Machine Tool Structural Optimization

One of the main aims of machine tool design is to develop a structure which will represent an optimum solution with respect to various design and functional requirements. This is a highly complex task, which includes finding an optimum machine structural concept, material use in the machine design space and optimum dimensioning of the proposed structure.

RCMT has developed an advanced integrated design development strategy, including:

• **Conceptual topology optimization** for fast evaluation of various structural designs suited for machining the workpieces of defined size
• **Topology optimization** for finding the optimum material distribution in the defined design space fulfilling the given structural target criteria
• **Parametric optimization** for optimum structural dimensioning fulfilling the given structural target criteria
• **Final design check**

The RCMT approach allows for achieving substantial mass reduction of up to 50% compared to conventional design or a significant increase of structural properties.

RCMT successfully collaborated on the design of a number of Czech machine tools with higher precision and machining performance.

**Design input data:**
- machine kinematics, axis strokes, max. dimensions, material information

**Functional demands:**
- static stiffness, modal properties, dynamic stiffness, feed drive bandwidth