

2017-12-15

Description of the PhD project

**Effect based aircraft maintenance planning and operations support**

The PhD project will be performed in cooperation with Saab AB, Linköping, and will address the development of efficient methods for the management of maintenance and support of tomorrow's aircraft systems.

The purpose of the project is to manage the maintenance and support of tomorrow's aircraft systems, in daily operations as well as over the whole aircraft life cycle. In general terms, this means to manage a set of sub-systems, and to integrate those into an interconnected, so-called system-of-systems. The PhD student will study, develop, and adapt mathematical optimization models and efficient solution methods for these types of problem settings, in order to improve the performance of the maintenance and support system-of-systems. Since mathematical models are generic, the project will also lay a foundation for a mathematics based modelling of general applications of system-of-systems.

For tomorrow's aircraft systems to perform with a high sustainment, a better efficiency, and interoperability, and at a low cost, novel solutions for aircraft support and maintenance operations are crucial. One important challenge is to improve the control of the whole maintenance process. A vital outcome of this PhD project is to show how a specified capability (e.g., cost efficiency or maximal performance) of an aircraft system-of-systems depends on the ability to plan for an efficient, distributed, and interoperable aircraft maintenance.

The project will develop and explore new modelling and optimization techniques to transform the aircraft support supply chain to become more controllable, flexible, and interoperable. The problems addressed are both layered, and in each layer divided into sub-problems. Below are a few examples of research questions to be addressed in the PhD project:

- Integrate distributed optimization problems in network models, thus enabling more accurate computations, both when solving sub-problems and when developing an integrated supply chain.
- Planning and scheduling of a more efficient utilization of the support resources across the whole supply chain.
- Manage the support of more complex and dynamic scenarios and missions, such as heterogeneous fleets and (un)manned air vehicles with complex configurations.

The research group in Mathematical Optimization<sup>1</sup> at Chalmers Department of Mathematical Sciences has a fundamental experience in optimization of maintenance planning while Saab has a strong experience in system-of-systems modelling. Hence, these groups will together provide a strong advisory team for the PhD student. Prof Ann-Brith Strömberg<sup>2</sup> (Mathematical Sciences, Chalmers) will be the PhD advisor and tekn lic Kristian Lundberg (Saab AB, 073-4186704) will be the industrial advisor and project leader.

Applications for the PhD position are made at Chalmers vacancies<sup>3</sup> homepage.

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<sup>1</sup> <http://www.chalmers.se/en/departments/math/research/research-groups/optimization/Pages/default.aspx>

<sup>2</sup> <http://www.chalmers.se/sv/personal/Sidor/ann-brith-stromberg.aspx>

<sup>3</sup> <https://www.chalmers.se/en/about-chalmers/vacancies/Pages/default.aspx>