



**FreeFlow<sup>®</sup>**  
*tooling for next generation  
molded fiber production*



# Plastic waste – one of the greatest environmental challenges of our time

Our oceans are overflooded by plastic waste. According to available data the world produces more than 75 million tons of plastic packaging every year and more than 8 million tons of plastic ends up as waste in our oceans - every year. About half of this is so called single-use plastics. Along with accelerating climate change this is one of the greatest environmental challenges of our time.

As a reaction to this development we see consumers steering consumption habits in a more sustainable direction and politicians acting to further push development of sustainable alternatives. The EU Directive on Single-Use plastics\*, for example, sets ambitious targets on decreasing the use of disposable plastic products in Europe already by 2021.

Molded cellulose fiber (paper) is one of the best alternatives to replace single-use plastics for use in products such as coffee cups, lids, plates and various food containers. Products made of molded cellulose fiber are fully biodegradable and are made from a completely renewable raw material, wood.

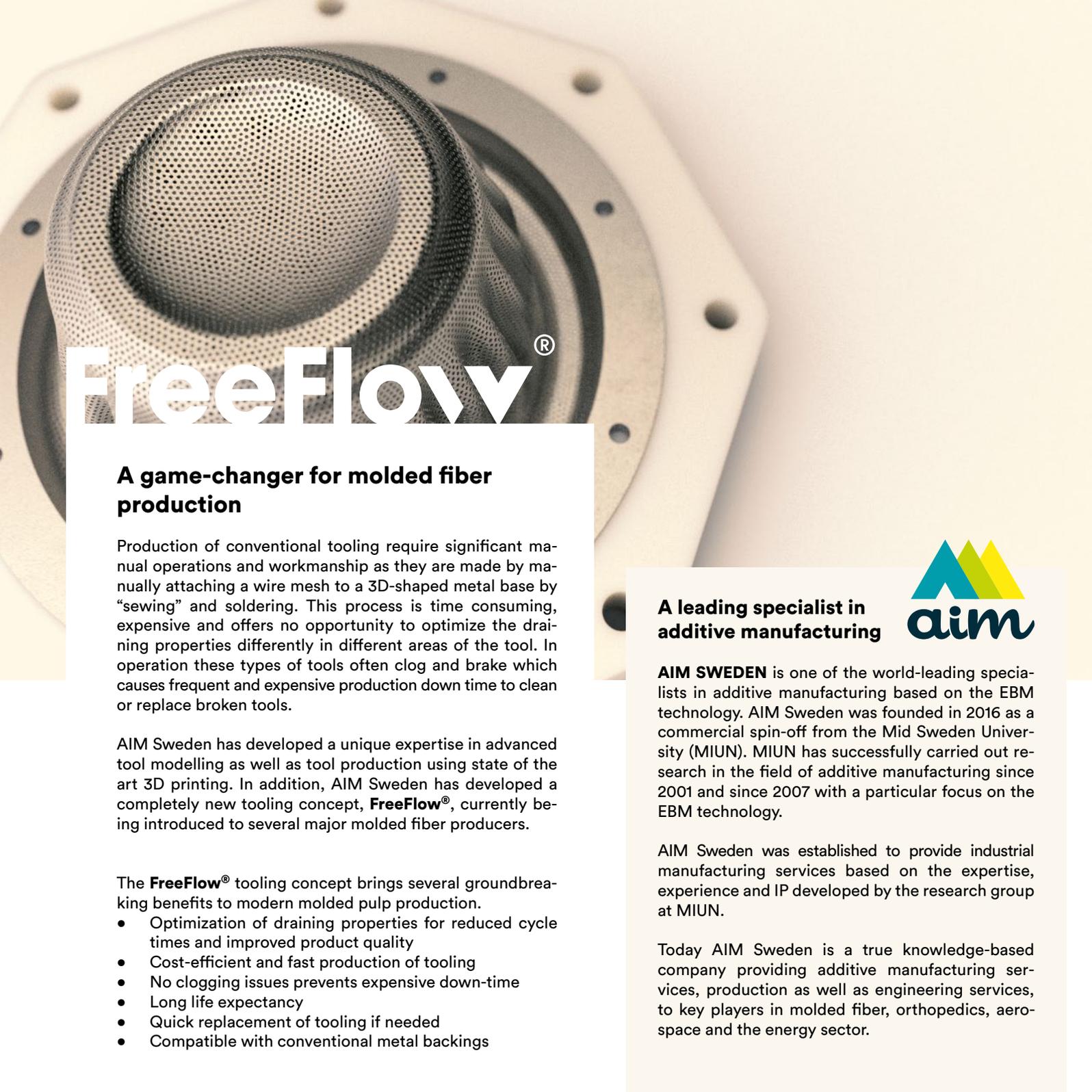
Recent development in molded fiber production has made it possible to produce thinner, stronger and stiffer material and even material capable of withstanding fluids and fat. This is of great importance as it opens up completely new application areas for paper-based products.

Industrial molded fiber production relies on large numbers of advanced molding tools. Since several years AIM Sweden has developed a unique expertise in applying state-of-the-art 3D printing to provide a new generation molding tools.

*“We have developed a completely new tooling concept for molded fiber, as well as methods for both modelling and production of these tools.”*



\* [https://ec.europa.eu/environment/waste/plastic\\_waste.htm](https://ec.europa.eu/environment/waste/plastic_waste.htm)  
[https://rethinkplasticalliance.eu/wp-content/uploads/2019/05/ZWE\\_Unfolding-the-SUP-directive.pdf](https://rethinkplasticalliance.eu/wp-content/uploads/2019/05/ZWE_Unfolding-the-SUP-directive.pdf)



# FreeFlow<sup>®</sup>

## A game-changer for molded fiber production

Production of conventional tooling require significant manual operations and workmanship as they are made by manually attaching a wire mesh to a 3D-shaped metal base by “sewing” and soldering. This process is time consuming, expensive and offers no opportunity to optimize the draining properties differently in different areas of the tool. In operation these types of tools often clog and brake which causes frequent and expensive production down time to clean or replace broken tools.

AIM Sweden has developed a unique expertise in advanced tool modelling as well as tool production using state of the art 3D printing. In addition, AIM Sweden has developed a completely new tooling concept, **FreeFlow<sup>®</sup>**, currently being introduced to several major molded fiber producers.

The **FreeFlow<sup>®</sup>** tooling concept brings several groundbreaking benefits to modern molded pulp production.

- Optimization of draining properties for reduced cycle times and improved product quality
- Cost-efficient and fast production of tooling
- No clogging issues prevents expensive down-time
- Long life expectancy
- Quick replacement of tooling if needed
- Compatible with conventional metal backings

## A leading specialist in additive manufacturing



**AIM SWEDEN** is one of the world-leading specialists in additive manufacturing based on the EBM technology. AIM Sweden was founded in 2016 as a commercial spin-off from the Mid Sweden University (MIUN). MIUN has successfully carried out research in the field of additive manufacturing since 2001 and since 2007 with a particular focus on the EBM technology.

AIM Sweden was established to provide industrial manufacturing services based on the expertise, experience and IP developed by the research group at MIUN.

Today AIM Sweden is a true knowledge-based company providing additive manufacturing services, production as well as engineering services, to key players in molded fiber, orthopedics, aerospace and the energy sector.

# FreeFlow<sup>®</sup> tooling concept



## 1. FreeFlow<sup>®</sup> tooling concept

The **FreeFlow<sup>®</sup>** tools are made up by a thin titanium skin supported by a nylon backing.

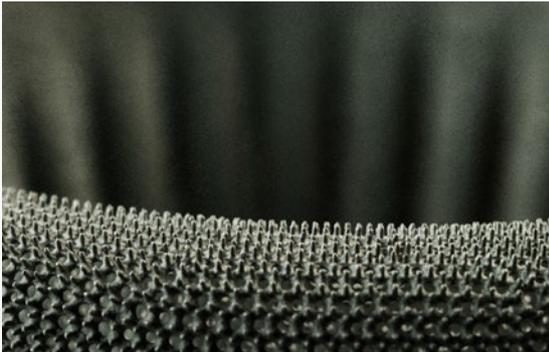
The titanium skin is the pulp-facing surface and its perforation determine the draining properties in different areas of the tool.

The nylon backing provides strength and stiffness to the tool assembly at low cost and a great degree of geometrical design freedom.



## 2. Skin – Perforation

The titanium skin allows for optimization of the draining properties differently in different areas of the tool. Full control of size, position and shape on individual hole basis means full control of perforation density. Titanium (Ti6Al4V) is a strong and completely corrosion-free alloy which translates to long life expectancy in harsh industrial production environments.



## 3. Skin

Distance pins on the back side of the skin sets a proper spacing between skin and backing for efficient distribution of vacuum from the larger holes in the backing to the smaller skin perforation holes.



## 4. Complete tool assembly

The **FreeFlow<sup>®</sup>** tool assembly allows you to optimize cycle times and avoid expensive production down-time. In case a skin despite this needs replacement the change-over is very quick. In summary the **FreeFlow<sup>®</sup>** tools allows you to shorten cycle times, reduce down time and improve product quality.

## Unique methods for modelling and 3D printing

AIM Sweden has developed a unique modelling method to generate skin perforation patterns. Our method allows us to quickly and with full geometrical freedom optimize draining properties over the tool surface. Equally important is to generate perforation files of high quality for 3D printing which are not too large to handle.

To manufacture metal skins efficiently AIM Sweden has developed unique 3D printing strategies. We are using the EBM technology from GE Additive but in terms of printing parameters we use our own proprietary process.

This allows us to build a high quantity of skins with high perforation resolution tightly stacked in each build. Ultimately this means maximum productivity as well as high and consistent quality.

*“Our business model is based on fundamental knowledge from academic research as well as hands-on understanding of industrial applications. This is a rare combination among 3D printing players on the market”*



## FreeFlow® – on the path for large scale industrialization

AIM Sweden has entered several partnerships with major players in the molded fiber segment. The **FreeFlow®** tooling concept is used in larger and larger industrial scale – and the results are overwhelming.

This is a great example of how advanced 3D printing and AIM Sweden as a company can provide important contribution for a more sustainable world.

Please contact us and we will tell you more about AIM Sweden and how we can support you.

### Göran Elofsson:

goran.elifsson@aimsweden.com, +46 (0)63-15 24 70

### Stefan Thundal:

stefan.thundal@aimsweden.com, +46 (0)76-050 61 65

### Axel Bergström:

axel.bergstrom@aimsweden.com, +46 (0)63-15 24 73



**AIM Sweden AB**

Lägervägen 13

Byggnad 9

SE-832 56 Frösön

[info@aimsweden.com](mailto:info@aimsweden.com)

[www.aimsweden.com](http://www.aimsweden.com)