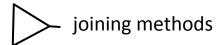
Filipe J.P. Chaves | Lucas da Silva | Eduardo Marques | Mariana Banea





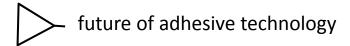


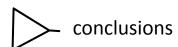
historical background

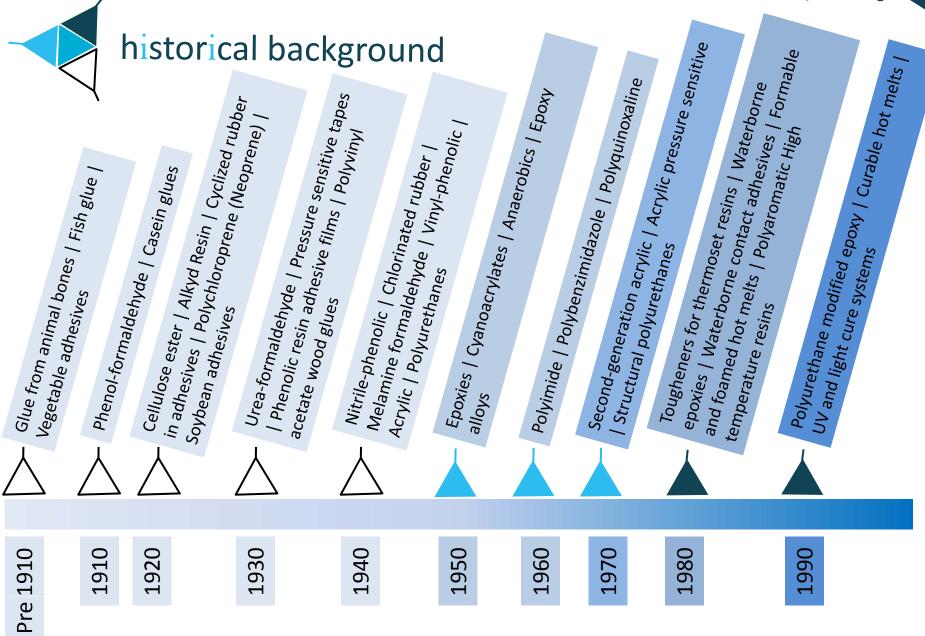






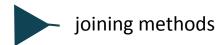


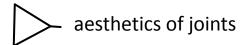




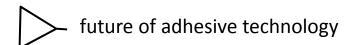
















There are three general joining methods that differ significantly from each other:



Periodic – occasionally some holes are made in the two components to join with fasteners or other mechanisms;







Linear – edges bead junction (occasionally or continuously) just like a weld line;







Area – this is characterized by a full face contact of the components surfaces to attach together.

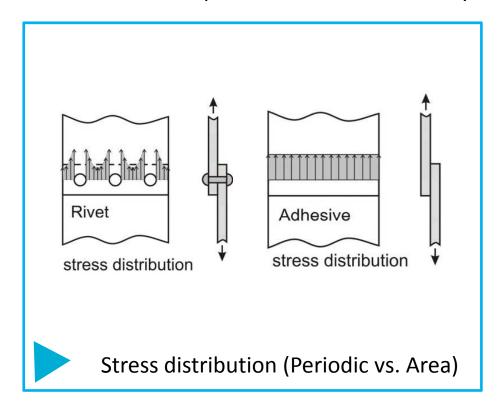


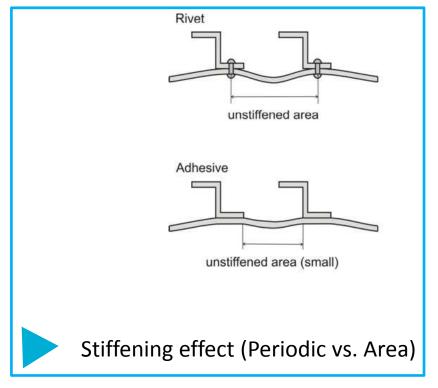






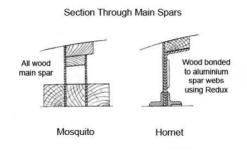
Adhesives may be used in periodic or linear joining methods, but the best attachment performance is achieved by the area joining method.







Adhesives can also join dissimilar materials like airplanes main spars.





#### mosquito

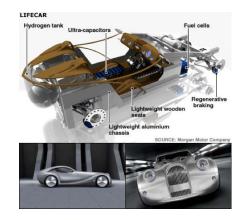
empty weight 7,545 kilograms maximum speed 685 KPH

#### hornet

empty weight 5,842 kilograms max speed at altitude 760 KPH

Adhesives are being used to substitute high demanding welding technologies for materials such as aluminum, like the lightweight chassis of Lotus Evora, Morgan Supersports and Aston Martin DB9.

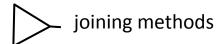






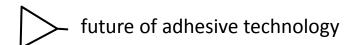


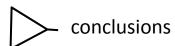














## ahestetics of joints

Joints may be used to express different appearance for an object, or even to emphasize a design motif.





the stainless steel machined fuel cap of an Bugatti Veyron attached by Allen screws expresses precision and technology





the prominent welds in a bicycle frame can express the toughness of the design



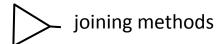




motorcycle and surfboard grip pads are bonded and may look like decoration or painting



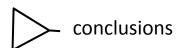








future of adhesive technology





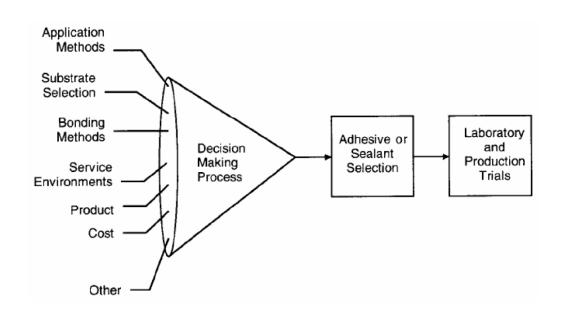
### adhesive selection

#### The adhesive selection depends primarily on:

the type and nature of substrates to be bonded;

the methods of curing that are available and practical;

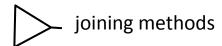
the expected environments and stresses that the joint will experience in service.





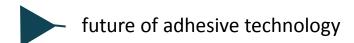


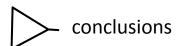








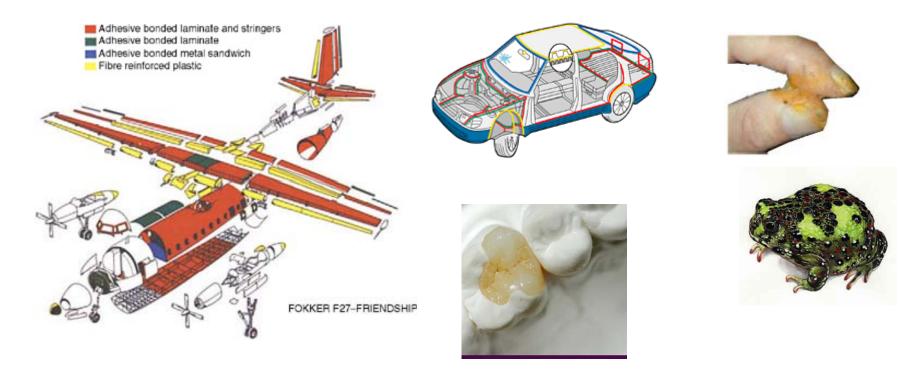






# future of adhesion technology

Nowadays, adhesives are present in all airplanes, motorcycles, boats, cars and are getting more and more sophisticated for example in usage of dental prosthetics and even in scar sewing.



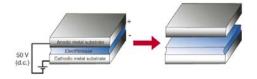


# future of adhesion technology

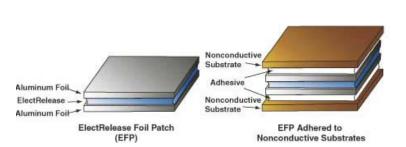
Future applications of adhesive will recur to debonding adhesives in order to facilitate repairs in structures just like the chassis of cars as shown in figure 9. Electrelease<sup>tm</sup> foil patch is already being commercialized, promoting debonding with electrical discharges.

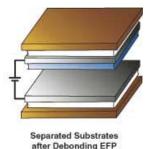






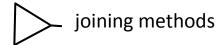
















future of adhesive technology





As adhesives properties are being improved, their applications are also expanding.

Adhesive joints are now being used for everyday structural applications in a wide range of products.

Adhesive joint design should take into account and the manufacture techniques to optimize the joint performance (mechanical and economic).

Industry supplies a good database for adhesive properties, which can be verified and complemented by experimental testing and numerical simulations provided by research laboratories.



## acknowledgments

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# Thank you!!

