ENABLING FDM-PRINTING IN INDUSTRY 4.0

ULTIFACT 4.0

INDUSTRY 4.0 FOCUSED

Industry 4.0 is the fourth industrial revolution and stands for the current trends of automation and data exchange in manufacturing technologies. 3D printing is key in enabling customization to products as no additional form of tooling is required when changing shapes. FDM printing however, is far from ready to be industrialized as there is a significant need for human intervention.

The project resulted in the UltiFact 4.0. A modular system with high interconnectivity, allowing cyber-physical systems to operate and interact in the smart factory. The concept is compatible with current FDM technology. Uptime is maximized by removing human necessity while printers are only used for printing with all other processing steps happening outside the units.

How to integrate FDM printing techniques in a production line by applying the core design principles of industry 4.0?
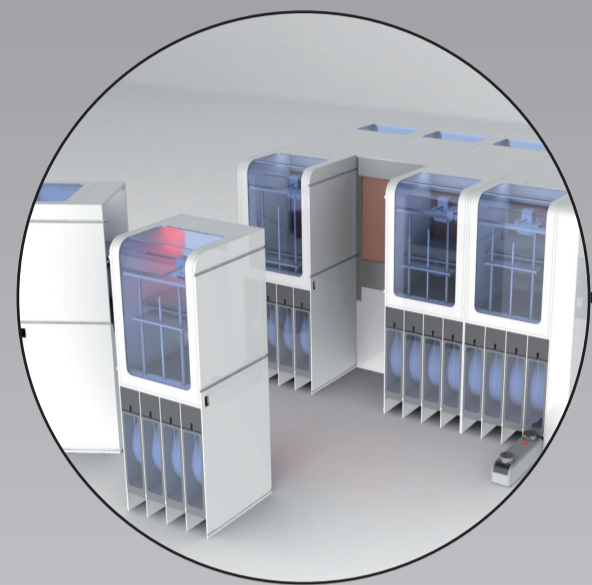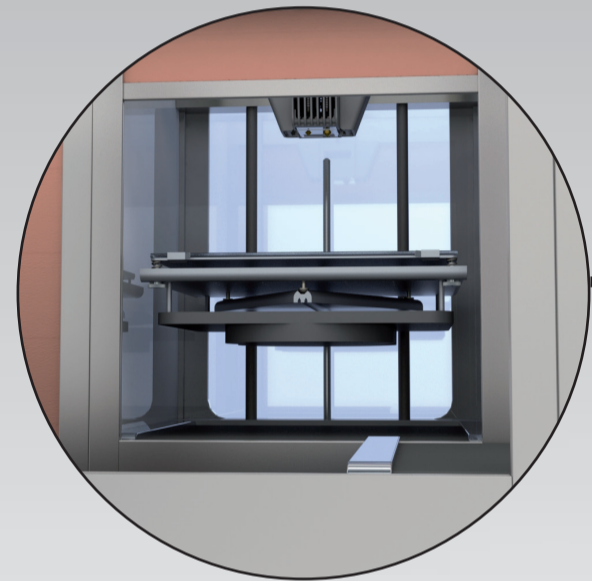
REPLACE

If a printer breaks down, another printer can continue the task. The broken printer unit can be removed while the rest of the UltiFact continues performing up to standard. The broken unit can then easily be replaced by a new one.

SEALED

Printing units are sealed, to maintain perfect parameters while printing, all data on the printing parameters are linked to the RFID tag to monitor performance.
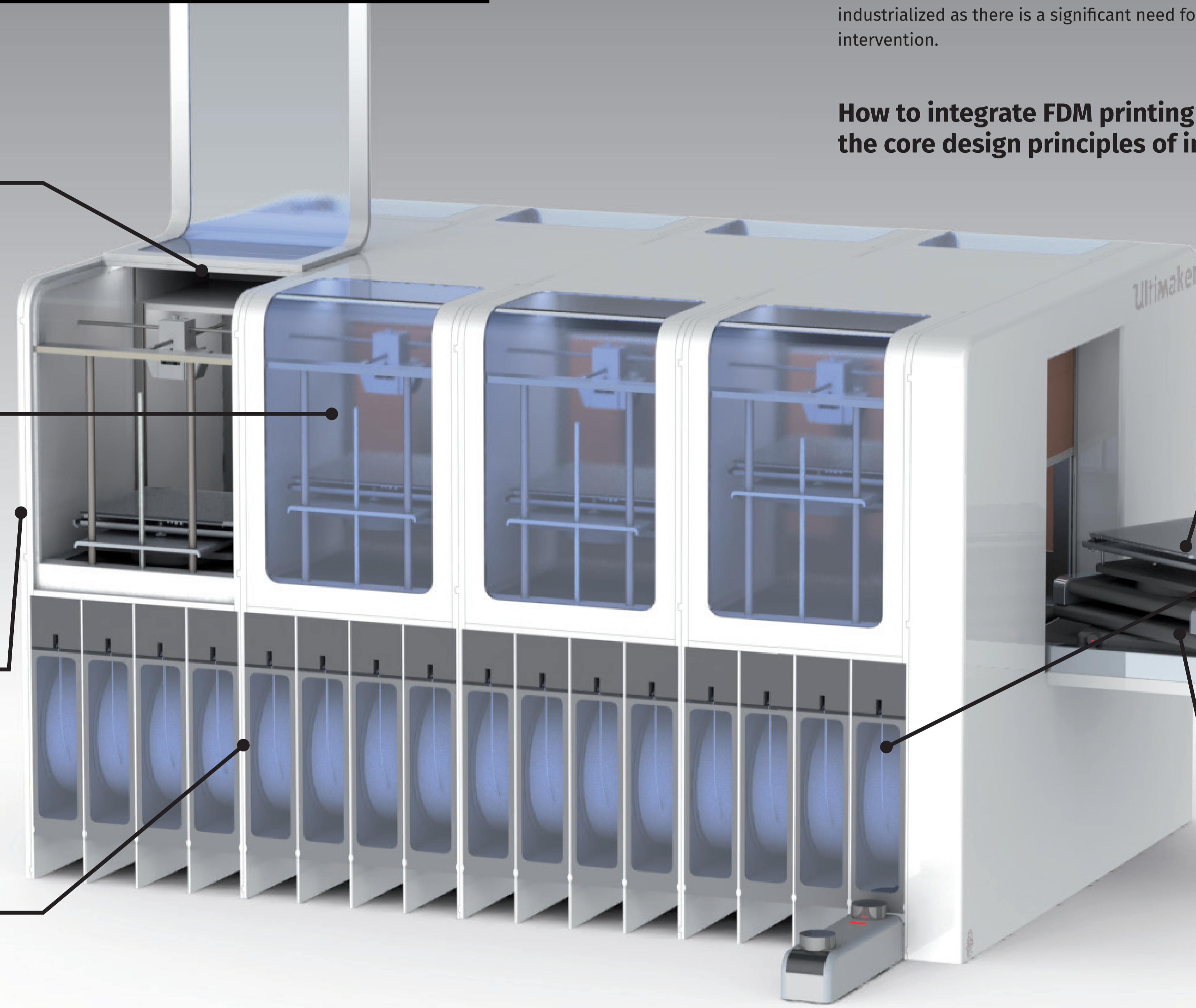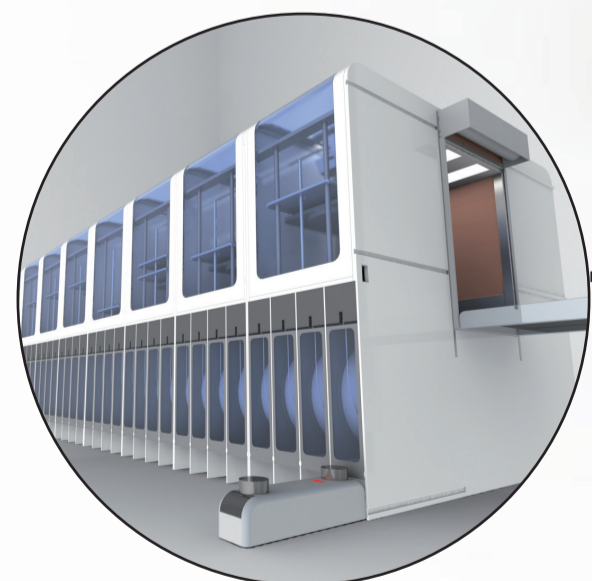
MAINTAIN

Operators are assisted by the included tablet while performing maintenance.

MODULAR

The concept features a modular system consisting of a front panel, control panel, shared system and printing unit. It can be scaled by adding more printing units.
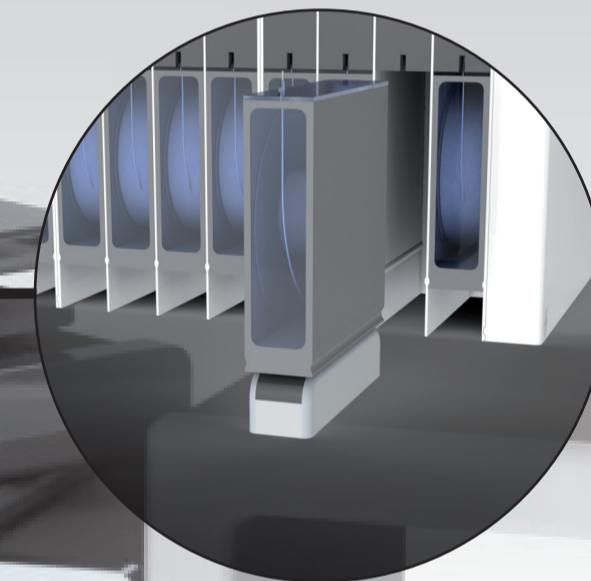
CARRIERS

The UltiFact is based on the carrier system seen in most industry 4.0 concepts. Carriers go through the factory and carry data on embedded RFID chips.
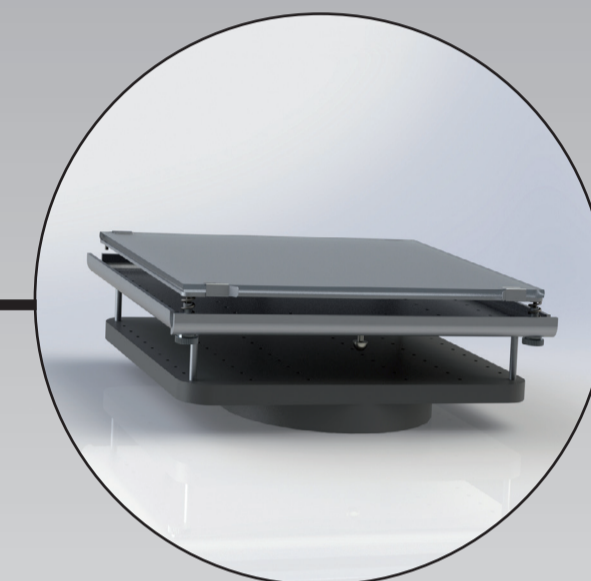
FILAMENT

Filament is fed to the printers from air-sealed boxes. Keeping printing parameters controlled. If a spool is empty, it is replaced by an autonomous robot, that drives from the warehouse to the printing unit.

COUPLING

When a printer is free, a new carrier is placed in that printer through conveyor belts. The carriers contain the ultimaker printbeds and connect with the printing units through kinematic coupling.
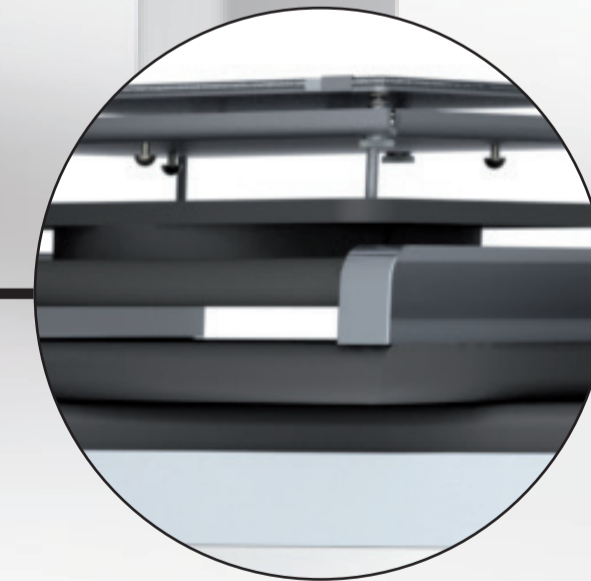
Duncan Maagdenberg
UltiFact 4.0
23 May 2019
Integrated Product Design (IPD)

Committee   Jo Geraedts
Sander Minnoye
Ruud Ruizenaar

Company   UltiMaker

T U Delft

Faculty of Industrial Design Engineering

Delft University of Technology