RÖCHLING
High Performance Plastics

High Performance Plastics for Wind Turbine Engineering

05/2010

Thermoplastics
Fiber reinforced plastics

Röchling – world leader in engineering plastics

Your international supplier of technical products
As part of the German Röchling Group, a world leader in the processing of engineering plastics, the High Performance Plastics division with its international subsidiaries is a leading supplier of semi-finished products and finished parts of engineering plastics for the capital goods industry. With our unique wide and varied range of thermoplastic and composite materials we offer tailored solutions that meet almost any requirements.

In our own laboratories and in collaboration with suppliers, scientists and institutions we develop new products and manufacturing technologies.

Flexible, high-performance, precise
We use modern, powerful and efficient CNC machining centers. Large-format CNC machines enable products with very large dimensions to be manufactured with close tolerances.

We take the initiative
We demand the highest standards of our quality management. We are certified to DIN EN ISO 9001:2008 and ensure our standard at continuous inspection and assessment of our activities in quality audits. We are also an active member of numerous bodies and committees and actively face the challenges of the future. In this way we ensure the continuous expansion of our know-how and outstanding reliability in the use of our products.

Machining of a Durostone® support ring

Mechanical testing in our laboratory

Logistic center

CNC cutting of sheets

Typical applications for high performance plastics within wind turbines

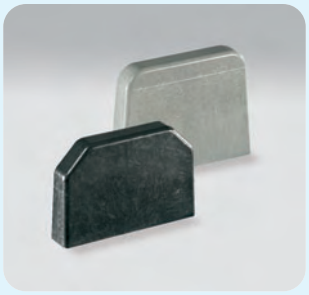
The most comprehensive range of composites and thermoplastics

Composites

The choice of materials for applications within wind turbines is subject to the most stringent electrical, mechanical and thermal requirements. With our fiber glass reinforced plastic Durostone®, we can supply a quality range of high grade materials for widely varying applications and open up entirely new design possibilities.This ranges from highly complex support rings to high volume plates and fasteners to Permaglas® compression moulded components.

We manufacture a comprehensive range of specially developed resin systems and fiber glass reinforcements.

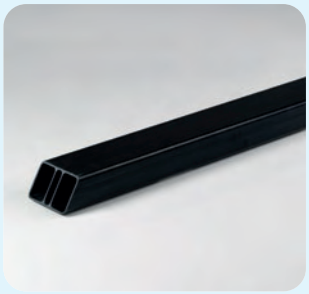
Our extensive stocks of semi-finished products, together with computer controlled machining centers, guarantees high quality machined components with close tolerances.



Compression moulded Permaglas® FRP parts

Pultruded Durostone® rod with high glass content

Pultruded Durostone® tube



Durostone® custom shaped hollow profile

Durostone® rotor blade profile for vertical axis wind turbines

Electrical insulating Durostone® profiles

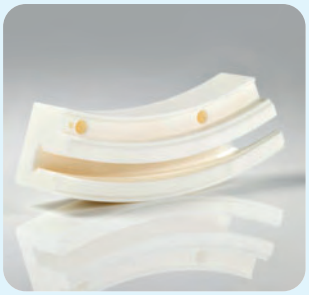
Thermoplastics

We offer an unique range of semi-finished and machined thermoplastic products in a wide selection of shapes and formats – sheets up to the format 6,000 x 2,500 mm, blocks, rods and welding wire. Our range of supply is a composition of engineering and high performance plastics. In addition to numerous standard types, we offer tailored modifications fitting to your specific application.

On the basis of these materials, our production program encompasses:

- extruded and moulded semi-finished products
- form-polymerised semi-finished products
- films
- extruded profiles
- special cast components
- cast moulded products
- and CNC machining in accordance to the drawings of our customers

CNC machined components



Slide-guide

Sliding element for heavy duty applications

Complex CNC machined part

Cable fixing

Self-lubricating gear wheels

Material properties of selected materials

Electrical insulation

Material grade	Specific gravity	Bending strength	Bending modulus	Compressive strength	Comparative tracking index	Electric strength	Thermal endurance / Recommended limit temp.
	DIN EN ISO 1183-1	ISO 178	ISO 178	ISO 604	IEC 60112	IEC 60243	
	g/cm³	N/mm²	N/mm²	N/mm²	CTI	kV/mm	°C
Composite Profiles Durostone® UPGMZ, UPGMZ-LP	1.75 – 1.95	longitudinal: 300 – 450 transversal: 100 – 250	10 – 20 x 10³	100 – 250	600	4	100 – 130
Composite Profiles Durostone® UPGZ, UPGZ-LP	1.85 – 2.00	longitudinal: 300 - 500	10 – 30 x 10³	70 – 150	600	2 – 4	100 – 130
Composite Profiles Durostone® UPGM, UPGM-LP	1.65 – 1.95	longitudinal: 250 – 400 transversal: 130 – 300	10 – 25 x 10³	250 – 300	600	2 – 4	100 – 130
Composite Sheets / Finished Parts Durostone® UPM 203	1.80	130	9 x 10³	250	600	12	155
Composite Sheets / Finished Parts Durostone® EPM 203	1.85	360	18 x 10³	450	150	13	180
Compression Moulded Composites Permaglas® PMP (SMC)	1.80 – 2.00	120 – 260	8.5 – 14 x 10³	200 – 300	600	9 – 12	100 – 130

Sliding elements

Material grade	Specific gravity	Tensile modulus	Mean specific coefficient of wear K_w	Mean specific rate of wear w_l	Coefficient of friction – no lubrication*	
	DIN EN ISO 1183-1	DIN EN ISO 527	Pin-disc tests according to ISO 7148			
	g/cm³	N/mm²	10^{-6}mm³/Nm	mm/km	dynamic	static
Sustamid 6	1.14	3200	4.19	12.59	0.61 – 0.88	0.18 – 0.51
Sustamid 6 G	1.15	3400	3.30	10.00	0.42 – 0.58	0.46 – 0.64
Sustadur PET WP	1.39	3200	2.04	6.11	0.29 – 0.36	0.16 – 0.21
Sustadur PET GLD 130	1.44	2600	0.87	2.61	0.25 – 0.28	0.18 – 0.19
Sustarin C	1.41	2800	0.23	0.69	0.42 – 0.53	0.17 – 0.46
Sustarin C GLD 160	1.52	2500	0.89	2.66	0.28 – 0.31	0.15 – 0.19
Sustarin C GLD 350	1.33	2200	0.46	1.39	0.24 – 0.29	0.23 – 0.24
Sustaglide	1.14	3400	0.50	1.50	0.16 – 0.22	0.12 – 0.15
					based on EN ISO 8	
Polystone® M slide WP	0.96	680	–		0.07	
Polystone® G	0.95	800	–		0.15	

* in case of an externally lubricated system coefficient of friction is determined by the lubricant applied

FRP reinforcements

Material grade	Specific gravity	Bending strength	Bending modulus	Compressive strength	Tensile strength	Impact strength (Charpy)	Thermal endurance / Recommended limit temp.
	DIN EN ISO 1183-1	ISO 178	ISO 178	ISO 604	ISO 527	ISO 179	
	g/cm³	N/mm²	N/mm²	N/mm²	N/mm²	kJ/m²	°C
Composite Profiles Durostone® UPGM, UPGM-LP	1.65 – 1.95	longitudinal: 250 – 400 transversal: 130 – 300	10 – 25 x 10³	250 – 300	250 – 350	–	100 – 130
Composite Sheets / Finished Parts Durostone® UPM 203	1.80	130	9 x 10³	250	70	40	155
Composite Sheets / Finished Parts Durostone® EPM 203	1.85	360	18 x 10³	450	280	50	180
Composite Sheets / Finished Parts Durostone® EPC 308	2.00	340	24 x 10³	350	300	33	180
Compression Moulded Composites Permaglas® PMP (SMC)	1.80 – 2.00	120 – 260	8.5 – 14 x 10³	200 – 300	60 – 185	40 – 120	100 – 130

The data mentioned in this brochure are average value as certained by current statistical returns and tests.
The above data is provided purely for information and shall not be regarded as binding unless expressly agreed in a contract of sale.

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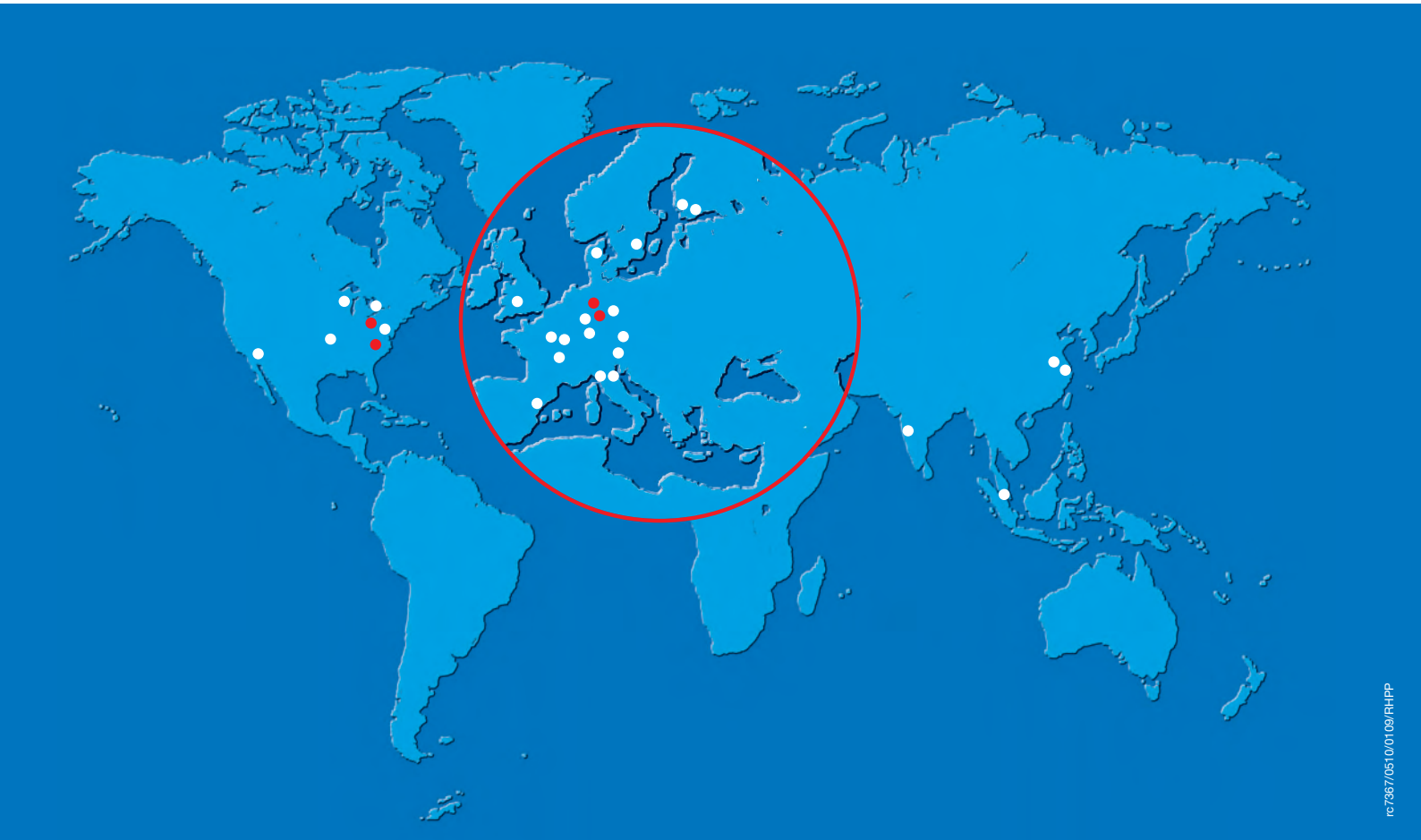
The world-wide locations of the Röchling High Performance Plastics Division



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