Manufacturing Cycle with Equiplets

From User Input to End Product

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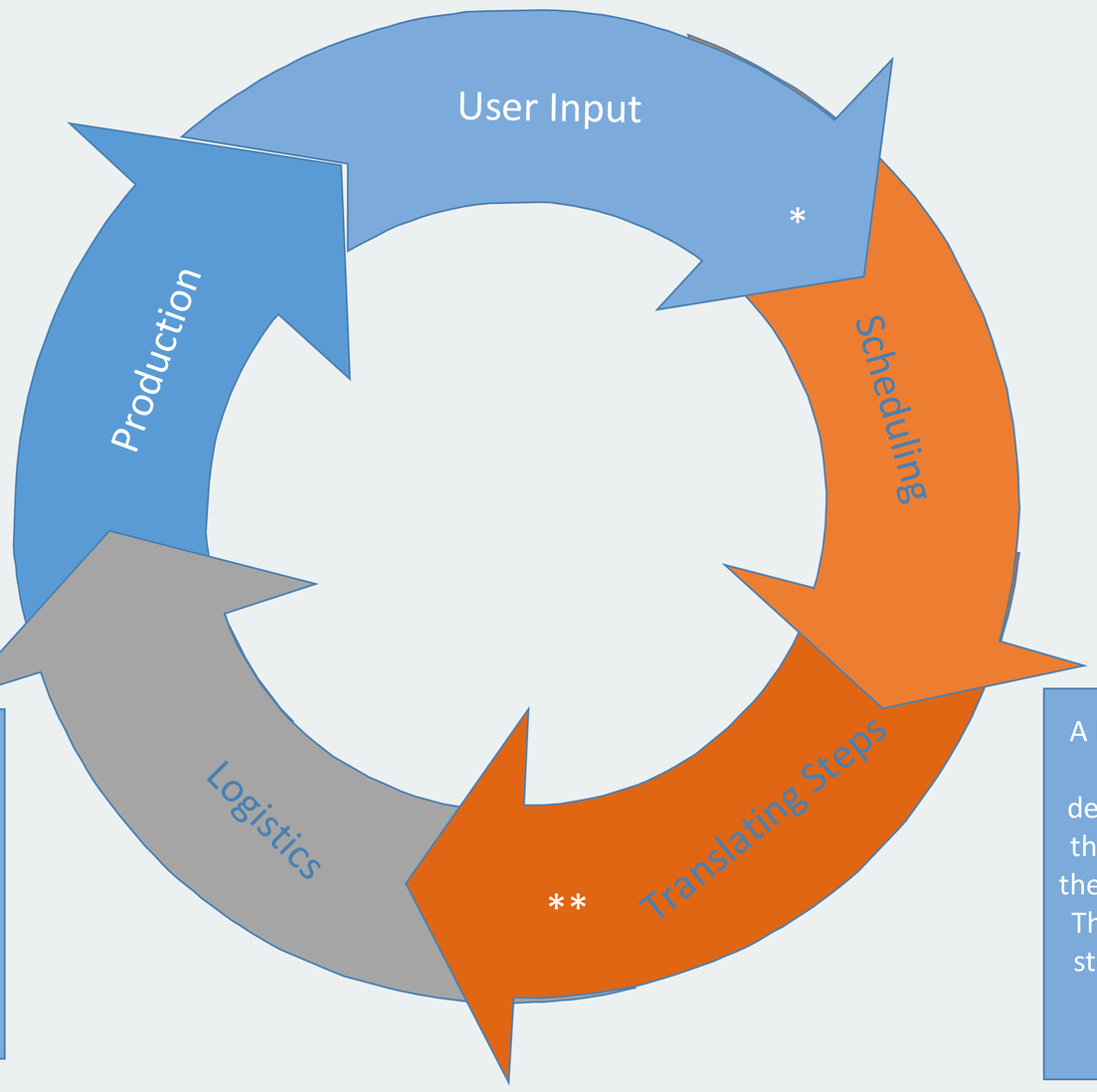
Introduction

In current manufacturing systems, time to market is usually a rather long period. In order to prevent a long time to market, REXOS provides a grid manufacturing system that is highly customizable due to the nature of the production machines (equiplets) that it consists of. All the equiplets in the grid are reconfigurable and thus are able to provide a variety of services resulting in a high mix low volume production grid. This poster shows the lifecycle of a product from input to production within such a grid.

Manufacturing Cycle

Blueprints are required to produce a product in REXOS. These blueprints need to be created and the most desirable way to do so is using a GUI. This GUI makes it possible to make products depending on the available machines. Once the design is finished, a product agent will be spawned with this blueprint. This product agent will be responsible that the product will be produced according to the blueprint.



After the product and required parts are available at the right equiplet, the equiplet steps will be executed by the equiplets. The responsible product agent will receive feedback from the equiplet containing information about the executed product step.

Once all the feasable equiplets have been found, the product agent will start the scheduling process. During this process it will gather the schedules of feasible equiplets. Once the product agent has this information, it can calculate a schedule which best fits. The required equiplets will be notified and the equiplets will update their schedules.

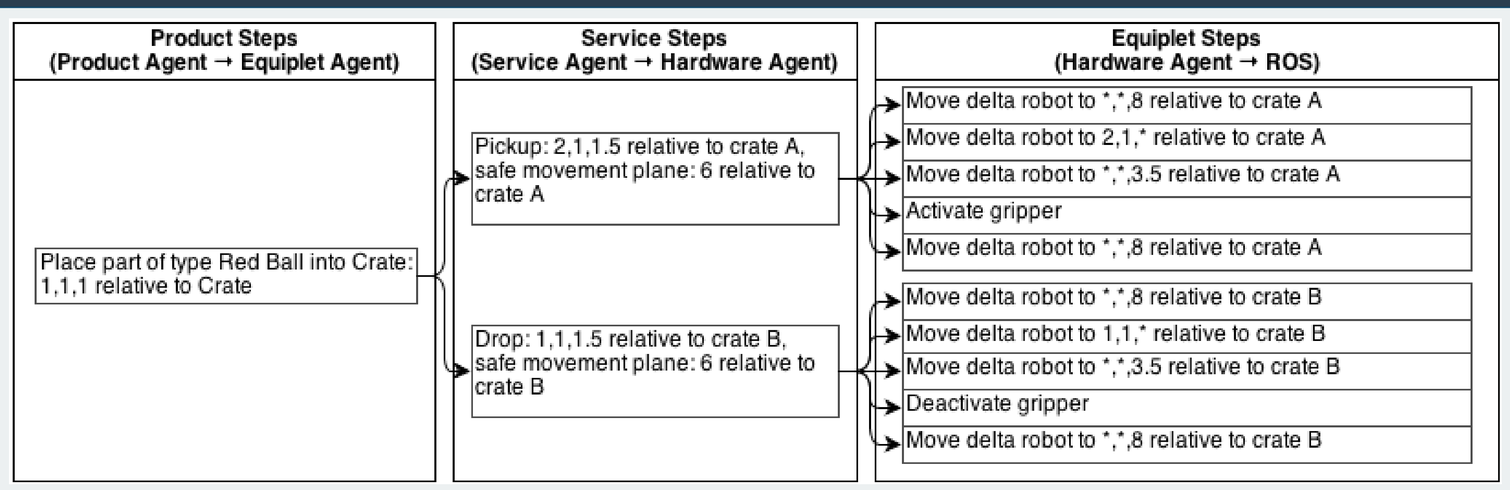
Whenever the product is ready to be produced, parts that are needed for production will be transported to the equiplets. The product agent is responsible for transporting the parts to the proper equiplet. Parts will be transported on a single robot, capable of carrying all parts needed for one complete product. This robot will navigate through the grid autonomously.

A blueprint consists of a collection of product steps. These products steps are abstract descriptions of manufacturing steps. Equplets that have the required modules can translate these steps into service steps with more detail. The service steps are translated into equiplet steps. Equiplet steps are specific Instructions which can be executed by the hardware configured on the equiplet.

Finding the Right Equiplets *

Once the blueprint for a product is known, the product agent will need to know where the product can be produced. The product agent will start by asking each equiplet in the grid whether it is capable of performing the needed steps. The equiplets have capabilities which are based on the modules attached and therefor the services it provides. If an equiplet has the right capability to perform a step, it will inform the product agent providing a duration of how long the steps will take to execute.

Example Translating Steps **



Product Life after Production

The resulting product logs can be used in different situations. These product logs can be consulted in order to optimize production. Future services, such as generating schematics for repairing the product, can be developed using these detailed production logs.

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