# Mines Albi

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RÉZAI-ARIA Farhad, is a full Professor at École Mines Albi. He was formely the head of SUMO group at Institut Clement Ader. His is born in Tehran (1953) and got his BSc in Metallurgy Engineering, from Tehran University of Technology (1976). He got his DEA from INSTEN (1978) and his PhD degree (These d'Etat,1986) from Materials Centre at Mines Paris, on high temperature fatigue (thermal & thermomechanical) and the oxidation interactions of cobalt-based superalloys for turbine blade applications. From 1988 to 1996, he was heading, as Associate Professor, the high temperature fatigue group at Mechanical Metallurgy Laboratory, leading by Professor B. Ilschner, at EPFL. Sicne 1997 he is with Mines Albi. He is curently corrsponding for ALM in Albi. His main scientifique interests are the relationships between microstructure/thermomechanical beahuour, fatugue-oxidation-processing interactions and in particular the role of the surface in fatigue/wear loadings and damage developments. He is avtive in mechanical behavior and life modellings. His is a membre of Fatigue Commission of SF2M and co-annimate its GT4 on therùmal fatigue.

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**An investigation on the wear mechanisms of hardfaced tools for high temperature forging of aeronautical parts**

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*The working surface of tool steels for forging at very high temperature of aeronautical parts experience severe cyclic thermo-mechanical loadings (beyond 1000°C and more than one minute) that drastically damage by incremental shear plastic straining wearing. Therefore the dimension of tools changes and it becomes difficult to respect dimensional tolerances for forged-parts. These surfaces are very often hard-faced by some cobalt-based superalloys. Classical hardfacing (called also cladding) by MIG or arc welding is compared with TPA and Laser as two emergent advanced technics. High temperature tribological experiments on semi-industrial and laboratory ring/disc scale are performed. Based on detailed microstructural investigations two main mechanisms are considered: shear-plastic yielding by dislocation movements and/or CFC to HC phase transformation. In the absence of allotropic phase transformation the friction factor remains unchanged along the whole testing period and it decreases as soon as it takes place. The allotropic transformation depends on different material/welding processing parameters and the number of the deposited layers. It is shown that the advanced laser hardfacing is very promising for extending the tool life.*