



E-book with 8 useful tips on savings related  
to the production of a new plastic part

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## **Introduction**

With this E-book we want to give you a small insight into our world of plastics. Plastics are used in all areas of daily life and serve many different purposes.

In this E-book, some aspects of product life, as well as the possibilities of optimizing the total cost, will be considered.

Enjoy your read.

## Manufacturing processes of plastic part production

There are many different production methods for a new plastic item and therefore it is very difficult to choose the right process. We will first give a brief overview of the most frequently used forms of production, their advantages and disadvantages and examples of applications. The plastics world is constantly evolving and has many special production methods. The correct method for your product therefore depends on many factors. In many cases there are several options that include plenty of possibilities and lots of advantages. During the lifetime of the product, the optimal production form may also change. Therefore, it is important that you have a plan at the beginning of the project that examines the entire life cycle of the product.



## **3D**

3D printing is a relatively new technology, but today there are many different technologies for printing plastic articles. Development in this area is growing fast, and today everything from very small objects with great complexity, to very large objects of a size of 4x2x2 m, can be printed. It's also possible to install additional functions with 3D printing – for example, you can print a complete gearbox. The initial costs are relatively low because no investment in tools is required. The item price is no longer a deterrent, but it is very much dependent on having the right 3D printer. Therefore the main applications are for prototypes or smaller series.

## **Mechanical processing**

Mechanical processing, such as turning or milling, is a very traditional way of manufacturing plastic products. However, even though mechanical processing has been in use for many years, it's possibilities should not be underestimated. With the help of modern CNC-controlled machines, articles can be produced very cost-effectively. Another strength is that you can produce items with a very large and uniform material thickness. The large variety of materials, including the special materials, means that it is possible for the finished item to have many different properties which are optimally adapted to the respective application. For example, in our production we have the possibility of processing simultaneously on 3 to 9 axes at the same time.

Mechanically machined parts can be found in large areas of industry from the first prototype, through smaller series, to large series production.



## Injection moulding

Injection moulding is a process in which plastic granules are melted and pressed into a mould with the help of an injection moulding machine. When the hot plastic is pressed into the mould it stays there for a few seconds to cool down. Afterwards the mould is opened and the workpiece is removed for additional cooling. In our production, this is done almost exclusively with the help of robots. Most thermoplastic materials can be injected.

In the injection molding process it is possible to produce very simple articles, but it is also possible to produce very complex ones with a complicated structure. It is also possible to form very small objects such as hearing aid parts, or very large objects such as parts for cars and trucks. Modern injection moulding companies have typically installed removal robots to reduce costs. Metal parts and other materials or other colours, can also be shaped at the same time.

Depending on the purpose, both the tool design and the production process can be adapted to the requirements for each item. In practice, this means that different requirements are placed on machines, moulds, materials and, last but not least, on the employees in order to achieve the desired quality and thus the right price.

## Part production costs for items made by 3D printing, CNC machining and injection moulding

There is not always a clear answer as to when to choose which production method. That's why we have created a small overview.

	3D-printing	CNC-processing	Injection Moulding
Setup costs	Low	Medium	Medium if you use insert tools
Tooling	Mostly no tool cost	Mostly no tool cost	Yes, but the tool can also be used for later serial production
Material	Has gotten much better in recent years	Medium/ large	Very large
Complexity of the items	Depending on the printing method, it can be very complex	Medium, good possibilities with machines with 5 or more simultaneous work axes	Depending on the tool
Insert of metal parts	Possible, but not in all 3D printers	No	Yes
Part price for simple items	Medium	Medium	Low
Part price for complex items	Medium if using the optimal printer for the job	High	Low if the part has been optimized for injection moulding
Recommended series size	Few pieces	Small and medium series	Can be a good option even in small quantities, especially when using insert tools
Production time for prototypes	Short	Short	Short, if you have prefabricated tool parts in stock and there is enough capacity in production (tool and moulding)

### Tip 1

Choose the correct production method at the right time. It is quite normal to start with one method and change to another later on. Make sure that your technical drawing covers the different production methods. Then it is much easier to switch to another production method later.

## Number of parts produced simultaneously in an injection mould

With injection moulding there are 3 main factors that determine the price of the final parts: material price, cycle time and setup costs.

**Material:** It is important to optimize material consumption in relation to the final price of the item. To do this, you can go different ways: the item can usually be successfully hollowed out, which saves both material and production time; a uniform material thickness throughout the item ensures a more even surface; sometimes using a better material with less wall thickness can lead to the best result; the use of recyclates can also improve overall costs; it's often possible to strengthen the material with various additives (for example talcum or various fibers) and thus achieve an increased strength.

**Cycle time:** By producing multiple parts simultaneously (in the same cycle), you increase the performance of the machine per hour and thus reduce the cost per piece. If you need a high quantity of items you should consider a multiple piece tool – the higher investment is usually earned back again very quickly. With very high quantities you should also think about risk minimization and invest in several identical tools.

In addition, consideration should be given to how, for example, hinges can be optimally solved. You can achieve high savings in both tool price and cycle time if, for example, you design the tool as a simple open-close tool. We can always help you with these tool details.

**Setup costs:** Every time items are to be produced, the raw material (granules) must be purchased and the machine must be set up. After the job is completed, the tool must be serviced and put back into the tool stock. The associated costs are part of the unit price. It is therefore worth considering how much can be produced on stock. Most of the time, the additional stock costs are cheaper than an additional setup of the machine.

### Tip 2

Optimize the item! Money can be saved in many places, but they have one thing in common: an open dialogue and discussion of all ideas throughout the supply chain which leads to real savings.



## Think about the entire supply chain

Often there are more factors than just the price of the item: if the part is to be mounted and/or removed later in the process, and if there is a slight improvement of the item, which leads to a great improvement in the later process. Packaging can also be an important factor in overall costs. Why should the supplier pack the item with 100 pieces when the final customer always needs 67 pieces? Cost minimization must be planned throughout the value chain. It may be that you, as a purchaser are not measured by this parameter, but today it is not about competition between the individual parts, but rather strong competition between the value chains. The best value chain receives the order and that is why the flow of information across the value chain is so important.

### Tip 3

Think of the entire value chain. A small change in one place can have a significant impact on the competitive situation of the entire value chain. Keep the level of information high and make the improvements visible to all stakeholders.



## Thinking about system solutions right from the start

Multiple functions can often be integrated into a product. An example of this is the direct injection of seals by using 2K technology on the item (also multi-coloured). It is also very common to place metal parts directly into the mould and form the plastic around it. You can in this way optimize the process by reducing the number of different items. This requires a very close dialogue between departments – there are many people in different positions who have good ideas. In the end it is a question of finding the best possible solution.

### Tip 4

Think of the entire system using fewer components, but with more features and an optimal design. Use the possibility of integrating additional parts made of metal or other materials / colours directly with your component.



## Think about the environment and save money

Environmental considerations are not “expensive and difficult” by definition. They can even be the opposite. There are many good reasons to think about the environment from the beginning. Today there are many good, recycled plastic granulates on the market. At present, the recycling of packaging and fishing nets is a very hot topic in public discussions. There are also several producers who process plastic waste in reverse – back into oil – and then build them up into new plastics. The most important thing however, is that you are sure where your recycled plastic granulate comes from and what’s in it. There are plans in the EU to tighten up the laws on recycled plastics to ensure that no dangerous substances are on the market. For most suppliers it is not a problem to document the quality of their recycled plastic using data sheets and test certificates of the provided granulates.

Many people today no longer want a “buy-and-throw-away” culture. Remember how your product can make the customer happy for a long time – he will show his thanks with positive advertising. Design parts with a long lifespan. With a better product, a higher price can also be achieved at the customers. And think about how the item can be recycled when it reaches the end of its lifetime.



### Tip 5

Think about the environment and recycled plastic, but also make demands on your suppliers. Design durable components.



## Choose the right level of quality

Why pay more than necessary? If you offer the exact level of quality, you are guaranteed to offer the correct price and quality. Sometimes it is also a good idea to produce a better tool, but in return you can get a pay back by less process control. In any case, it is important to know exactly what was wanted and what was agreed.

### Tip 6

Choose the right quality for your task! It's fine to have different requirements in different categories. Remember to communicate your expectations clearly and from the beginning.

	<b>Cost-optimized</b>	<b>Standard</b>	<b>Extended requirements</b>	<b>Special wishes</b>
<b>Example</b>	<b>Plugs and protective caps</b>	<b>Plastic screw</b>	<b>Parts with multiple functions or other requirements, complex components</b>	<b>Microparts or items with very special requirements for material, surfaces, tolerances and/or machining</b>
General requirements	Not critical	Normal requirements	Some special and partly critical requirements for the application	Many special and critical requirements
Tolerance	Form, fit and function tolerances	According to DIN or ISO standard	Single tolerances with special requirements are measured separately and more often; maybe also with special equipment	Very small tolerances agreed, very special tolerances, critical functions, often only optically or electronically measurable
Process	Testing, easy measurement	Measurement according to standard methods	Measurement with optical or other devices, continuous process control, documentation on request.	Measurement and process control by special agreement. If necessary with 100% measuring rapport
Item quality	Fully formed parts, surface approved by visual / objective assessment	Good representative parts	Very good parts, according to the agreed parameters	Very good parts, according to the agreed parameters

### Tooling

Drawing material	No changes or additional documentation provided by the customer	From the customer, few changes (production adjustments)	Dialogue on production and DFM; joint meetings, documentation necessary	Extended dialogue on manufacturing and DFM with creative joint meetings, detailed documentation
Part geometry and tool making	Tool contour milled	The part geometry is evaluated in a way that the tool can be produced most cost-effectively	Complex part geometry; Tools are milled, eroded, polished, etc.	All production methods can be used to solve the task

## Choose the right material

What are your requirements for the part? Are you 100% sure what loads, temperature, wear, chemicals or friction your item will be exposed to?

In our e-book on material selection, we have described in detail how you can proceed by finding the right material. If you don't have it you can order it on our homepage. It's free but invaluable.

### Tip 7

Choose the right material for the application

## Using insert tools

In our e-book on use of insert tools we have described this in detail. If you don't have it you can order it on our homepage. It's also free.

### Tip 8

Tip 8: Use insert tools to reduce tool costs.

### FACTLINE

#### Quick Tool Insert Tools

- 34 different standard sizes
- 13 different sizes of mother tools
- Over 30 mother tools
- All mother moulds can be installed on different injection moulding machines to ensure sufficient capacity

## Our possibilities

Although A Tech Supply is relatively new on the market, we have many years of experience in the plastic production branch. In recent years, we have worked on many different processes and projects for different industries, putting us in a great position to help you with all your plastic production needs.

You are always welcome to send us an enquiry or contact us for further information.

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<https://www.atechsupply.com>

### FACTLINE

#### Our capacity

- 50+ injection moulding machines (electric + hydraulic)
- Handling robots on many machines
- 2 fully automatic packaging machines
- 15+ eroding Machines
- 15+ turning/milling machines with up to 9 axes
- Various grinding machines
- Various welding and engraving equipment

### FACTLINE

#### In-house competences and production

- DFM and product optimization
- Construction and manufacture of injection moulds
- Design and manufacture of Quick Mould Tools
- Design and production of Real Micro Moulding tools
- Injection moulding, also as 2K and with inserts
- Real micro moulding
- 3d print
- CNC machining of demanding plastic workpieces
- Fully automatic bag pack

## Om A Tech Supply ApS, Trend Mould ApS og Dencker A/S

We are the export-oriented sales organization for Dencker A/S ([www.dencker.net](http://www.dencker.net)) and Trend Mould ApS ([www.trendmould.dk](http://www.trendmould.dk)), which sells injection moulded plastic solutions and tools.

A Tech Supply is responsible for technical sales and product optimization (DFM); Dencker A/S and Trend Mould ApS are responsible for the production of tools and items. In this way we create optimal solutions for customer-specific parts and system deliveries.

In our state-of-the-art production in Skals and Nyköbing / Mors in Denmark, we produce both injection moulds and prototypes (3D printet, injection moulded or CNC machined). We produce the injection moulded parts in various sizes, from real micro moulding processes to parts in a size of approximately 1 x 1 meter.

Depending on the customers' requirements, we work with tolerances from a few micrometers to simple form fit and function tolerances. Due to the long-standing focus on automation, optimization and efficiency, as well as the primary use of mould inserts, we can offer solutions at very short notice and – even in a worldwide comparison – at extremely competitive prices.

