This study aims to demonstrate the industrial suitability of a food 3D-printing technology, developed into an academic context.

The project proposes an integration between food 3D printing technology and Flexible Manufacturing System (FMS).

In addition, the line has been performed with the aim to provide a networked production, exceeding geographical constraints.

The line has been developed thanks to the collaboration of several companies such as Omron and Bosch Rexroth, which provided the control and the transport systems, respectively.

The printer has been designed through the use of a CAD tool (Solidworks).

Mechanical couplings' design has been integrated with simulation, according to the structural specificities of the line.

Several experiments have been performed in order to reach the correct machine setting.

The critical machine features (extruder motor's steps, speed and acceleration along the 3 axes) were parametrized taking into account the external environmental conditions.

It was conducted an empirical collection of printing time, through the processing of custom shapes imported from CAD and translated into g-code language by the slicing tool.

Starting from the collected data sample, statistical analysis have been performed (chi square goodness-of-fit test).

The whole system has been simulated through discrete event simulation model, following a strictly operational flow. Thus, respect for precedence constraints and production requirements of the pilot system were ensured.

The graph shows results in terms of saturation, expressed in percentage, of both print and handling system, according to the different generated scenarios.

It has been shown that the technology can be used, under certain conditions, in industrial applications. In fact, it is possible to reach a high line saturation that allows a safety margin for possible breakdown to which the machines are subject, hence ensuring the operational continuity.

Once demonstrated the potential of the line in an industrial environment, several points can be improved:

- Development of a simulation model based on a networked multi-batches approach.
- Web interface: means the ability to manage orders and their specific customization features, directly from the web.
- Integration with ERP systems to manage the entire contract lifecycle, from digital order arrival until order delivery.
- Implementation of networked production chain.