cheaply, 3D printing quickly rose to become one of the 21st centuries most disruptive innovations.

Whilst 3D printing was the basis of this disruption, online manufacturing – 3D printing, CNC machining, injection molding and sheet metal fabrication powered by AI – has quickly become a key player in the Industry 4.0 revolution. Beyond prototyping, online manufacturing empowers engineers to manufacture without compromise at all stages of the production process.

For instance take Kepler, a Canadian satellite communications start-up. Kepler's founders are four University of Toronto graduates who are determined to create a low-cost constellation of spaceborn satellites. For some additional background info, the Kepler office looks more like your traditional start-up rather than Johnson Space Center.

Traditionally, the aerospace industry a very difficult market to break into, especially for a young company without 7+ zeros at the end of their innovation budget, yet one which is ripe for disruption. By reducing the risk of sourcing quality parts, the team was able to rapidly build and test their product. Within one year, the team Kepler took a sketch on a napkin and [turned it into their first satellite in orbit](#).

Imagine a start-up putting a satellite in space twenty years ago. It would have been unthinkable. But whilst Kepler's story is extraordinary, it is by no means unique. Kepler is just one example of the disruption that online manufacturing empowers. And with the inefficiencies piling up from traditional processes, the manufacturing industry itself is ripe for disruption. Until it addresses the following issues, the online manufacturing market share is only set to grow.

- A lengthy process and inconsistent quotes process due to a number of factors can elongate the quote process by weeks.

- Delays in lead time slow down the innovation process leading to a blow out in iteration time, costing money and leaving engineers twiddling their thumbs.
- High quantity minimum orders can create a significant hindrance particularly when considering prototyping. Imagine having a garage full of a part that will never be used because it didn't make the final cut.

Often, a combination of one or more of these logistical barriers create roadblocks, pushing many companies to seek an alternative. This is especially true for smaller-scale engineers and entrepreneurs. By presenting viable solutions to these issues whilst still delivering quality parts, online manufacturing is quickly becoming a competitive advantage.

### **Tedious quote-order cycles add long delays**

For traditional manufacturing, it could take on average one to two weeks just to receive a quote, with a lot of back and forth communication for each order. And when you throw into the mix that a good deal of quotes are rejected, the inefficiencies begin to stack up.

Quote inaccuracies due to complex product configurations and dynamic pricing scenarios, according to a recent [white paper by Tata Consultancy Services](#), “lead to sales ineffectiveness, lost margins, and lost business opportunities”.

Whilst processes are streamlining, traditionally manufacturing quotes are done manually. This presents buyers, this causes error-prone orders and adds human bias to the quote process leading to further discrepancies in the price.

This perpetuating cycle has over the years become the norm, simply because there were no alternative options. Industry 4.0 technology including artificial intelligence (AI) and machine learning however poses one possible solution.

The technological advantage for building and editing your quotes online gives you the ability to review your parts for manufacturability in real time. As a result, parts can be approved and priced instantly, ensuring accuracy, cost-competitiveness and reducing lead times.

### **Delays in lead time slow down the innovation process**

With rapid globalization of supply chains, outsourcing the manufacturing process to an overseas provider has become the global norm. The initial benefits – cheap labor, lower manufacturing costs and high production capability – of outsourcing directly to one factory may seem obvious, but there are also negative aspects of the process.

Aside from slow quote process, the hassle of administration, finding a reliable supplier, checking and comparing prices for materials can also slow the process down.

Yet focusing solely on low production costs rather than the negative costs associated with long lead times can lead to a loss of competitive advantage. As stated in [the Journal of Operations Management](#), “while time is a basic business performance variable, management seldom monitors its consumption explicitly – almost never with the same precision accorded sales and costs. Yet time is a more critical competitive yardstick than traditional financial measurements.”

By focusing on reducing lead times, engineers have more space to do what they do best. Whilst the actual time in production doesn't differ dramatically between online manufacturing and traditional manufacturing, the inefficiencies of the whole process can wipe off weeks from the process.

### **High quantity orders kill creativity**

Manufacturers have reached the point where to make money, they must produce goods in mass. Particularly when manufacturing in low-cost countries, buying parts in small quantities is relatively impossible or more probably, uncompetitive on price.

Beyond the obvious flaws of high volume manufacturing, such as the fact that you need to have serious space to store the MQO, the price of shipping huge quantities of stock and leftover parts going to waste, this type of manufacturing isn't conducive with innovation.

For product companies creating new and innovative designs, a MQO can be a barrier to product realization. Imagine printing 1,000 pieces of a part and after waiting for weeks for it to arrive, it isn't quite right. Going back to the drawing board takes time, money and produces unnecessary waste.

According to [McKinsey & Co](#), engineering-intensive businesses – including aerospace, automotive, and medical – can accelerate prototyping by using online manufacturing solutions; “allowing them to explore completely new design features or create fully individualized products at no extra cost.” By enabling innovations in fields that can have great potential for humankind, online manufacturing has a self-propagating effect.

### **The lock out: SMEs struggle to access high quality manufacturing**

Whether as the result of MQOs, or a myriad of other aspects of traditional manufacturing, smaller customers have a much larger likelihood of being neglected.

This generally leads to those organizations struggling to find an effective and affordable solution for small orders. For the small fish, this has created a high barrier to entry, leaving them two solutions; fork out the cash or save by reducing quality, increasing time and ultimately, compromising on design.

For smaller businesses this can draw out the innovation process and delay a market launch. However, the ability for engineers at smaller companies to customize their products seamlessly and without compromise shouldn't rest on the size of their wallets.

Online manufacturing solves many of these issues – high MOQs, lengthy delays and tedious quote process – and thus lets the smaller players into a market that they were once alienated from.

As a result, this industry has delivered an outstanding amount of value to engineers and innovators alike. Due to the high speed of iteration, we've seen businesses – including Kepler – increase their ability to innovate in the manufacturing process.

This feat is not alone however, with many teams within aerospace, automotive, medical and online product manufacturing turning to distributed and digital technology to gain a competitive advantage. The streamlined process brings advantages across the whole value chain of production, ending what has for years been a stagnant manufacturing stalemate.