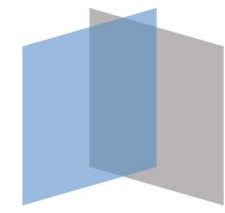


Exploitable results:



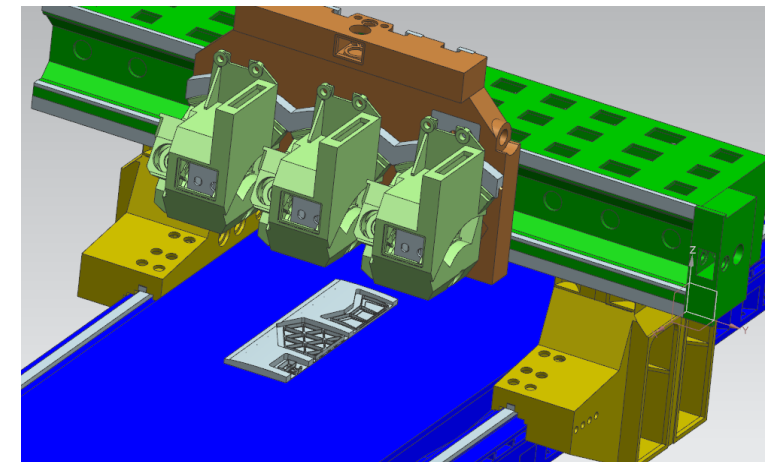
twincontrol

Machine Tool Digital Twin

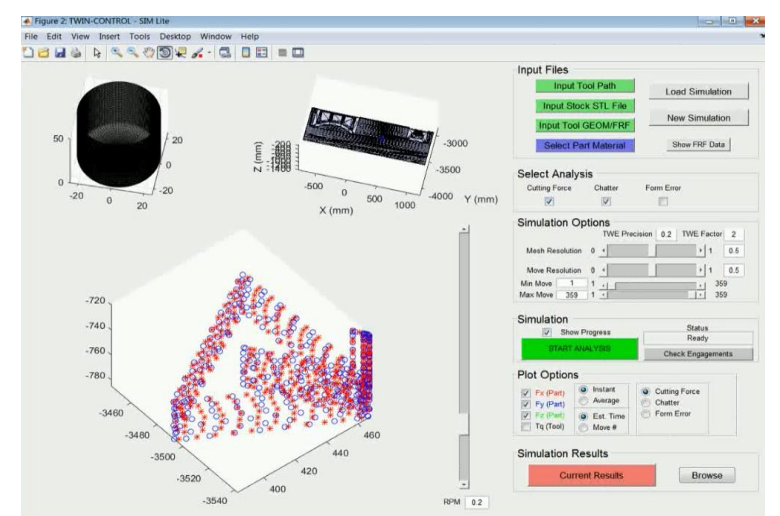
A new approach to simulate machining processes has been developed based in SAMCEF Mecano FEM solver. A digital representation of machine tools can be developed in this environment by combining structural FEM analysis, specific elements for the feed drives and control loop models. The novelty of this approach consists in the integration of new machining process models that provides the chance to evaluate machine tool performance during manufacturing operations.

The process models, apart from calculating instantaneous cutting forces during simulations, allow determining additional features like process stability and form errors. Indeed, a new feature called Stability Roadmap has been developed that analyses stability conditions for complete manufacturing operations. For process-specific analysis, these models are also available in standalone mode to provide a fast and easy simulation tool.

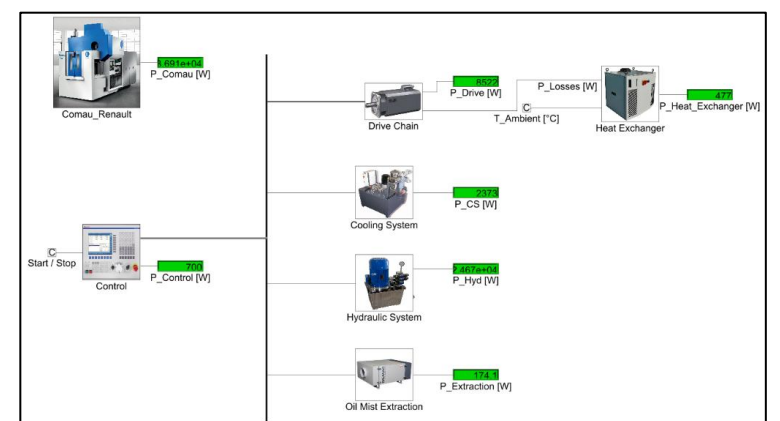
The loads estimated by this integrated simulation can be used by additional modules simulating life cycle performance of the machines. On the one hand, physical simulation models of the components that are most critical from an energy consumption point of view have been developed, with the objective of allowing a energy efficient machine tool design. On the other hand, an easy-to-configure tool to estimate end-of-life of critical components (bearings) has been integrated.



Virtual Machine Tool



Process models GUI



Energy Efficiency models

Impact

- Reduction of machine tool design, development and set-up time and costs **(10%)**
- Reduction of machining process design and set-up time **(10-20%)**
- Reduction in energy consumption **(35%)**
- Reduction of cycle time **(up to 20%)**, leading to an increase in machine up-time **(up to 4%)**



G.A.: 680725
twin-control.eu
@twin_control

