Utilization of Digital Technology in Manufacturing

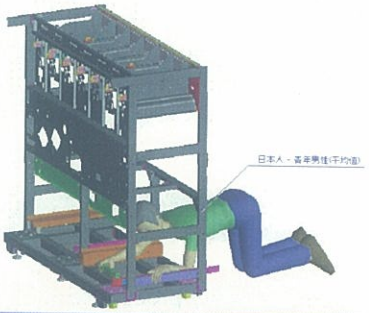
November 27, 2012
Manufacturing Platform Technology
Manufacturing Group
Fuji Xerox Co., Ltd.

FUJI xerox

Utilization of 3D (Digital) Technology

Fuji Xerox utilizes 3D (digital) technology in its development and production areas to realize:
"evaluation before production" from previous "evaluation after production".

(1) Creating a prototype
Conduct Digital Design Improvement (DDI) to reduce the number of prototypes, related costs, and development hours.



(2) Mass-production simulation
Design and verify the production process using 3D technology.
(virtual mass production line)

FUJI xerox

Virtual Prototype Creation:
Improving the Failure Detection Rate Utilizing 3D Technology

Conducts virtual quality inspections before actually creating a prototype, resulting in improved improves design quality.

Before Introducing DDI

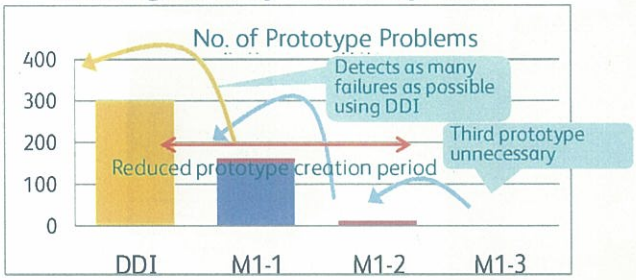
Inspect assembly feasibility using an actual machine

After DDI

Inspect assembly feasibility using DDI

Effects of DDI Implementation

Time spent on prototype creation has been significantly reduced by 40 %.



Improving Bug Detection Rate

Inspect driver operability

Inspect working posture and visibility

Realistic inspection using life-size display

Aim at more virtual inspections

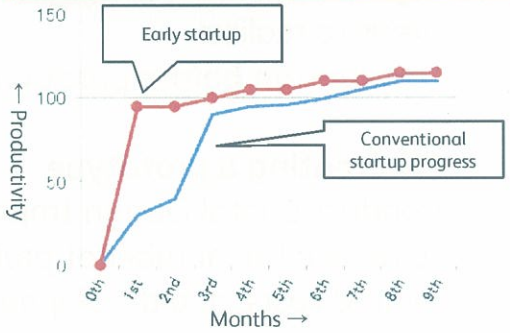
FUJI xerox

Utilization of 3D Technology in Virtual Mass Production

A process to virtually build and examine the production line using an almost completed prototype.

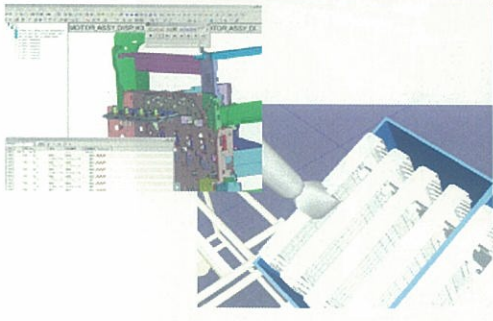
By designing and examining the production line virtually, potential problems can be identified in advance, and the actual production line can then be established in a shorter period of time.

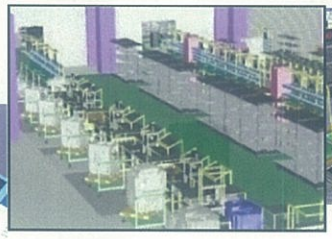
Conceptual Representation of Shortening Production Line Startup Period

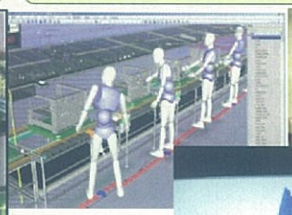


Steps in Virtual Mass Production

Determines assembly procedure → Designs 3D production line → Examines using virtual production line







FUJI xerox

Digital Design Improvement

Fuji Xerox is implementing the Virtual Model Evaluation based on the Digital Design Improvement concept in order to reduce product development time, frequency of trial production and relevant costs. Using a virtual model made by the 3D CAD (computer aided design) data, the Virtual Model Evaluation enables the company to resolve numerous issues before making a prototype. With this system, examiners can virtually measure operability of a product under developed: for example, how smoothly users can react to encountered problems such as a paper jam with the product. Resolving issues without having to physically construct a prototype reduces labor hours and expenses.

Previously, 3D animations of prototypes were created and tested through the use of virtual human models. Although this method was effective in reducing development time and costs as there was no need to construct a prototype, implementing human models was so complex that it took up too much time to create and limited the number of examiners who could operate the program.

To further decrease evaluation time and simplify the method, Fuji Xerox now evaluates a real size 3D CAD model of the product under development, replacing the human model with an actual examiner through the use of a camera and sensor with virtual reality technology. This virtual model moves in accordance to the examiner's position through an attached sensor as if the examiner is evaluating an actual prototype, and provides an accurate virtual display from the examiner's perspective. The examiner's view can be displayed on a monitor through the attached camera so that other examiners can share his/her view as several examiners normally evaluate prototypes.

The Digital Design Improvement Room is also used for remote collaboration between the R&D Square and the Ebina Center. At Fuji Xerox, design developments are done at the R&D Square, the prototype production is executed at the Ebina Center, and actual manufacturing is conducted at factories in Japan and other countries. It is crucial for all locations to communicate frequently and closely. With the remote collaboration, designers and technicians can communicate directly from where they are without having to physically relocate, which could also benefit environment protection. Product suggestions and improvements can be made instantaneously without wasting time and energy, which will realize speedy provisions for better products to customers. The remote collaboration is currently practiced only between the R&D Square and the Ebina Center, but Fuji Xerox anticipates extending the system and making global networks that connect production development sites to achieve faster production. Fuji Xerox continually develops superior process designs and products by uniting unique technologies, social awareness, and the opinions given by development and production frontlines.