

# Preface

Adhesive joints are nowadays a major method of joining in many industries. The pioneers were the aerospace engineers but other more traditional industries such as the automotive engineers are increasingly using adhesives to bond their innovative designs and materials. The joint mechanics are well understood in static conditions, however, concerning other modes of loading such as impact, vibration and fatigue, the information is relatively scarce. However, the major reason concerning the still limited use of adhesives in the automotive industry is the lack of design tools in terms of durability. It is at the moment difficult to predict the failure load after exposure to load, temperature and humidity over a long period of time. With the rapid increase in numerical computing power there have been attempts to formalize the different environmental contributions in order to provide a procedure to predict assembly durability, based on an initial identification of diffusion coefficients and mechanical parameters for both the adhesive and the interface. A coupled numerical model for the joint of interest is then constructed and this allows local water content to be defined and resulting changes in adhesive and interface properties to be predicted. However, there are many challenges associated to this simplified analysis that need to be addressed such as the diffusion of water at the interface, the mechanical behavior of the interface, corrosion of the substrate, etc. The most recent advances and limitations concerning design of adhesive joints under humid conditions are described in this book and future trends are discussed. The book contains eight chapters that cover the effect of water on the adhesive and the interface, surface treatments against water attack, and tools to predict the joint strength under humid conditions.

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Porto  
Yokohama

Dr. Lucas F. M. da Silva  
Prof. Chiaki Sato

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da Silva, L.F.M.; Sato, C. (Eds.)

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