

# Geometry assurance: Analysis of miss-constraining for manual assembly at Volvo Cars Sweden

## Background

Volvo Cars develop, design, and manufacture premium cars for the global automotive market. Although many assembly steps in the production can be automated, most of the final assembly steps in the automotive industry are performed by people and there is no indication that this will change. Man, triumphs robots in terms of flexibility.

However, since humans are different from robots, other factors must be taken into consideration when designing products that are to be mounted manually. One scenario that can occur during manual assembly is when a manual assembly operation is not fully successful, the product is mounted but not in the way the system solution intends, so called miss-constraining. In order to increase robustness, secure product quality during the manual assembly process and reduce costs, the design of the product needs to take the possibility of miss-constraining in consideration. To achieve this, further investigations on how this phenomenon occurs and works need to be done.



## Tasks

- Literature studies on geometry assurance, robust design, inspection methods and manual assembly.
- Study the phenomena of miss-constraining and collect information of it within Volvo Cars.
- Map the collected information of miss-constraining in relation to the different design variants, product features, system solutions, materials and geometrical requirements.
- Use several test cases both physical and virtual in the simulation software RD&T.

## Goals

- Collect and summarize information about miss-constraining.
- Create a methodology to evaluate the design from a manual assembly perspective in early phases with regards to minimizing the risk of miss-constraining.
- Verify the validity of the methodology.
- Evaluate how miss-constraining affects geometrical requirements.
- Propose a way to integrate this methodology within the development process.

## Means

Office, computer and software will be arranged by Volvo Cars in Torslanda. The work will mainly be conducted on site at Volvo Cars in Torslanda at the Robust Design & Tolerancing group. This thesis work needs to be conducted by two students. Preliminary start is January 2021.

## Information

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