New trends in Manufacturing Process Optimization
- Integrated Process Planning and Scheduling

Responsible research topic: Prof. Gabriel Frumusanu,
gabriel.frumusanu@ugal.ro

This research presents a review concerning the new trends that were reported in recent years in some research regarding the optimization strategies of the products and related manufacturing processes. The approach provides a systematic, adaptive and efficient means to optimize machining companies.

In the analysis were explored:
- Type of optimization such as *mono-criterion* and *multi-criteria;*
- Objective function such as *the productivity*, *the manufacturing costs*, *the energy consumption*, *the manufactured surface roughness* and *the makespan.*
- Methods of solve such as *Genetic Algorithms* GA, *Particle Swarm Optimization* PSO *technique*, *Artificial Neural Networks* ANN.

Process planning is also a complex decision-making process that involves some major tasks, such as the selection of machining operations for every feature, sequencing all operations considering precedence constraints, choosing available manufacturing resources, determining setup plans and machining parameters.

Production scheduling is a decision-making process that deals with the allocation of manufacturing resources to tasks over given time period and its goal is to optimize one or more criteria.

Process planning and scheduling are two tasks important in manufacturing process, and there is a strong relationship between them which led to the problem of IPPS. The IPPS problem can be defined as follow: "given a set of *n* jobs which are to be processed on machines including alternative process plans, manufacturing resources and other precedence constraints, select suitable process plan, resources and sequence the operations so as to determine a schedule. Results of the IPPS help schedule planners to determine optimal scheduling plans and to assist the process planers to determine the final process plans for each job.