

# Increasing Efficiency in the Assembly of Automation Systems: Analysis and Layout Optimization

Degree programme : BSc in Industrial Engineering and Management Science  
Thesis advisor : Prof. Dr. Cédric Bessire  
Expert : Moritz Maier  
Industrial partner : Infotech AG, Solothurn

The company Infotech AG is a leading manufacturer of customized automation cells for various precision industries. The company faces challenges in final machine assembly due to its rapid growth, while continuing to develop and manufacture locally. This thesis analyzes the causes of the current bottlenecks and develops concepts for an optimized assembly layout by examining the various activities that are carried out during the assembly process.

## Introduction and Objectives

Infotech AG, a leading provider of automation solutions, is facing challenges in its mechanical final assembly. These challenges result from rapid growth, limited space and a shortage of specialized technicians, leading to both inefficiencies and bottlenecks. The aim of this thesis is to investigate these inefficiencies in order to develop concepts for an optimized assembly process. This would help to increase the efficiency and thus lay the concept to stem more easily the prognosed future growth of produced machines.

## Methods

The study started with a detailed analysis of the current situation, including the observation and documentation of existing processes. Interviews were conducted with technicians and department leaders to identify bottlenecks and inefficiencies. Trials were conducted to document the various assembly times and analyze the time spent on different activities during assembly. A literature review provided an overview of different assembly methods. Benchmarking against industry best practices and standards provided a framework for comparison. Improvements focusing on workplace design and layout were then developed and tested in an experimental phase.

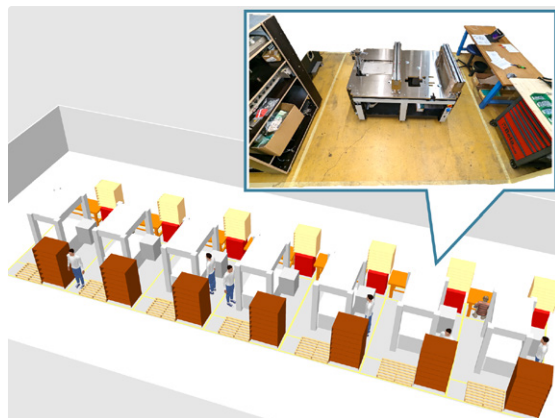


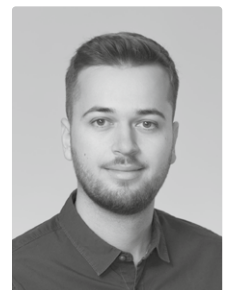
Figure 1: Redesigned layout of Infotech AG's assembly to improve efficiency and reduce movement.

## Results

The analysis showed several key problems, including inefficient workplace design and long times spent searching for parts and materials. To address these issues, three different concepts for improving the layout were developed. A comparison of these showed that a flow assembly is not implementable at Infotech because of their various products. However, considerable efficiency gains can be achieved with a cycle assembly (see Figure 1) or an optimized fixed-position assembly. These changes minimize walking distances and search times, yielding efficiency gains of around 10% to 27% (see Figure 2).

## Recommendations

In order to reduce non-productive times in the final mechanical assembly and to produce a higher number of machines, it is recommended to adapt the layout of the assembly. Changing the production layout that the machine moves forward and employees walk less can minimize non-productive time and improve the overview and efficiency. It is recommended to test a new cycle assembly layout in a pilot project in order to include valuable feedback from the assembly employees who know the processes best before implementation of this more efficient and increased production capacity layout at Infotech AG.



Simon Ambühl  
Industrial Engineering

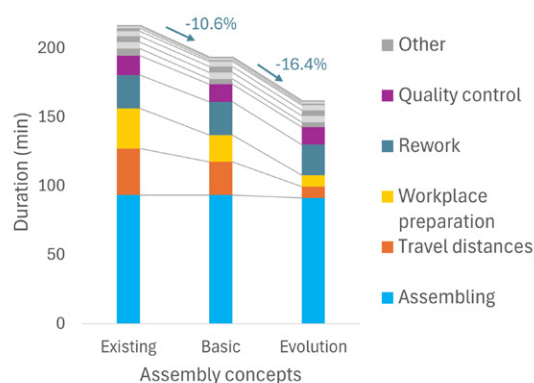


Figure 2: Comparison of current, optimized fixed-position and cycle assembly process and their potential efficiency gains.