

PhD Thesis Title: Workforce management at aircraft final assembly lines

Nowadays, aircraft final assembly lines are the complex systems where hundreds of high-skilled operators are employed. The objective of this PhD thesis is to develop efficient Operational Research tools in order to improve the management of workforce and at the same time to reduce the monotonicity of assembly work.

An aircraft final assembly line is a straight line usually composed of a relatively small number of workstations. At the same time, each workstation deals with thousands of tasks to be performed by specialized high-skilled operators. These tasks are linked by precedence and zoning constraints and have to be completed under a defined takt time (cycle time constraint). The optimization problem to be considered involves two decision levels: first, how to dimension each workstation in terms of workforce and second, how to schedule the tasks within one workstation as well as how to reschedule the work to be done if some tasks are late or some operators are absent. It should be also noted that the products to be assembled are highly customized; therefore the inequalities of task processing times for different variants have to be taken into account in order to reduce the idle times and to complete all tasks on time.

The research objective is to analyze how the potential of work sharing impacts the formulations of line balancing, model sequencing and scheduling in mixed-model assembly lines and to develop new formulations of these combinatorial optimization problems as well as new solution methods.

The candidate should have competences in mathematical formulation of mixed-integer optimization problems, skills in programming and metaheuristics.

Thesis supervisors: Prof. Olga Battaïa, olga.battaia@isae.fr Prof. Alain Haït, <u>alain.hait@isae.fr</u>

Olga Battaïa, Alain Haït Professors ISAE-SUPAERO