

I. Personal and study details

Student's name: **Uhlí Jan** Personal ID number: **482404**
Faculty / Institute: **Faculty of Mechanical Engineering**
Department / Institute: **Department of Production Machines and Equipment**
Study program: **Robotics and Production Machines**
Specialisation: **Production Machines**

II. Master's thesis details

Master's thesis title in English:

Optimization of feed rates in NC programs based on tool load

Master's thesis title in Czech:

Optimalizace posuvových rychlostí v NC programech na základ zatížení nástroje

Guidelines:

During roughing operations, there is variable removal of material and, as a result, different force loads on individual movement axes of the machine. The goal of the work will be to design a strategy for optimizing the feed rate in NC programs according to the defined limits of the directional force load of the tool. Outline of work: 1. Research of approaches and methods to optimize feed rates during milling and the use of process digital dual parts; 2. Design of a roughing operation with variable directional force loading of the tool; 3. Virtual machining simulation and tool force load analysis; 4. Algorithmization proposal for optimization of feed rates in NC code; 5. Verification and evaluation of the results on the test components in relation to the load on the movement axes of the machine. Scope of the graphic part: Necessary figures and tables. Scope of the text part: approx. 60 – 80 pages.

Bibliography / sources:

- [1] LAŠOVÁ, V. Základy stavby obráběcích strojů. Západočeská univerzita v Plzni, Plzeň, 2012
- [2] ALTINTAS, Y. Manufacturing automation: metal cutting mechanics, machine tool vibrations, and CNC design. 2nd. New York: Cambridge University Press, 2012
- [3] ALTINTAS, Y., KERSTING, P., BIERMANN, D., BUDAK, E., DENKENA, B., & LAZOGLU, I. Virtual process systems for part machining operations. CIRP Annals, 63(2), 585–605, 2014.
- [4] ARMENDIA, M., et al. Twin-Control. A Digital Twin Approach to Improve Machine Tools Lifecycle. Springer, 2019.

Name and workplace of master's thesis supervisor:

Ing. Matěj Sulitka, Ph.D. Department of Production Machines and Equipment FME

Name and workplace of second master's thesis supervisor or consultant:

Ing. Michal Stejskal Department of Production Machines and Equipment FME

Date of master's thesis assignment: **13.10.2023** Deadline for master's thesis submission: **02.01.2024**

Assignment valid until: **15.09.2024**

Ing. Matěj Sulitka, Ph.D.
Supervisor's signature

doc. Ing. Petr Kolář, Ph.D.
Head of department's signature

doc. Ing. Miroslav Španiel, CSc.
Dean's signature

III. Assignment receipt

The student acknowledges that the master's thesis is an individual work. The student must produce his thesis without the assistance of others, with the exception of provided consultations. Within the master's thesis, the author must state the names of consultants and include a list of references.

Date of assignment receipt

Student's signature