

SUCCESS STORY
**FROM PASSENGER
TO CARGO AIRCRAFT**

NIAR, USA



Krauss Maffei

Pioneering Plastics

FIBERFORM CONQUERS AVIATION INDUSTRY BENEFITING FROM LARGESCALE AUTOMOTIVE PRODUCTION

OVERVIEW

CUSTOMER: NIAR
COUNTRY OR REGION: USA
INDUSTRY: Aviation

APPLICATION: Window closures

- Cavities: 1
- Shot weight: 140 g
- Material organic sheet: Victrex AE250 LM-PAEK
- Material injection molding: Victrex 150 CA30 PEEK

MACHINE DETAILS:

GXW 450-2000/1400

- Clamping force: 4,500 kN
- Screw diameter: 70 mm
- Handling: Industrial robot IR (2x)

CUSTOMER PROFILE:

With its ATLAS laboratory, the NIAR Institute is driving forward the development of composites solutions for aviation. www.wichita.edu

REQUIREMENTS:

- Short transfer time between oven and tool
- Homogeneous and precise heating of high-temperature plastics
- Integration of several processes in one machine
- Short cycle times

INDIVIDUAL SOLUTION:

- Production of thermoplastic composite components
- Data acquisition of all process parameters
- Flexible and combinable technologies (FiberForm, ColorForm, MK injection molding)

ADVANTAGES:

- Short cycle times of 90 sec (40 window closures per hour)
- 20 percent lighter compared to metal (potential to increase to 40 percent)
- Fully automated production

The US research institute NIAR is investigating how modern composite technologies can be used safely and efficiently in aviation, for example when converting passenger aircraft into cargo planes. KraussMaffei is providing support with its expertise from the efficiency-driven automotive industry.

Among other things, the professional conversion of the passenger aircrafts involves closing the numerous window openings, which was previously done with metal plates. The NIAR Institute and KraussMaffei have pooled their expertise and developed a lightweight construction solution using the FiberForm technology. With FiberForm, a so-called organo sheet, thermoplastically impregnated continuous fibers, is inserted into the mold, formed and overmolded.

For the window panels, this is done on a GXW 450-2000/1400 with a swivel platen. The result is an oval panel whose geometry is based on the original aircraft window, but was adapted at certain points - for example with ribshaped reinforcements - in order to withstand the pressure loads.

The biggest advantage of fast injection molding compared to metal processing is the short cycle time: 40 window closures can be produced within an hour. Compared to its metal counterpart (590 grams), the composite version of the window shutter weighs around 20 percent less. The team is already working on further optimization to achieve a saving of 40 percent.

“Our aim is to transfer efficient processes from automotive production to aviation - such as FiberForm.”

(Dr. Waruna Seneviratne, Director NIAR ATLAS)



*Thermoplastic lightweight construction for large-scale production:
The GXW 450-2000/1400 with swivel platen*



The high degree of automation ensures excellent cycle times



Working together to drive forward the introduction of thermoplastic lightweight construction in aviation (from left): Nolan Strall (President Krauss-Maffei Corporation), Dr. Waruna Seneviratne (Head of NIAR ATLAS) and Eugen Schubert (Sales and Application Manager Krauss-Maffei Corporation)