Göteborg 2017-12-14

Description of the PhD project

Tactical resource allocation for efficient capacity utilization

The PhD project will be performed in cooperation with GKN Aerospace AB, Trollhättan, Sweden, and will address tactical resource allocation that is, the task to allocate processing operations to production resources, while performing simultaneous long-term resource and capacity planning. Due to an increasing demand for a high resource utilization in the production, while maintaining short lead times, there is a need for an improved methodology and algorithmic support in the planning process.

The aviation industry is expected to grow, but the competition is strong, and that results in shrinking margins and an increasing demand for flexibility. The ability to efficiently utilize the company's production system while volumes and product mixes change, will be crucial to reach a high resource utilization without sacrificing service levels and turnover rates. Further, since there are requirements on technical precision in combination with rigid measures for quality assurance, the task of ensuring a cost-effective manufacturing is quite challenging.

Tactical resource allocation, i.e., the process to assign processing operations to production resources while performing resource and capacity planning, has been identified as crucial for maximizing the resource utilization while ensuring efficient long-term production flows. This type of tactical planning is generic, in the sense that it is vital for low volume production systems. Currently this planning is experience-based and runs without method support.

Few academic studies have focused on this kind of tactical planning, making it difficult to know what data is required, and how the planning models and methods should be designed to best match the aviation industry's requirements. Hence, there is a need for theory development regarding the optimal design and use of models and methods for this type of capacity planning—which is the purpose of this project.

The research group in Mathematical Optimization[1] at the Department of Mathematical Sciences, Chalmers University of Technology and University of Gothenburg, has a rich experience in modelling and solving optimization problems within production planning, while GKN has the required technical expertise to address the resource allocation problem. Hence, these groups will together provide a strong advisory team for the PhD student. Prof Michael Patriksson[2] and prof Ann-Brith Strömberg[3] (both at Mathematical Sciences, Chalmers) will be the PhD advisors, prof Joakim Wikner[4] (Jönköping University) will provide advisement regarding logistics research, and adjunct prof Torgny Almgren (GKN Aerospace) will be industrial advisor and project leader.

Applications for the PhD position are made at Chalmers vacancies[5] homepage.

[1] http://www.chalmers.se/en/departments/math/research/research-groups/optimization/Pages/default.aspx
[2] http://www.chalmers.se/sv/personal/Sidor/michael-patriksson.aspx
[3] http://www.chalmers.se/sv/personal/Sidor/ann-brith-stromberg.aspx
[4] http://ju.se/personinfo.html?sign=wjoa&lang=en
[5] https://www.chalmers.se/en/about-chalmers/vacancies/Pages/default.aspx