Editorial

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Biographical notes: Sergio Baragetti is Professor of Machine Design and Computational Mechanics at the Università degli Studi di Bergamo. He graduated in Mechanical Engineering in 1994 from Politecnico di Milano. His research activities include numerical and experimental study of the effects induced by surface treatments on the fatigue behaviour of mechanical components, components and structures analysis: evaluation of the limit load for hydraulic actuators, evaluation of fatigue resistance for innovative railway undercarriages, study and optimisation of conical threaded connections for oil applications, design of devices for fatigue pluriaxial tests, design of crankshafts and connecting rods, design of components for lifts, design of highly accelerated inert vibrating screening units and probabilistic analysis of components and structures. He is the author of 92 publications (96 including accepted and under publication papers): 25 on international journals such as *ASME Journal of Mechanical Design, International Journal of Fatigue, IMECHE Proceedings Part C, Fatigue and Fracture of Engineering Materials and Structures, International Journal of Computer Applications in Technology, International Journal of Materials and Product Technology, Meccanica* and *Structural Integrity and Durability*, six of which as only author on the journals *ASME Journal of Mechanical Design, Meccanica, International Journal of Fatigue, International Journal of Computer Applications in Technology* and *International Journal of Materials and Product Technology*; 14 presented during international conferences, 5 Italian books, 1 international book, 4 patents (2 of which international), 43 papers on Italian journals and presented during national conferences, 4 accepted papers and under publication. He is the member of the Editorial Board of *International Journal of Computer Applications in Technology*.

1 Introduction

Fatigue resistance evaluation of mechanical components is still a challenging topic for a lot of researches that aim to foresee the residual life or to establish the fatigue limit of a component. Fatigue resistance of a component is not only dependent on the mechanical characteristics of the material, but also is strongly influenced by the load history, the induced stress state, surface hardness and technological factors. Each component is subjected to different manufacturing processes before its utilisation; another important factor that has a big influence on the fatigue resistance is the presence of a tensile or compressive residual stress field, after machining or surface treatment, at the surface of the component. In the last few years, the finite element method helped in simulating conditions in which a mechanical component is subjected to special kind of loads. The

residual stress field can be simulated too and fatigue crack propagation in residual stress field is no longer a matter of few high-level researches. Only an intensive use of numerical models, confirmed by means of experimental tests, can represent a powerful tool to enhance the fatigue behaviour of mechanical components.

The aim of this Special Issue of *International Journal of Materials and Product Technology* regards the study and presentation of detailed analyses on the effect that loads, stress state and technological factors have on the fatigue resistance of mechanical components. The results of such analyses could be used directly by a machine designer who needs to asses whether a component can exhibit particular fatigue resistance capabilities.

The contributors to this Special Issue try to propose numerical and analytical models that are able to predict the effects induced by mechanical and thermal processes or simulate the working conditions of complex mechanical components. The authors present different solution algorithms and search a confirmation to the trustworthiness of their models by executing several experimental tests.

The result is a useful collection of papers that gives a survey of the state-of-the-art in the fatigue life prediction field.

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