Conclusion

The aim of this work has ever been to qualify and to direct the research to metal matrix composite, by the optimization of the fabrication and machining parameters in according to their metallurgical and structural configuration.

In a first case micro-chemical and micro-structural aspects for the Ti6Al4V/SiC_f composite, obtained by *Hot Isostatic Pressure* process and candidate to be material constituent at middle-temperature (500-600°C) in aeronautical engines, have been analyzed.

The results, carried out on the fiber/matrix interface during varies condition of thermic solicitation, have showed a poor variability of the chemical elements due to the formation of titanium carbide that reduces the diffusion kinetics on the aforesaid zone. This situation achieves the structural stability for the composite, confirmed by the carried mechanical tests, too.

Moreover the internal friction probes on the composite, carried to verify its behaviour during high vibrational conditions, show the presence of a relaxation peak at about 600°C, due to induced stress reorientation of interstitial-substitutional pairs (C-Al and C-V) in the hcp α phase of the matrix near the fibres. The same result has been observed about the studies of the Ti-composite realized by a new different fabrication process, i.e. the *Roll Diffusion Bonding*.

The machining studies instead have been developed about aluminium matrix composite, reinforced by SiC whiskers or Al_2O_3 particle. In particular it has been possible to studied the drilling operations and the effects on that of the workpiece heating, in according to the *hot drilling* theories about the thrust and torque reduction on the tool.

About this case the adoption of two different aluminium alloys for the matrix composite (2000 and 6000 alloy series), reinforced by whiskers, has highlighted the matrix importance about the aim. In fact about the studied composite with matrix of alloy 6061, the aforesaid condition of reduction doesn't come true, cause the complexity of the cutting phenomena that becomes. This experimental situation is instead offset by the presence of the Al_2O_3 particle reinforcement, for which the minimum temperature exists. Also for the other composite Al2009/SiC_w, the torque and thrust reduction has been found, at a minimum workpiece temperature between 80 and 100°C (also at high feed conditions), confirming the importance of matrix.