

KraussMaffei

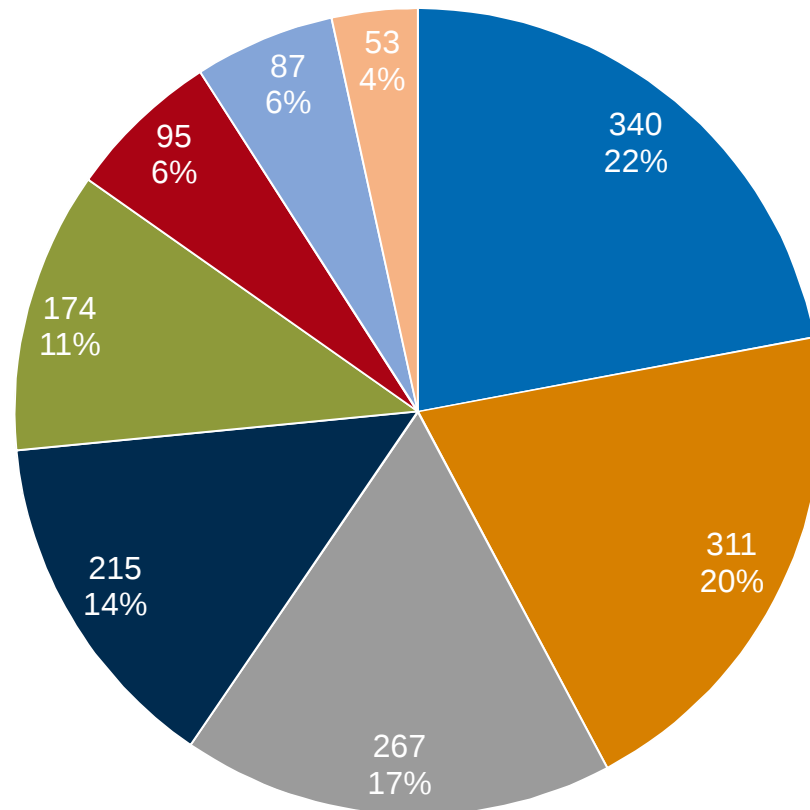
Engineering Passion

**More speed in Pultrusion
iPul by KraussMaffei**



Global pultrusion market by industry in 2016 in \$ mio.

Total shipment was \$ 1,542 mio



The global pultrusion market is forecast to grow at a compound annual growth (CAGR) rate of

5.1%

- Consumer goods
- Building/Construction
- Chemical
- Others
- Infrastructure
- Electrical
- Transportation
- Cooling tower

Sales in million US Dollar

Pultrusion market growth/per year

The best performing composite applications in the global pultrusion market

Window Profiles

10,4%



Rebars

10,2%



Transportation

6,2%



Decking

5,7%



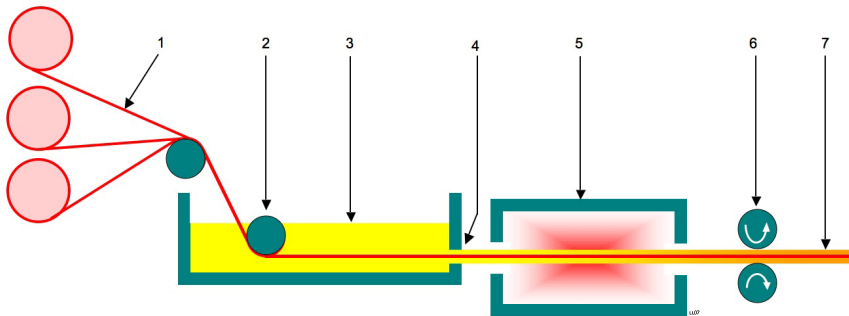
Grating

5,2%



Pultrusion with open bath vs. Pultrusion with injection box

Open bath



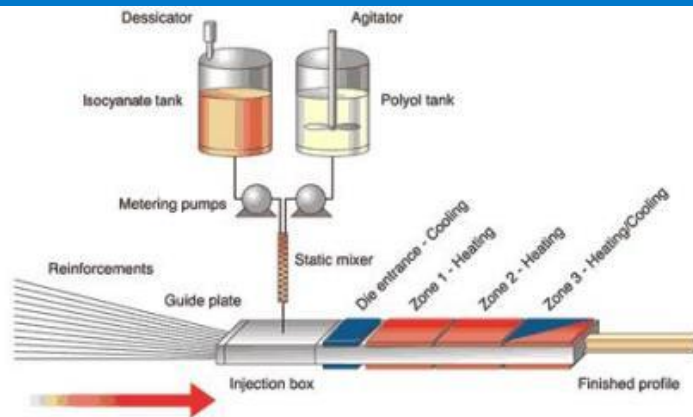
- Dirty production
- Slow production speed $< 1\text{m/min}$
- Irregular quality
- No process parameter control
- High material waste
- High maintenance effort
- Unhealthy for operator
- Environmental pollution

➡ Only recommended for simple and cheap profiles

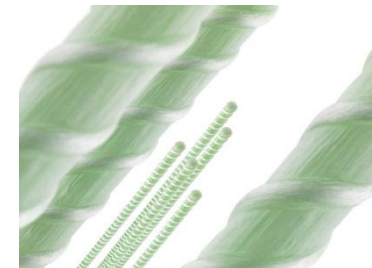


Pultrusion with open bath vs. Pultrusion with injection box

Injection box



- Clean production
- High production speed up to 3m/min
- Constant quality
- Online process parameter control and documentation
- Low waste
- Low cleaning and maintenance effort
- No healthy risk for operator
- Environmental friendly
- Must have for profiles with high quality requirements →



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The Revolution in Pultrusion



injected. innovative. integrated. industrialized.
Pultrusion Technologies

Official market introduction June 2017



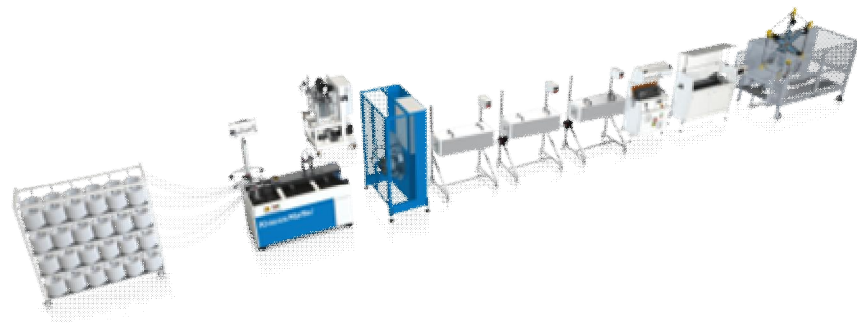
Your partner for new developments and turnkey solutions

- n New low pressure metering machines for 2K polyurethane, 2K epoxy and 2K polyamide which you can add to your existing pultrusion lines
- n Complete iPul pultrusion lines
- n Design and manufacturing of I-Box and Tool
- n Joint developments with material suppliers
- n Development capacities in our laboratory



Your partner for new developments and turnkey solutions

- n New low pressure metering machines
- n **Complete iPul pultrusion lines for profiles or rebars from one independent supplier with global sales and service structure**
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Your partner for new developments and turnkey solution

- n New low pressure metering machines
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- n Design and manufacturing of I-Box and Tool
- n **Joint developments with material suppliers to offer the right process setup for new customers**
- n Development capacities in our laboratory



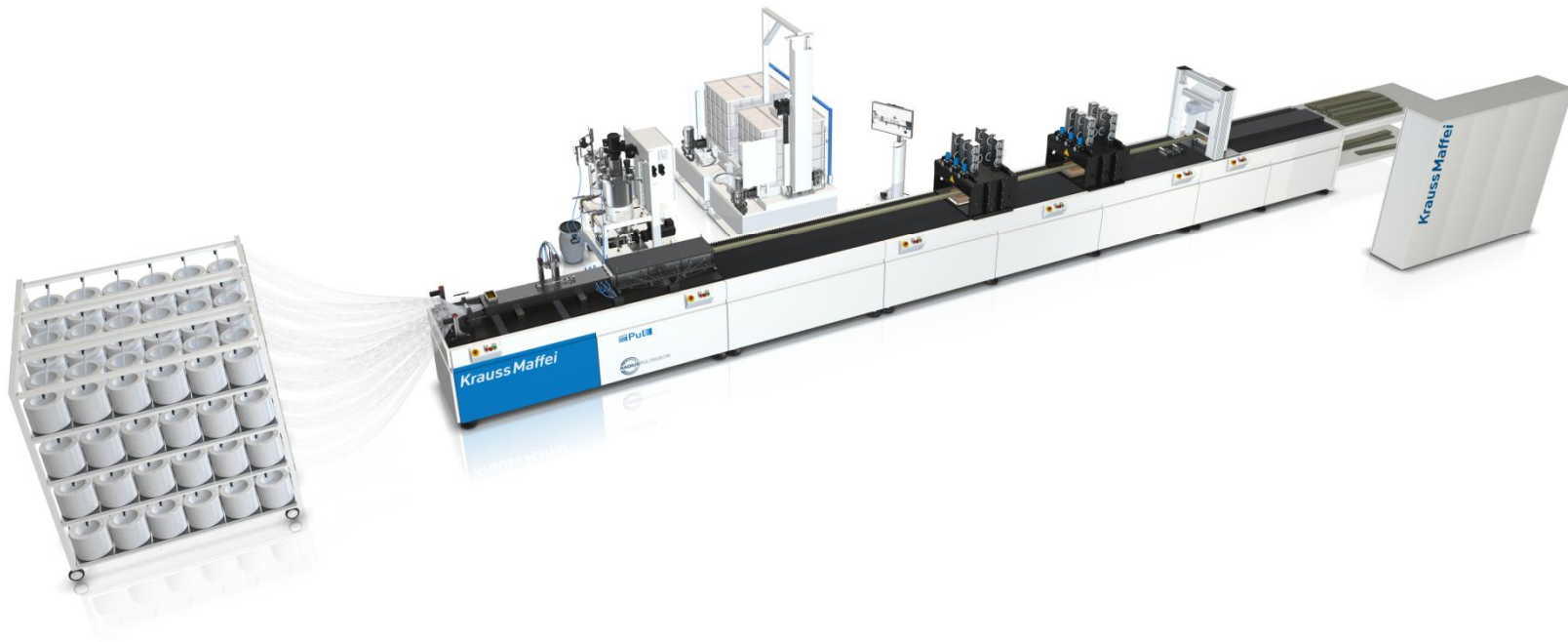
Your partner for new developments and turnkey solution

- n New low pressure metering machines
- n Complete iPul pultrusion lines
- n Design and manufacturing of I-Box and Tool
- n Joint developments with material suppliers
- n **Development capacities in our laboratory lines for material trials or prototyping**



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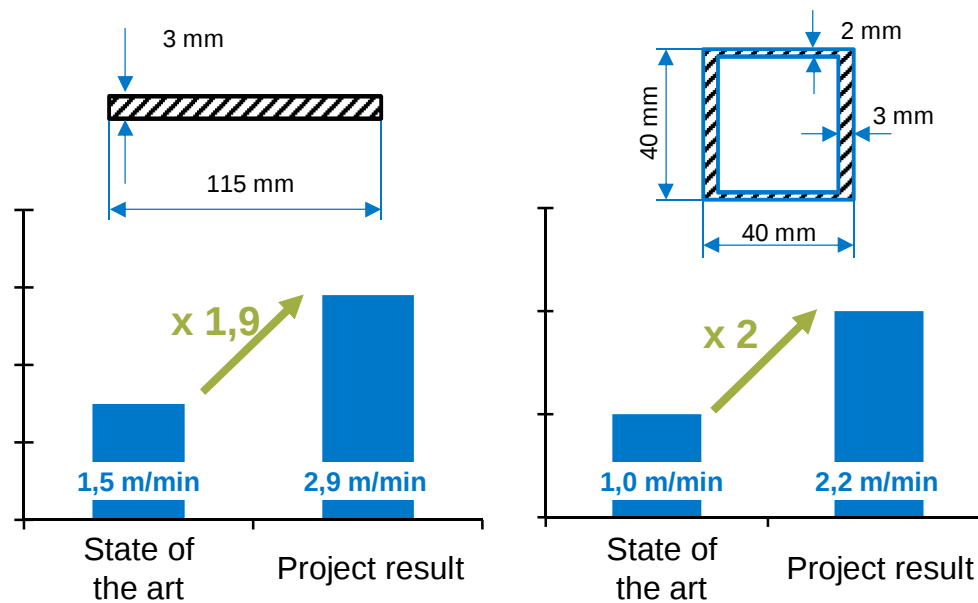
KraussMaffei iPul pultrusion line for profiles



Higher productivity with iPul PU Pultrusion

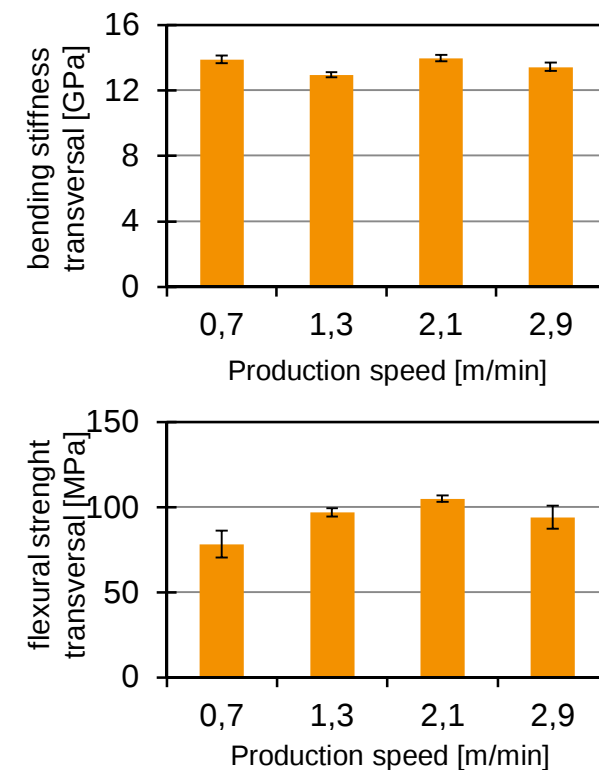
Current production speed 2,2m/min; development target 3m/min

Increased productivity



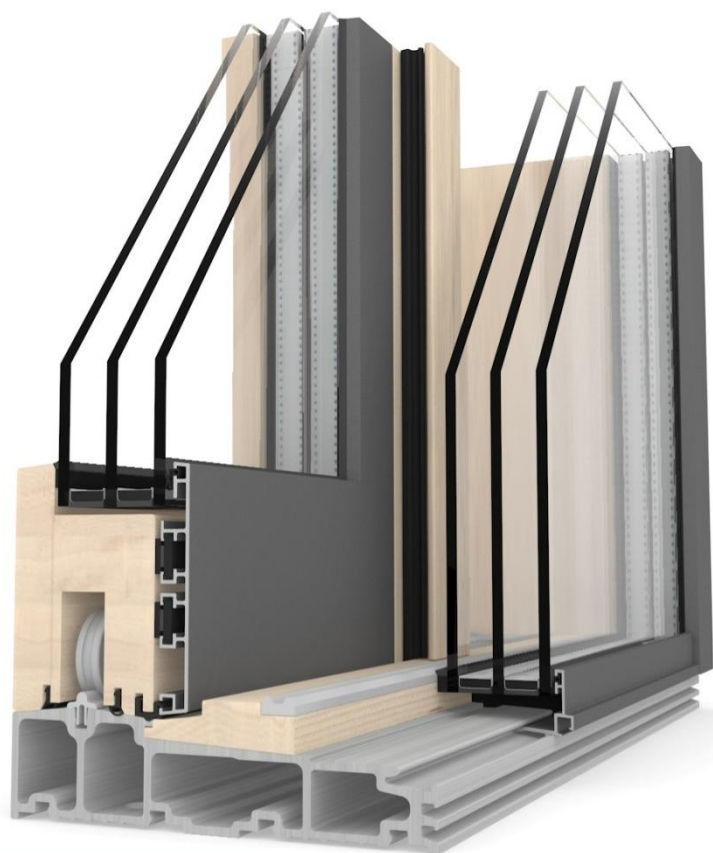
Potential cost reduction **20 %**

Good mechanical properties



(Pultruded PU Profile with 78 Gew.-% GF)

Insulation sill profile for sliding window door with PU and GF

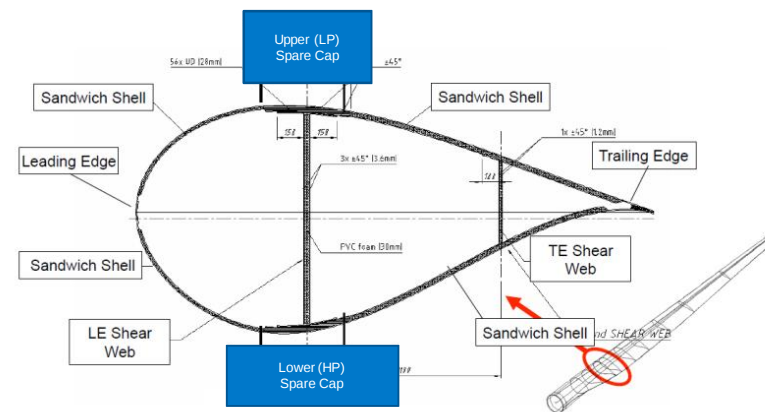
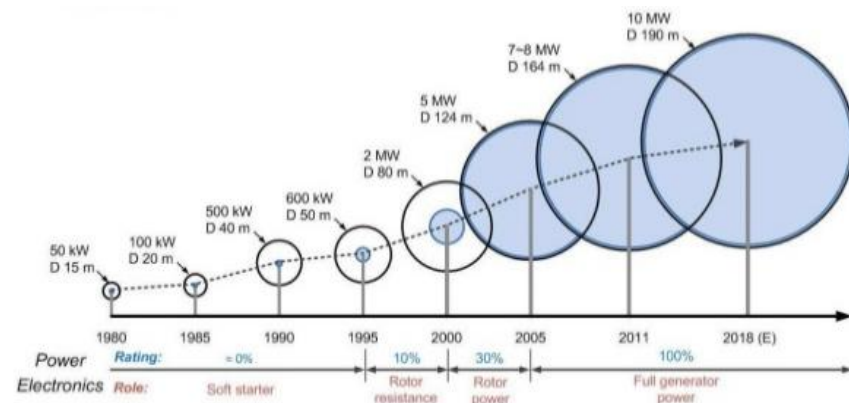


Internorm®



Producer: „Internorm“

Current production speed 0.4-0.5m/min; development target >1.5m/min



Source: www.compositestoday.com

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KraussMaffei iPul pultrusion line for rebars



Development of rebars with epoxy and GF

Current production speed <2m/min; development target 12m/min



Advantages of Composite Rebars

- § Highly durable
- § Corrosion resistant
- § Much stronger than steel
- § Not magnetic and magnetisable
- § Not electrically or thermally conductive
- § Easily machineable
- § Four times lighter than steel

KM's offer to our customers

- n Turnkey pultrusion systems
 - Design and engineering of injection boxes and tools
 - Individual engineering of the metering machines and pultrusion lines is possible according to the requirements of the customer
 - Automation of process steps
 - Intuitive operator control of the complete line
- n High performance production
 - High production speed of $> 3\text{m/min}$: Increase in productivity and profitability (depending on matrix and profile geometry)
 - Improvement of the process control
- n Process development support
 - Development of final products incl. certification by our partners
 - Increase functionality of the profiles