Résumé
- Objectif: optimiser le choix des paramètres de coupe à l’usinage robotisé
- Modélisation multicorps d’un robot et couplage au procédé d’usinage
- Simulation de l’usinage robotisé sur base d’un modèle numérique
- Validation du modèle dynamique par des essais expérimentaux
- Mise en place d’outils visant la recommandation des paramètres de coupe optimaux suivant le compromis "stabilité-productivité-precision"

Context
- Attractive cost: cost reduction of about 30 to 50 % in comparison with a CNC machine tool having the same workspace
- Machining of large workpiece with complex shapes and difficult access
- Increase of productivity for current manual operations such as composite trimming and chamfering
- However, robot joint stiffness is low: < 1 N/µm (CNC machine tool stiffness > 50 N/µm)
- Machining errors are mainly caused by joint flexibility, backlash and friction losses
- Hence, vibration of the structure, instability and loss of accuracy (chatter phenomenon) [1]

Simulation environment
- EasyDyn: multibody framework [2]
- Dystamill: milling routine [3]
- Coupling of EasyDyn and Dystamill [4]

Experimental setup and milling tests
- Stäubli TX200 robot
- Cutting tool
- Spindle
- Workpiece
- Materials: aluminium, plastic, composite, foam, wood, stone, steel,

Perspectives
- Extension of the multibody model to a robot including control, actuators & flexible links [5]
- Validation of the robotic machining environment on the basis of milling tests
- Analysis of the stability using different criteria
- Development of numerical tools leading to an optimal choice of cutting parameters

References