Remote collaboration on safety features using digital twins

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What is a digital twin?

- A virtual simulation of a process or model
- Allows for realistic digital simulation of processes
- First usage in the 60s when NASA built a digital twin for the apollo program

Problems - Where do digital twins come in?

- Specialized machinery may require trips over long distances abroad and domestically.
- These trips can be expensive due to accommodation and transportation costs.
- The process or machinery that is to be simulated may not be installed or up and running yet.
- Travelling may lead to increased downtime, and a loss of productivity
- Frequent travelling has detrimental effects on the environment.
- Some scenarios may be hard to simulate in real life or might be risky.

Results - What benefits can digital twins provide?

For the end user, digital twins can provide

- Easier training: No downtime of equipment is required for machine training. Error conditions which are difficult to generate in real conditions, can easily be generated.
- Convenience: Models can be simulated without leaving the house or office. This leads to less downtime from travel and facilitates international cooperation and demonstration.
- Enhanced safety: With a virtually commissioned model there are no dangers to the induvial, making it easier to simulate dangerous scenarios for training with no risk to the individual.

And for the engineer, digital twins can provide

- Quicker development . With digital twins, adjustments can be done easily. Adjustment of issues such as erroneous parameters and positioning can be done with a few clicks of a button.
- Cost efficiency: With true to life representation of components, engineers can see if they are adequate for the desired performance before ordering them.
- Improved collaboration: Digital twins can be worked on from anywhere at any time and multiple teams involved in the development can work in parallel.
- Innovation: digital twins allow engineers to try new components and methods easier than ever before.

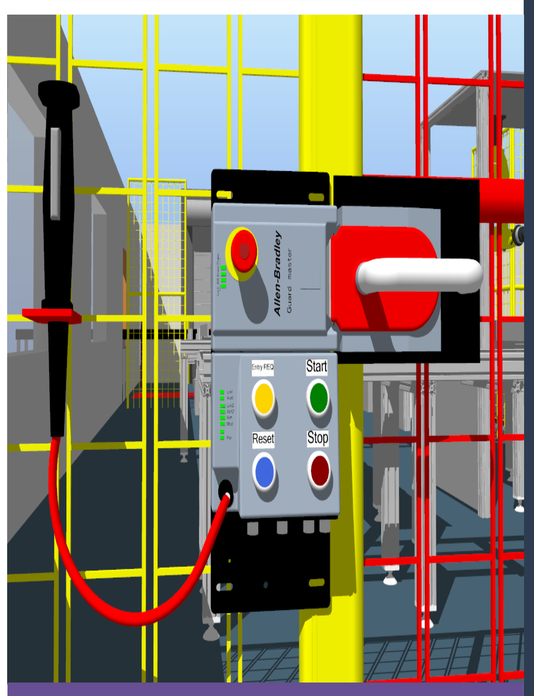
Method - Safety

To evaluate how digital twins can be used for remote collaboration the following safety components were simulated in the digital twin built using Emulate3D:

Safety components

- Light curtains
- Multifunctional Access Box (MAB)
- Enabling Switch
- Cable-pull Safety Rope and Estop button

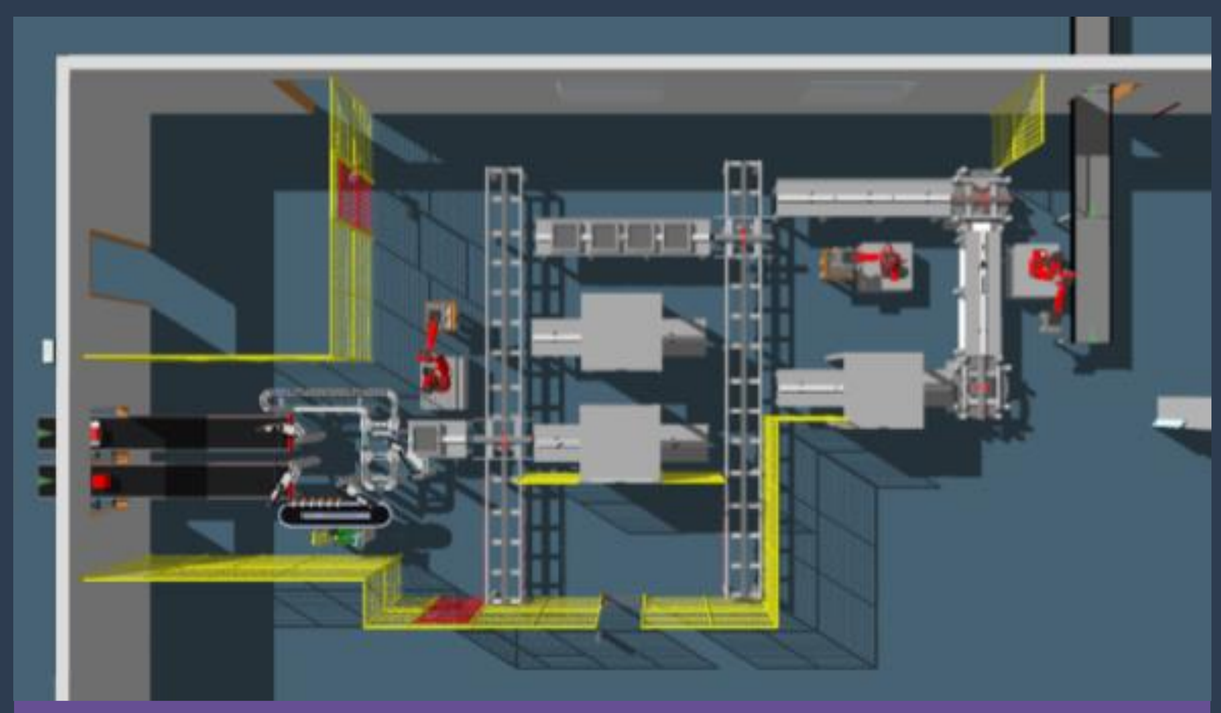
The components were chosen to provide familiarity with components located in Rockwell Automation's office in Gothenburg In order to develop a digital twin, Rockwell Automation's virtual commissioning software Emulate3D was used.



A MAB in E3D

Discussion - The future of digital twins

Although digital twins are not a recent technology, they have seen increasing relevancy in recent years. With this technology, remotely collaborating on development and design of processes may be easier than ever before. Despite digital twins being a powerful tool for developing, physical meetings are unlikely to go anywhere due to the social cohesion among colleagues which they bring.



The finished model with implemented safety features