INDUSTRIAL TUBING SOLUTIONS
IN BRIEF

The Optinova Group is a leading global supplier of advanced tubing solutions for the global medical device industry and for challenging industrial applications. We use our experience and knowledge in extrusion, combined with a sustainable business mindset, to develop top quality components which are part of innovative solutions, increasing the quality of everyday life.

Follow us under #feelgoodfactory
DECADES OF ADVANCED TUBING

1971
Godby Plast
founded by Habia, of Sweden

1985
Expansion of plastic material in use

1992
Eriksson Capital acquires 100% ownership

1998
Established in China

2002
Hall 6 finished; 300 m² clean room

2013
Second plant in Minneapolis, USA established

2017
Sales office in Bangkok, Thailand, established

1982
First clean room

1990
New company name: Optinova

1995
100% focus on medical tubing

2000
Established in the USA

2011
Acquisition of Medicin Lake Extrusion in Minneapolis, USA

2015
Acquisition of ScanTube Group; industrial tubing added to portfolio

2018
Transition to only one brand: Optinova

#feelgoodfactory | 4
WHY WE ARE IN THE BUSINESS OF EXTRUSION

The Optinova Group is a leading global supplier of advanced tubing solutions for the global medical device industry and for challenging industrial applications.

Our greater purpose
We use our experience and knowledge in extrusion, combined with a sustainable business mindset, to develop top quality components which are part of innovative solutions, increasing the quality of everyday life.

Our guiding star
All in all, we describe how and what we do with our guiding star:

#feelgoodfactory
INCREASING THE QUALITY OF EVERYDAY LIFE
Sustainability

We strive to be at the forefront by operating in a sustainable way within our industry and society. Our efforts are important for the growth of our employees and our overall business. Together we can contribute to a better world and towards a higher purpose. We invite and encourage everyone at Optinova to promote sustainability at every level.

Diversity

The diversity among Optinova employees is a competitive advantage. We are inclusive with respect to gender, age, nationality, culture and experience. With this we can get plenty of different views, ideas and input to help us make the best decisions.

<table>
<thead>
<tr>
<th>Employees</th>
<th>Nationalities</th>
<th>Women / Men</th>
<th>Average age</th>
<th>Working years</th>
</tr>
</thead>
<tbody>
<tr>
<td>430+</td>
<td>26</td>
<td>40 / 60%</td>
<td>41.5 YR.</td>
<td>3,200</td>
</tr>
</tbody>
</table>
LOWERING ENERGY
consumption in plants and office spaces

OPTIMIZING VENTILATION
in production areas

WATER REDUCTION
reducing fresh water and reuse water

LOGISTICS FOCUS
to optimize transportation paths, touch points and CO₂ emission

LEADERSHIP
development at all levels to inspire and create engagement and a meaningful everyday

SUSTAINABILITY
social, environmental and financial requirements on suppliers and partners

BRAND BUILDING
for securing new competence attraction

RECYCLING
production materials, primarily plastics

LEADERSHIP
development at all levels to inspire and create engagement and a meaningful everyday

SUSTAINABILITY
social, environmental and financial requirements on suppliers and partners

OPTIMIZING VENTILATION
in production areas

LOGISTICS FOCUS
to optimize transportation paths, touch points and CO₂ emission

WATER REDUCTION
reducing fresh water and reuse water

BRAND BUILDING
for securing new competence attraction

RECYCLING
production materials, primarily plastics
QUALITY COMMITMENT

We are committed to achieving customer satisfaction by supplying superior quality tubing and services that are delivered on time. We accomplish this by continuing to improve our capabilities, complying with requirements, and maintaining the effectiveness of our quality management system.

<table>
<thead>
<tr>
<th>Category</th>
<th>Certificate</th>
<th>Godby</th>
<th>Jomala</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>ISO 9001</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ISO 13485</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ISO 14001</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Material</td>
<td>REACH</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
</tr>
<tr>
<td></td>
<td>RoHS</td>
<td>✓*</td>
<td>✓*</td>
<td>✓*</td>
</tr>
<tr>
<td></td>
<td>FDA &amp; USP Class VI</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>GB4806.6 / GB4806.7</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Clean room</td>
<td>ISO 14644</td>
<td>✓*</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Product specific</td>
<td>UL 224</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>NSF/ANSI standard 51</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EU 10/2011</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>SEMI F57/F40</td>
<td>✓**</td>
<td>✓**</td>
<td></td>
</tr>
</tbody>
</table>

* Not certified but compliant with self check. ** In progress
Medical Device
ISO 13485

Clean Room
ISO 14644-1, class 8

Business Management
ISO 9001

Environment
ISO 14001
**WHY OPTINOVA?**

We strive to create value and celebrate your success #feelgoodfactory

---

**Material knowledge**

We possess in-dept knowledge of raw materials, having our own polymer experts (PhD level), as well as, laboratories for research. We combine this with external partner collaborations that ensure our expertise in polymers and raw-material processing.

---

**Extrusion specialist**

We know extrusion inside and out; the core of our business with over 100 extrusion lines globally, making us the biggest in the world. We continue to push the limits and develop our processes with new innovations.

---

**Secondary operations**

We provide secondary operations according to our partners’ needs, many times custom made just for them. Our Innovation Center provides valuable consultancy, and we’ve even created the robots needed to make the operations as automatic and efficient as possible.

---

**Magical world of polymers**

It all starts in the magical world of polymers. Our PhD-level polymer scientists provide in-depth knowledge of raw material experience in polymer processing. Material properties and purity are investigated in our own polymer laboratory. Can we share some polymer magic with you?

---

#feelgoodfactory
RAW MATERIAL AND ADDITIVES

- Fluoropolymers
- Additives
We dig deeper where we are really good
PUSHING THE LIMITS OF EXTRUSION

Extrusion is our passion and our core competence. We have several decades of experience across 100 extrusion lines globally, which has enabled us to accumulate data within our unparalleled knowledge library.

Come feel the passion & push the limits with us
WE DARE TO BE DIFFERENT

Engineering is the basis for customization and creating true value. Automating customization is unbeatable for handling high volume production to meet a wide varying market needs. Creating difference is fun…
PRODUCT CATEGORIES

Industrial applications contain demanding specifications to meet today's markets requirements. Our industrial product categories are designed to solve your design challenges.

- Beading, monofilaments, profiles
- Liners (inner jackets)
- Heat shrink tubing, spiral Heatshrink
- Single- and multi-lumen tubing
- Multi-layer tubing, co-extrusions
- Secondary operations
- Property enhancements
- e-PTFE solutions (Coltex™)

**Beadings, monofilaments and profiles**
Stable rod, multi-purpose profiles.

- Materials: PTFE (sintered and un-sintered, natural or filled), PFA, FEP, ETFE, PVdF
- Natural or colored
- Enhanced filled or virgin
Liners, inner jackets

Thin wall liners, liners for high pressure hoses.

- Materials: PTFE, PFA, FEP, ETFE
- For high pressure hoses
- For liquids or gases under metal braid or rubber hose construction

Heatshrink tubing, spiral heatshrink tubing

Heat-induced shrinking tube.

- Materials: PTFE, FEP, Dual wall PTFE/FEP
- Shrink ratio PTFE 2:1 and 4:1
- Shrink ratio FEP 1.3:1 and 1.6:1
**Single- and multi-lumen tubing**
Various polymer properties extruded in single- or multi-lumen, short and/or long tubes.

- Materials: PTFE, FEP, PFA, ETFE, PVdF, MFA, PEEK
- Available in long length as well as short cut to length pieces

**Multi-layer tube/co-extrusions/ striped tubing**
Multiple layers or stripes with colors or additives.

- Materials: PTFE, FEP, PFA, PVdF, PEEK
- Full colored, bicolored or (multiple) color stripes
- Antistatic stripes and layers
- Other additives upon request
**Property enhancements**
Enhanced properties by adding additives and fillers:

- Enhanced antistatic properties
- Better heat transfer
- Excellent abrasion resistance
- Better bonding with other materials
- X-ray contrast

---

**e-PTFE solutions (Coltex™)**
Mono- and bidirectional expanded PTFE tubing or profiles.

- Sealing tape for flanges (Coltex™)
- e-PTFE tubing made according to customer specifications
- e-PTFE rods and monofilaments
## INDUSTRIAL SOLUTIONS

### TRANSPORTATION
- Insulation, harnesses, bowden cables
- Seal rings for valves
- Liner for high pressure hydraulics and pneumatics
- On-board communication wires, cables, and sensing

### FOOD & BEVERAGE PROCESSING
- Packing and filling machines
- Coffee machines
- UV lamp protection
- Handling of corrosive fluids
- Distribution of cleaning agents
- Dosage systems and robots
- Analytical equipment in quality assurance

### SUSTAINABLE ENERGY SOLUTIONS
- Liquid cooling for batteries
- Electrolyte circulation in redox-flow batteries
- Generator hoses for wind power plants
- Fluid handling for solar panels
- Heat exchanger tubing for photovoltaic solutions

### SEMICONDUCTORS, ELECTRONICS & CABLES
- Handling of process and waste fluids
- Fiber optic protection
- HV cables
- Robotics
- Pneumatics and hydraulics

### CHEMICAL PROCESSING
- Water purification
- Heat exchangers
- Chlorine salt processing
- Pharmaceutical processing
- HPLC
- Fluid handling
- Dispensers, burettes, pipettes
Applications Examples

We are a world leader in precision tubing extrusions for industrial applications. We have developed a world-wide reputation of fulfilling customer expectations; not only with fluoropolymer extrusions but also with a wide variety of thermoplastics.

Safe and intelligent transportation

Where there was solely metal piping before, now lightweight high-performance materials like fluoropolymers are coming into place due to their outstanding properties. Independent if it’s a combustion engine or EV, motorcycle, truck or bus; many applications such as brake systems, cable harnesses, encapsulated sensors, high-speed data transmission, fuel components and fire protection systems are using Fluoropolymer components. On the road, at sea, in the air, and even in space.
A good day starts with a good cup of coffee

Almost everyone enjoys a cup of coffee or espresso during the day. In premium coffee machines you will find food grade approved fluoropolymer tubing to maintain the excellent quality in the brewing process. These kinds of tubing are also used in the production/filling of other beverages and liquid foods; even as fabricated tubing solutions.

Green energy for a sustainable future

Our tubing is the ideal choice for energy that needs to be generated, stored and transported. Fluoropolymers are unaffected by UV light, very high (+260°C) and very low temperatures (-200°C), weather or corrosion so they are the perfect fluid handling solution for all outdoor installations due to both the low maintenance and low life cycle cost while maintaining excellent performance without degradation.
At the speed of light through a tube

Independent if we talk autonomous driving, IoT, 5G or different types of sensors or measurement equipment; fiber-optical based communication is the basis for high speed data transfer and secure data storage for today’s environment. The sensitive glass fibers must be protected and shielded and here Optinova tubing solutions made of PTFE, FEP or PVdF are used by major cable manufacturers globally.

Corrosion protection for safe work environment

This is one of the major challenges within the Chemical Processing Industry. Due to outstanding chemical resistance, fluoropolymer tubing solutions from Optinova are used in a variety of chemical process plants. Applications like heat exchangers, steam handling, chlorine generation, toxic gas monitoring or the distribution of hot adhesives or paints wouldn’t be safe without fluoropolymers.
**Working under pressure to save lives**

High pressure hoses are designed not to explode under pressure. The high-quality tubing liner encloses fluids or gases that support passenger safety during transportation. Independent if used for hydraulics, brakes, fire extinguishing systems or engine parts they are all reinforced with high pressure hoses; the quality of the liner is the guarantee for safety.

**Water – an essential source for life**

Different types of water are used to enhance the quality of our Life. Independent if it is drinking water, in beverages, the water we swim in, ultrapure water for enhanced manufacturing of computers or phones or process water for different industrial processes; tubing helps with the transport water. Optinova PTFE or PFA tubing is the primary choice choice when harsh environments should not affect the quality of the water used.
## General summary of properties

<table>
<thead>
<tr>
<th>Feature</th>
<th>PTFE</th>
<th>FEP</th>
<th>PFA</th>
<th>ETFE</th>
<th>PVDF</th>
<th>MFA</th>
<th>PEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elongation at break %</td>
<td>200–400</td>
<td>300–325</td>
<td>300</td>
<td>230</td>
<td>15–50</td>
<td>300</td>
<td>50</td>
</tr>
<tr>
<td>Flexural modulus MPa</td>
<td>275–620</td>
<td>550–700</td>
<td>590–700</td>
<td>1200</td>
<td>2100</td>
<td>590-700</td>
<td>4000</td>
</tr>
<tr>
<td>Hardness Shore D</td>
<td>55–65</td>
<td>55–60</td>
<td>55–64</td>
<td>63–75</td>
<td>75–78</td>
<td>59</td>
<td>R-126</td>
</tr>
<tr>
<td>Density g/cm³</td>
<td>2,17</td>
<td>2,15</td>
<td>2,15</td>
<td>1,7</td>
<td>1,8</td>
<td>2,15</td>
<td>1,32</td>
</tr>
<tr>
<td>Coefficient of friction</td>
<td>0,10</td>
<td>0,25</td>
<td>0,21</td>
<td>0,23</td>
<td>0,30</td>
<td>0,27</td>
<td>0,25</td>
</tr>
<tr>
<td>Transparency</td>
<td>See note</td>
<td>***</td>
<td>****</td>
<td>*****</td>
<td>***</td>
<td>*</td>
<td>****</td>
</tr>
<tr>
<td>Melting point °C</td>
<td>330</td>
<td>257–275</td>
<td>300–310</td>
<td>270</td>
<td>175</td>
<td>285</td>
<td>334</td>
</tr>
<tr>
<td>Min/max service temp. °C</td>
<td>−240/+260</td>
<td>−200/+200</td>
<td>−200/+260</td>
<td>−190/+150</td>
<td>−60/+150</td>
<td>−150/240</td>
<td>−70/+250</td>
</tr>
<tr>
<td>Water absorption %</td>
<td>&lt;0,01</td>
<td>&lt;0,01</td>
<td>&lt;0,03</td>
<td>0,02</td>
<td>0,04</td>
<td>0,03</td>
<td>0,50</td>
</tr>
<tr>
<td>Chemical resistance See note</td>
<td>*****</td>
<td>****</td>
<td>*****</td>
<td>****</td>
<td>****</td>
<td>****</td>
<td>****</td>
</tr>
<tr>
<td>ETO</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Steam</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Radiation</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Notes:** The property data are taken from different sources and are not necessarily typical for any specific grade. This table is unsuitable for specification, since all values are indicative and for guidance only. Optinova Ab takes no responsibility for data given in the table. Excellent: ***** Poor: *