Route to Airport Köln (Cologne) and Frankfurt / "Steffenberg and Biedenkopf"
Köln / Bonn (approx. 90 min)

Frankfurt (approx. 90 min)

**EHA Composite Machinery GmbH**
Niedereisenhausen
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Fax +49 (6464) 9150-52
*E-mail: sales@ehacomma.com*
*www.ehacomma.com*
### History of EHA formerly Bolenz & Schäfer-BSD

- **1933** Founding of Bolenz & Schäfer
- **1943** Production of clutches and brakes
- **1952** Production of hydraulic elements and aggregates
- **1963** Start of development of Filament Winding Machinery
- **1979** BSD uses a commercial CNC control for a Filament Winding Machine for the first time
- **1988** First Filament Winding Machine with 6 CNC axes of motion
- **1989** BSD becomes a member of the ROTH Industries.
- **1989** BSD builds the first winder with integrated tape placement head. The machine has 13 axes of motion
- **1990** BSD builds their first equipment for a prepreg plant. The prepreg is used to produce bicycles
- **1995** EHA becomes a member of ROTH Industries
- **1999** EHA incorporates the Filament Winding Machine division of BSD
- **1999** EHA designs and builds the most advanced, completely automatic Filament Winding Machine for pressure vessels
- **2000** EHA designed, built and installed the most efficient Filament Winding plant for the high production of pressure vessels to a Norwegian customer
- **2009** EHA designed and installed the most advanced full automatic plant to produce high voltage pipes
- **2011** EHA has sold over 450 composite machines and turnkey facilities around the world
- **2012** Start of co-operation with AFPT for automatic tape placement heads with laser welding

### Filament Winding Machines

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type 1</strong></td>
<td>Best Seller: Overhead beam for pressure vessels and/or electric industry.</td>
</tr>
<tr>
<td><strong>Type 2</strong></td>
<td>Compact winder for R &amp; D and small production plants.</td>
</tr>
<tr>
<td><strong>Type 5</strong></td>
<td>Large diameter and long length parts used in paper pulp machines, wind energy, oilfield, aviation industry and space.</td>
</tr>
</tbody>
</table>

### Impregnating Baths

<table>
<thead>
<tr>
<th>Rollers</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller 1</td>
<td>Roller impregnation for sensitive carbon and special fibres.</td>
</tr>
<tr>
<td>Roller 2</td>
<td>Roller impregnation for standard glass, carbon, aramid and other fibres.</td>
</tr>
<tr>
<td>Dip</td>
<td>Dip impregnation for easy fibres.</td>
</tr>
</tbody>
</table>

### Curing Ovens

<table>
<thead>
<tr>
<th>Oven</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Oven</td>
<td>Continuous operation with 3 temperature zones.</td>
</tr>
<tr>
<td>Batch Type Oven</td>
<td>Batch operation with infinite temperature profile.</td>
</tr>
</tbody>
</table>
Hot melt plant for prepreg production

- Spool creel
- Calender for prepreg
- Unwinder with separator foil
- Rewinder for prepreg
FWA 2/4/1 compact production winder

CNC-control

RCA: automatic cutting and re-applying of fibres

Simulation of winding path

Scheme of axes

Tape placement head with laser

Winding of thermoplastic tape with torch

Delivery device

Carriage of FWA 5

D-ring

FWA 5 Filament Winding Machine for huge products
FWA 1/4/3 Filament Winder with overhead beam
Spool creel with electronic closed loop control, Type EPS

Spool creel with closed loop control, Type SFT

Spool creel for inside pull, Type SI
Roller impregnation for sensitive fibres

Dip impregnation for easy fibres

Fibres in a roller impregnation bath

Fibres in a dip impregnation bath

Doctor blade with precise adjustment

Roller impregnation for standard fibres

TiO₂ eyelets
Curing Ovens

Continuous oven

Batch type oven

Automatic handling

Curing of pressure vessels

Conveyor system for mandrels

Infra-red curing
The **product or production program** has the following description:

<table>
<thead>
<tr>
<th>Name of product</th>
<th>max.</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winding length wl (mm)</td>
<td>max.</td>
<td></td>
</tr>
<tr>
<td>Mandrel length (mm)</td>
<td>max.</td>
<td>(standard is wl plus 1.000 mm)</td>
</tr>
<tr>
<td>Thickness of laminate (mm)</td>
<td>max.</td>
<td></td>
</tr>
<tr>
<td>Weight of laminate/mandrel (kg)</td>
<td>approx.</td>
<td>weight or volume?</td>
</tr>
</tbody>
</table>

**Shape:**
- pipe
- pressure vessel
- others

**Shape of cross section:**
- round, oval or rectangular
- others

Do you have **experience?**
- with the filament winding process
- with CNC-control

Which **raw materials** will be used?

<table>
<thead>
<tr>
<th>Fibre:</th>
<th>Matrix:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass, Aramid, Carbon (HT or HM)</td>
<td>Polyester, Epoxy, Vinylster, others</td>
</tr>
</tbody>
</table>

Winding process: ____________________ (wet or dry with prepregs/towpregs)

Numbers of fibres: ____________________

Which **curing cycle** is requested?

<table>
<thead>
<tr>
<th>typical temperature profile:</th>
<th>C°</th>
<th>C°</th>
<th>C°</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g. 90° C)</td>
<td>(e.g. 120° C)</td>
<td>(e.g. 140° C)</td>
<td></td>
</tr>
<tr>
<td>time:</td>
<td>min</td>
<td>min</td>
<td>min</td>
</tr>
<tr>
<td>(e.g. 80 min)</td>
<td>(e.g. 80 min)</td>
<td>(e.g. 80 min)</td>
<td></td>
</tr>
</tbody>
</table>

**Required delivery date:** approximately ________________