Intro

Cyber-physical systems

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1 Manufacturing processes

There are two types of manufacturing, **continuous** and **discrete**.
As far as a normal manufacturing project, a mix of continuous and discrete processes is common. When determining whether a process is continuous or discrete, we don't look at where the "raw materials" comes from.
For example, a bakery is usually a continuous process, but whether the manufacturing of the wheat, the sugar, the milk, etc. is one or the other doesn't matter. The materials are a given for the isolated process.
In the following sections, definition and examples will be included.

1.1 Discrete manufacturing

A discrete manufacturing is defined by:

In a discrete process, both the raw materials and the final product are countable.

A descrete manufacturing could be a car assembly. The whole process is consists of parts, where if an error should occur, the faulty part can be removed and binned, and a new part can be installed, and the process continues.
This process can also be paused over night, and continued the dat after, with no larger effects.

1.2 Continuous manufacturing

A continuous manufacturing is defined by:

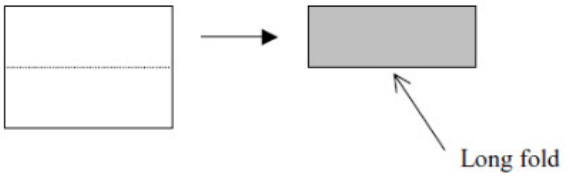
A manufacturing process where raw materials and energy are consumed in a continuous stream.

A continuous manufacturing could be a chemical lab, where different chemicals are mixed in order to achieve a specific chemical. If something goes wrong, or the ratio is wrong, the process can't be undone and reversed into the starting chemicals.
This process cannot, in most situations, be paused and resumed at will, as the chemical reaction is active at all times.

2 Intro exercise

Work Center 1

Fold up in half long way.



Work Center 2

Fold first corner on each side.

Fold down on each side.

Work Center 3

Second fold of wing on each side.

Fold down on each side.

Work Center 4

Third fold of wing on each side. Place in finished goods inventory.

Fold down on each side.

2.1 Assignment

a. Which work center has a bottleneck? Why?

The main bottleneck is between Work Center 3 and 4. That is because in Work Center 3, 2 steps are required, whereas in 1, 2 and 4, 1 step is required. (if we assume that the non-long folds take as long as 1 long fold) The bottleneck means that whenever Work Center 3 deliveres a paper plane, 2 planes has been delivered from Work Center 2. This means that a stack of planes will build up in Work Center 3, and the effectiveness is hindered.

b. What should be done to reduce bottlenecks in a production line?

A solution to this bottleneck could be to order paper with a star already printed on, so the step would disappear altogether.

Another solution could be to move the task into Work Center 1, although that would make Work Center 1 take longer to produce a folded plane.