

Press release

Bremen,
20 March 2012

Release agent free FRP component manufacture using Flex^{PLAS®} release film – Fraunhofer IFAM at JEC Europe 2012 in Paris – R&D for practical applications

The Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, Germany, will present its work at JEC Europe 2012 in Paris (Hall 1, Booth H 64) from 27 to 29 March 2012. The focus will be on release agent free FRP manufacture using the newly developed Flex^{PLAS®} release film.

In order to be able to manufacture large fiber reinforced plastic (FRP) components – such as those used for aircraft and wind turbine construction – which are free of release agents, researchers of Plasma Technology and Surfaces PLATO and experts in the Fraunhofer Project Group Joining and Assembly FFM at Fraunhofer IFAM have developed a deep-drawable Flex^{PLAS®} release film. This is an elastic polymer film with a flexible release layer that allows easy removal of components from molds, even when stretched by 300 percent. The film can be applied using a special deep-drawing process without alteration of the tool design, and is suitable for both female and male molds.

The Flex^{PLAS®} release film has already been used to manufacture large carbon fiber reinforced plastic (CFRP) components on a 1:1 scale, without using release agents, via a prepreg process at 180 °C in an autoclave. As will be able to be seen at Booth H 64 in Hall 1 at JEC 2012 in Paris, the resulting large components can then be coated without further pre-treatment. This is because the use of the release film allows clean removal from the mold without transfer of any residues.

The innovative Flex^{PLAS®} release film is not only suitable for use with prepreg technology but can also be used for other manufacturing processes such as the (vacuum) infusion process or the wet layup process. The release properties of the

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flexible release film are not solely limited to carbon fiber and glass fiber matrix resins.

In addition, the new technology allows in-mold coating of fiber composite components, whereby the component is coated by applying a gel-coat to the film (see photo). The matt effect of the coated surface can be adjusted via the roughness of the Flex^{PLAS®} release film that is employed. The risk of coating defects is significantly reduced using this approach.

Besides obviating the need to apply release agent on the surfaces of molds, the productivity of various other steps in the process chain can also be increased by using Flex^{PLAS®} release film. Notably, there is no downtime required to thoroughly cleaning the molds and free them from release agent residues. This means that the service life and availability are considerably increased. Also, the fiber composite component can be coated, without release agent residues having to first be removed. Furthermore, if the film remains on the component to the end of the process or up to delivery to the final customer then it also acts as a protective film.

Background information

Fraunhofer IFAM in Bremen, Germany, has for many years been working on issues related to the use of release agents. These work areas include the removal and reaction of release agents on fiber composite components, in-line monitoring, and the replacement of release agents by permanent release layers.

Release agents are essential for manufacturing fiber composite components. Prior to the start of the layer build up, they are applied to the full surface of the molds in order to ensure easy removal of the cured components. On removing a fiber composite component from a mold, the separation occurs within the release agent layer. This is why some release agents always end up on the component surface. These release agent residues must be removed prior to coating or bonding the fiber composite components. This can be achieved by cleaning or surface abrasion of resin materials via

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grinding or blasting processes. It is also necessary to regularly remove release agent residues from the surfaces of the molds.

The scientists of Plasma Technology and Surfaces PLATO at Fraunhofer IFAM have already developed an ultra-thin plasma-polymer release layer to replace release agents. This is already being used in, for example, the car manufacturing industry. A prerequisite for this technology is that the mold is coated in a low pressure plasma reactor. This is, however, not viable for the manufacture of large fiber composite structures for reasons of size. This shortcoming is solved by the newly developed Flex^{PLAS®} release film.

Further information about the Fraunhofer IFAM
www.ifam.fraunhofer.de

Photo

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<http://www.ifam.fraunhofer.de/index.php?seite=/presse/downloads/>



Photo caption

Removal of the Flex^{PLAS®} release film developed by Fraunhofer IFAM, Bremen, from a fiber composite component that was in-mold coated with a gel-coat (© Fraunhofer IFAM).

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Hall 1, Booth H 64