Editorial

L. Norberto López de Lacalle*

Department of Mechanical Engineering,
Escuela Técnica Superior de Ingeniería,
c/Alameda de Urquijo s/n, E-48013 Bilbao, Spain
E-mail: norberto.lzlacalle@ehu.es
*Corresponding author

J. Paulo Davim

Department of Mechanical Engineering,
University of Aveiro, Campus Santiago,
3810-193 Aveiro, Portugal
E-mail: pdavim@ua.pt

Biographical notes: Luis Norberto López de Lacalle is a Professor of High Performance Machining in the Department of Mechanical Engineering of the Faculty of Engineering of Bilbao. He finished his engineering studies in 1988. His PhD was reached in 1993. In this year, he began researches about the milling and turning of titanium and nickel alloys. Other important projects were the introduction of high-speed machining in the die and mould Basque companies. At present, projects about five-axes machining and simulation of ball end milling operations are going on. He authored more than 160 high-end papers and conferences about machining, machine tools, laser and EDM.

J. Paulo Davim received his PhD in Mechanical Engineering from University of Porto in 1997 and the Aggregation from University of Coimbra in 2005. Between 1986/1996, he was a Lecturer in University of Porto. Currently, he is an Aggregate Professor in the University of Aveiro and Head of MACTRIB – Machining and Tribology Research Group. He has more 20 years of teaching and research experience in machining, tribology and manufacturing processes. He is the Editor of three international journals, Guest Editor, Editorial Board Member, Reviewer and Scientific Advisory for many international journals and conferences. He has also published more than 250 articles in refereed international journals and conferences.

At the present time, the milling of sculptured and complex surfaces is an important topic from both industrial and technological points of view. In this machining application, several problems coincide in the same workpiece, for instance, difficult-to-cut steel or superalloy, a complex geometry, a final very good roughness required and narrow tolerances to be achieved. Usually, success comes from a holistic view of the design and manufacturing process, where milling in three- or five-axis is critical.

Before the generalised use of high-speed milling (HSM), the technology employed in moulds manufacture was a combination of conventional milling and sinking electrodischarge machining (SEDM). This technology was fully optimised with a lot of small companies ready to apply it, but the global market demand required day-by-day

shorter production times. EDM is intrinsically a slow machining process. Currently SEDM is being eliminated, or at least reduced, by HSM. For this reason, authors in this issue focus on HSM as the basic technology for finishing, the final and high-added-value stage when a complex forms is produced.

The mould and die manufacturing sector is placed in all the industrialised or emerging countries, with strong competition among firms and even among countries. This fact has brought new machining approaches for roughing, semi-finishing and finishing, new polishing and surface treatment technologies and new process planning. This special issue aims to include works about several of these topics, especially in machining. Another important industrial sector involves aircraft engine components, some of them with complex ruled or sculptured surfaces. In this case, the rotational parts must be studied for the influence of the machining on the in-service component behaviour. Finally, various new applications of hardened steels, ceramics or sintered materials for tool manufacturing have increased the use of non-conventional techniques such as electrodischarge machining, ultrasonic machining and laser polishing.

CAM is important for defining correct CNC programs, especially for five-axis milling. Virtual verification of programs is highly recommended. At the same time, research has focused on providing CAM users with utilities for the calculus of cutting forces, making possible the definition of toolpaths and leading to minimal dimensional errors arising from tool deflection under the action of the cutting forces.

This special issue includes high quality research articles related to milling and surface finishing of sculptured surfaces, including moulds, dies, blades, and other complex surfaces, such as the following:

- milling of dusting materials
- milling of moulds and blades
- three-axis and five-axis milling of complex surfaces
- surface finish and surface polishing
- machinability of tool materials or related materials
- behaviour of machines and CNC when milling complex surfaces
- CAM programming of sculptured surfaces
- effect of machining on the surface integrity and residual stresses
- models for ball end milling, bull-nose milling or flank milling
- laser polishing of sintered moulds.

The Guest Editors greatly acknowledge Inderscience Publishers for their adequate and professional support throughout the preparation of this special issue. Finally, we would like to thank all the authors and all the referees for their availability and their thorough evaluations of these papers.