

Methodically improving assembly lines

A bicycle assembly case study



Optimize assembly operations

Building bicycles requires the assembly of many parts using various movements. Currently, manual labour is used for assembly operations at bicycle assembly lines. To remain competitive in the international market, it is important to improve assembly operations on assembly time, costs, bicycle quality and assembler workload.



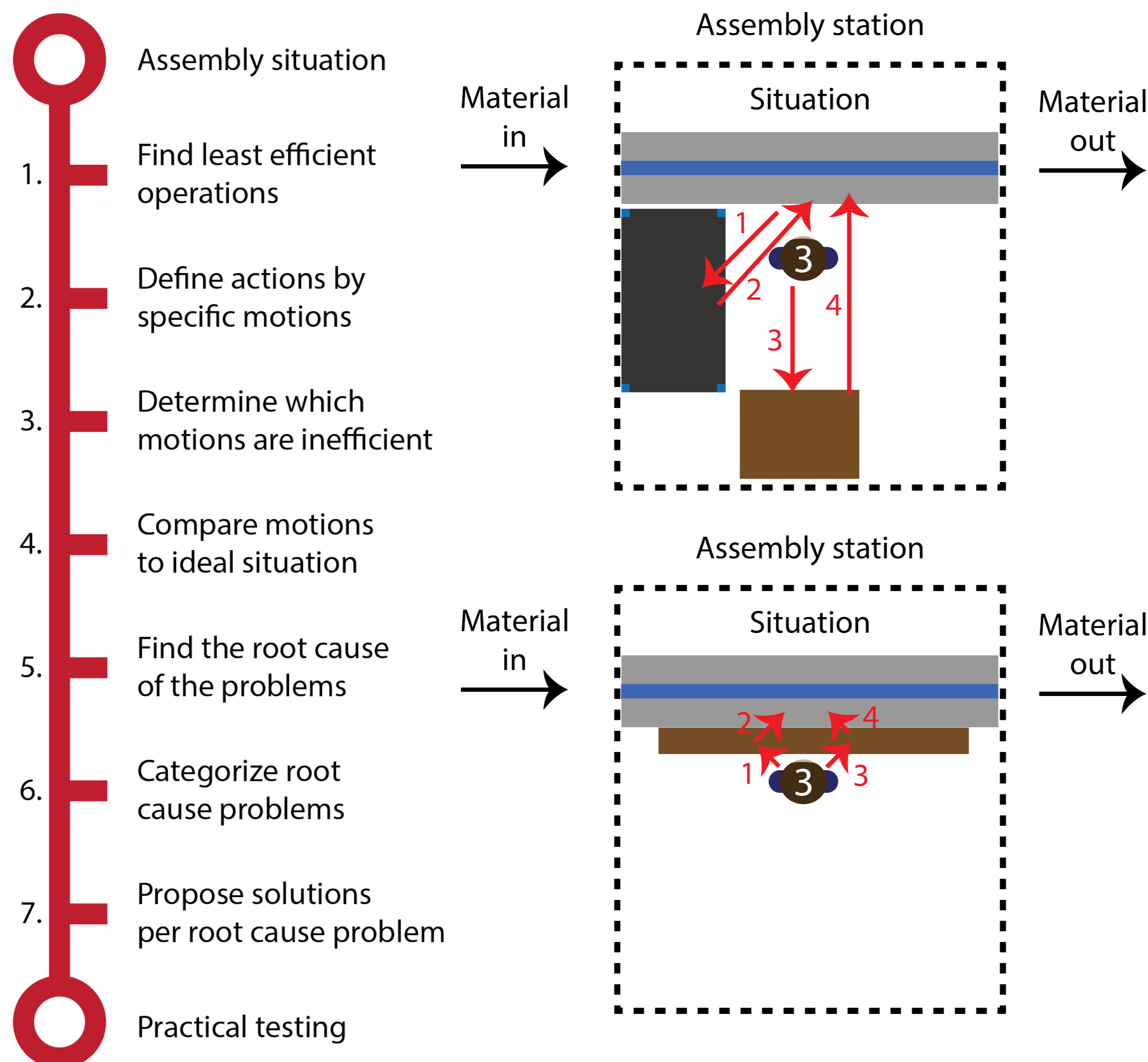
Part and movement variety

There are various existing options to improve assembly lines. Examples are application of design for assembly practices, balancing assembly workload over workstations and investing in assembly equipment. However, these existing solutions are not applicable for all assembly operations of the assembly line since the part and movement variety is large. Therefore, an improvement method must be able to deal with various assembly operations.



Apply & test structural improvements

This thesis aims to structurally improve assembly lines while keeping the variety of movements and parts in mind. A method is proposed which can be applied to the various assembly operations. The application of the method creates solutions which reduce the time spent on movements which do not contribute to the assembly of a product, but are required in the current assembly situation. The method was applied to a case study assembly line. This resulted in reductions of assembly time and assembler workload.



Proposed method

The improvement method identifies the assembly operation with the largest amount of non-value-added time. The next step is to determine which motions make this assembly operation inefficient. Once the inefficient motions are found, the root cause behind the inefficiency can be determined. A solution for the root cause can then be ideated to solve the inefficiency. This leads to solutions which eliminate reoccurrence of assembly line inefficiencies.

Improving assembly situations

On the left, the difference between a current situation and an improved situation is displayed. In the current situation, the assembler has to turn and reach for materials. By applying the method, the need to turn and reach is eliminated by changing the assembly station layout. This saves the assembler time and energy.