

**MORE SPEED AND
EFFICIENCY IN PULTRUSION**
COMPOSITE PRODUCTION ON
AN INDUSTRIAL SCALE



COMPOSITE PRODUCTION ON AN INDUSTRIAL SCALE

Of all composite technologies, pultrusion has the broadest number of applications and is by far the most highly automated and energy efficient production process. It is hard to find an industry that does not use pultruded products. Considering the whole product life-cycle of the application, pultruded profiles are in many cases more economically attractive than their wooden, metal or plastic counterparts. Notwithstanding the upfront higher initial investment costs, revolutionizing industries with its broad application is a true added value.

Fast growing technology

The pultrusion market is relatively young, highly fragmented and among the composite industry's fastest growing segments. There are about 100 new market entrants per year world wide. In the past decade average growth rates exceed 5% p.a. worldwide and even 10% for some applications.

Added value for many applications

Corrosion resistance, durability, lower maintenance cost, fire retardancy, weight saving and energy conservation are only some benefits of pultruded window profiles, cable trays, grating, bridge decks, electric insulators, ladder rails or dowel bars. Fiberglass windows alleviate condensation problems, where the humidity is set at a defined level to protect certain work-of-arts or involved in environmental projects as the green house of zero emissions.

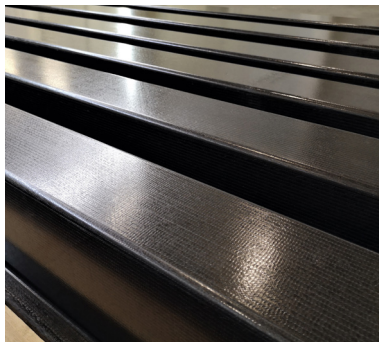
iBox for more speed and clean production

The advantages of the iPul production line with iBox in comparison to the state-of-the-art solution for pultruded

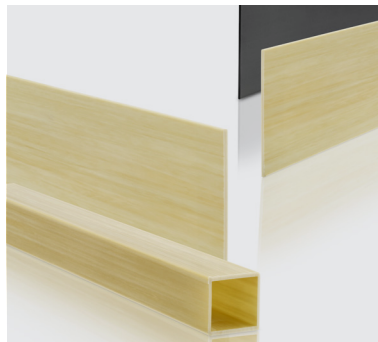
flat glass fiber profiles led to the FSK innovation award in 2017 for doubling the speed up to 2,9m/min. In cooperation with partners from the chemistry industry and in research and development for composite engineering, we are setting new boundaries as well in the complexity of profile geometries as in the production speeds. Our motivation for the development was reinforced by the strive to lower styrene emissions during manufacturing for environmentally friendly and clean production, without any health risks for the machine operator.

Pultrex – A Company of KraussMaffei

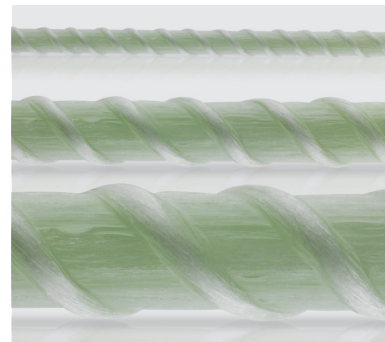
After entering the pultrusion market with the disruptive innovation and presenting of the "iPul" pultrusion technology with injection box(iBox) in 2017, KraussMaffei bought out Pultrex in 2019, a major player within the European pultrusion machinery market. By this means, becoming a honored member of the established pultrusion family with roots of more than 45 successful years, over 700 commissioned production lines and more than 3000 delivered toolings world wide.



Automotive:
Profile for a car chassis
(Photo: Carbon TT)



Consumer goods:
Pultruded profiles and sheets offer
attractive surface solutions



Construction:
Rebars for concrete reinforcement

MACHINE REFERENCE	Px250-3T	Px500-6T	Px750-8T	Px750-10T	Px1000-8T	Px1000-10T	Px1000-12T	Px1000-20T
Pulling force kgf	3,000	6,000	8,000	103,000	8,000	10,000	12,000	20,000
Profile clamp force								
Per puller (kgf) @ 6.5 bar air pressure	7,500	10,700	21,400	21,400	21,400	21,400	32,100	42,800
Standard clamping length (mm)	660	660	660	660	660	660	660	660
Pulling and cutting dimensions								
Width mm	250	500	750	750	1,000	1,000	1,000	1,000
Standard height mm	125	160	160	160	160	160	230	350
Optional height mm		230	230 / 300	230 / 300	230 / 300	230 / 300	300 / 350	
Pulling speed – Infinitely variable								
Minimum – metres/min	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.06
Maximum – metres/min	5.00	4.00	3.00	3.00	2.50	2.50	2.25	2.00
Die heating zones								
Self-tune temperature controllers								
Standard	2	2	4	4	4	4	4	8
Option: up to 24 zones on all machines								
Utilities – For standard machines								
Electrical – kva	15	20	30	30	30	30	35	40
Compressed air @ 6.5 bar m³/min	0.02	0.03	0.05	0.05	0.05	0.06	0.05	0.04

All Pultrex machines are available either with injection box and metering machine or simply with an open bath. Depending on the profile geometry, the pulling force ranges from 3 to 20 tons. The profile geometry for our standard machines outlines the working space from 250x125mm to 1,200x350mm. Optionally, we can adjust the pultrusion line, corresponding to the customer needs for the specific application.



Consumer Goods:
Profiles for a multitude of applications

YOUR BENEFITS OF A TURNKEY iPUL PULTRUSION SOLUTION:

- Low pressure metering machines for 2C polyurethanes, 2C epoxy resins and 2C polyamide which you can integrate to your existing pultrusion line
- Complete iPul pultrusion lines for profiles and rebars with iBox or open bath solution
- Joint development with material suppliers
- Design, manufacturing and testing of your injection box and tool
- Research & development capacities in our research lab for material trials or prototyping.

THE PULTRUSION PROCESS WITH iBOX

Pultrusion has the following production line composition: reinforcements from glass-, carbon, basalt or aramid fiber rovings/mats, tows or in stitched format are pulled out from a spool and funneled together to the required shape through a guide system into the injection box. Simultaneously, a low pressure metering machine mixes and tempers the matrix system (Polyurethane-, Epoxy resin or Caprolactam) under appropriate conditions inside the mixing head. During the following procedure, the blended medium is fed into the properly tempered iBox. Inside the injection box the fibers are impregnated with highly reactive resins under pressure, before passing through the heated die and hardening to the final profile shape.

Two pulling systems available

A pulling mechanism grips and hauls off the profile with constant speed out of the pultrusion machine die. In general two kinds of pulling systems can be applied: a caterpillar for lower pulling forces and simple geometries or electricpneumatic puller with grippers for higher process requirements.

Ready for use profiles

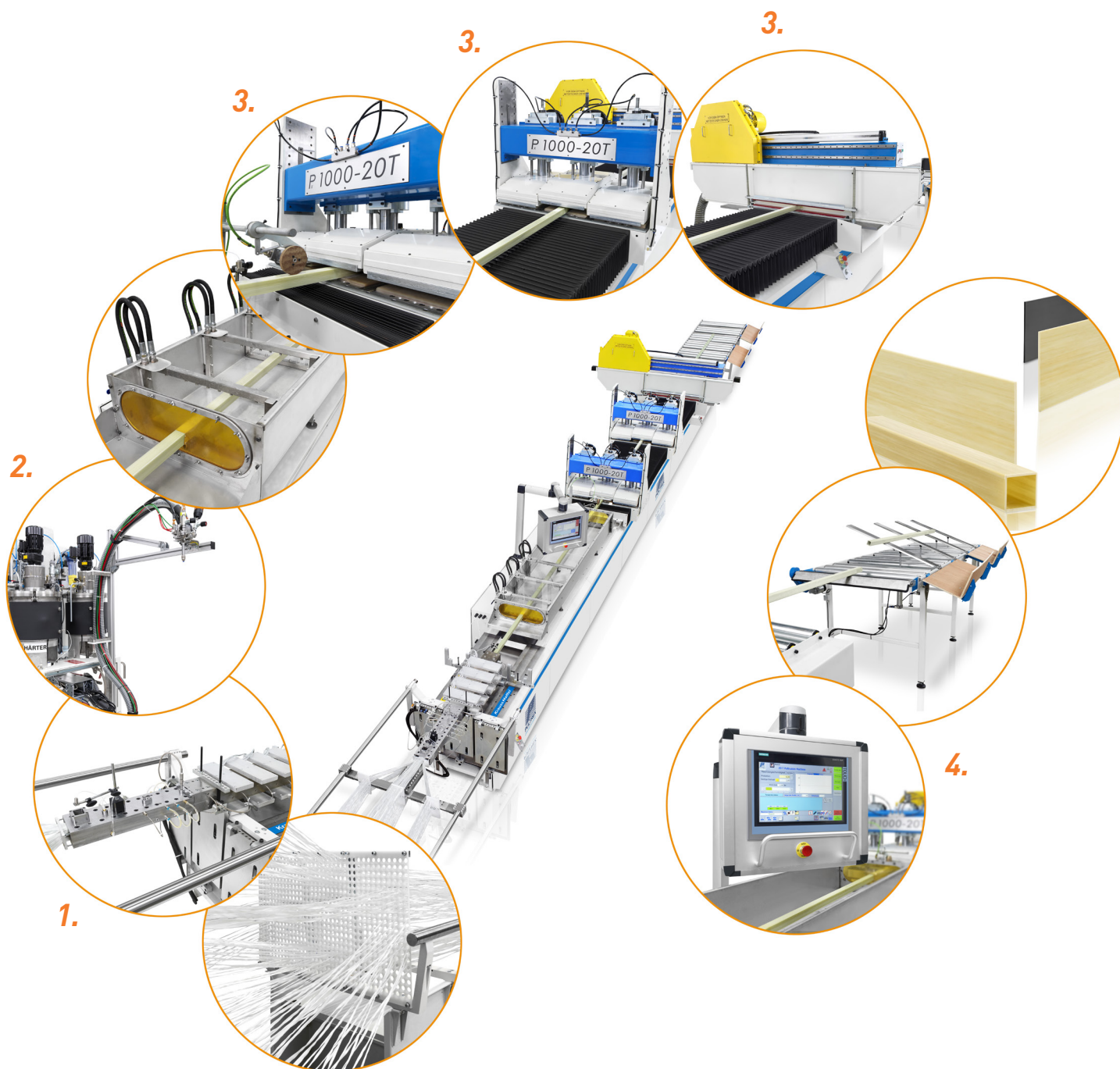
After curing inside the die the profile passes through a cooling bath as a further process stage. The profiles can be cut to length by a traveling cut-off saw and afterwards be stacked, coiled or packed.

Centralized monitoring and 24/7 production

The operator panel is monitoring the process parameters for the whole pultrusion line. As an option, an automatic refilling station can be integrated to the production line for continuous high-speed 24/7 output. Turnkey pultrusion solution from one established, independent supplier.

Interesting details

The iBox is the heart of every iPul machine and facilitates the continuous laminating of fibers and profile production with a constant cross section, with high quality and speeds. The high fiber volume fraction of up to about 75%, designates the process as ideal for structural components of a highest strength to weight ratio. Pultrex machines are known for their efficiency in power consumption, machine control stability at varying pulling loads and operator safety. Furthermore, they can pultrude up to four profiles simultaneously, being extremely economical efficient. The combination of the KraussMaffei metering machine and the iBox is a unique high-tech product for composite profile production.



Main components of the iPul pultrusion line

1. Injection box and tool
2. Metering machine
3. iPul line with multiple grippers
4. iPul control panel

*Turnkey pultrusion solution from
one independent supplier.*

TURNKEY PULTRUSION SOLUTIONS

FROM ONE INDEPENDENT SUPPLIER

We offer turnkey pultrusion lines for composite profiles or pullwinding machines for rebars from one independent supplier with more than 1400 global sales and service experts in more than 60 locations. We will guide you with our expertise through the whole value creation chain from the research and development of your composite product to after sales support for your Pultrex pultrusion production line.

YOUR CHOICE: Open bath or iBox

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