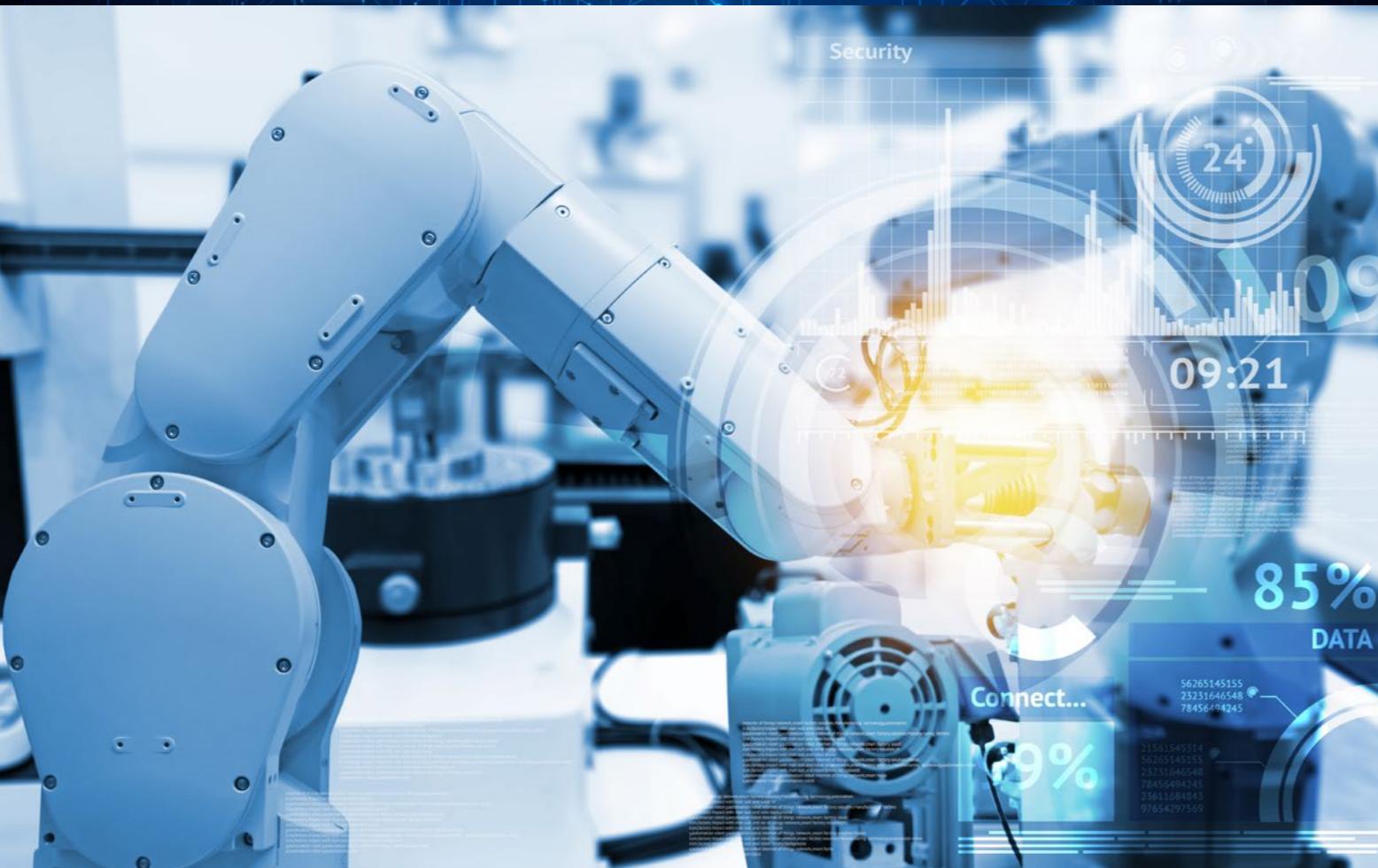




Procter&Gamble
Rakona Technology Center

Team Design Case Packing



Problem Statement

The engineering team located in Czech Republic is asked to design and build a prototype of a case packing machine which enable online customization while meeting the target criteria of safety, quality, speed and reliability.

Business Project Description

Current Situation

Procter & Gamble typically has dozens of product variations that reflect the preferences of different customer groups. To maintain the business competitiveness, the in-house engineering teams need to design equipment that can be used to produce all the variations in the product portfolio.

The traditional approach for P&G operation is to install systems of
(1) process units that produce the liquid
(2) interconnected machinery that runs various operations related to packaging.

Business Request

With the popularity growth of consumer products customizations according to customer preferences, P&G has established a new business plan in cooperation with a major online retailer that involves an online app that allows users to define and order a custom content of the secondary packaging according to their preferences (in terms of product variant size and color of the bottle...).

As each customer can select a unique case content, this business request requires ultimate flexibility of the manufacturing lines. Since changing the operation from one product to another normally triggers actions in all the traditional production systems, a major redesign must be one to avoid productivity losses.

Technical Problem Description

The request from your team is to design and build a prototype of a bottle filling machine that combine a standard filling operation for different bottle sizes with an innovative feature of mix-in-bottle operation (see picture below the scope of the process).

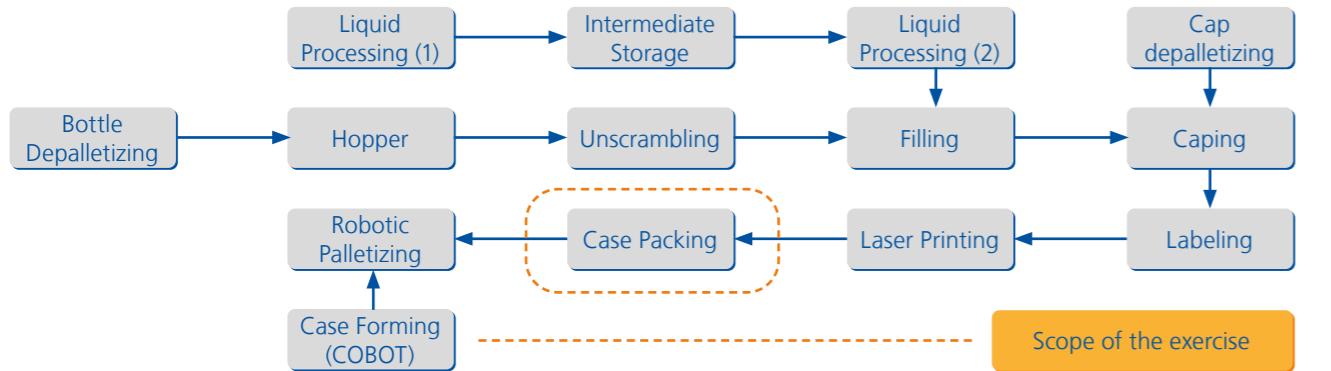


Figure 1 The Block diagram of existing lines highlighting the scope of the exercise

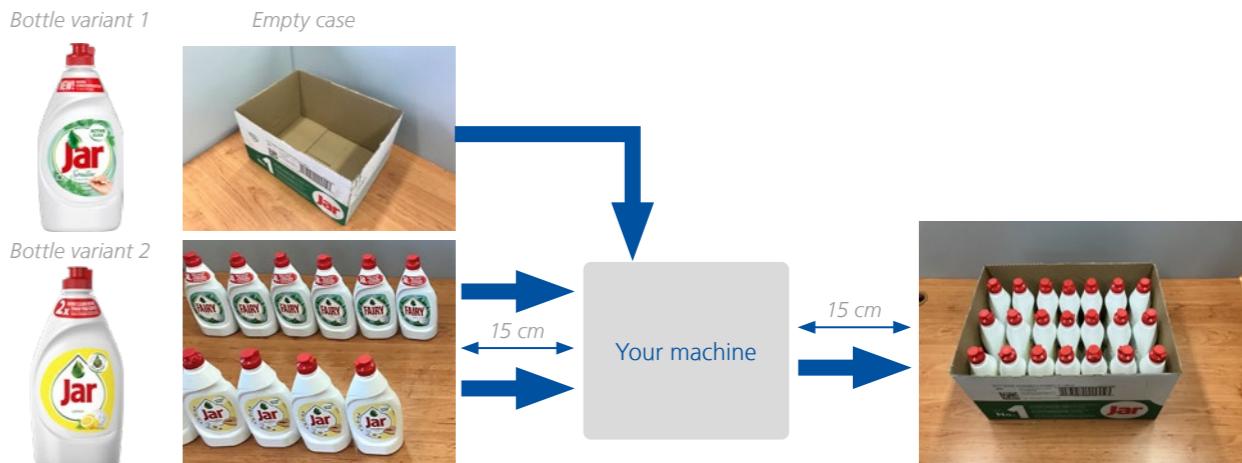
The innovation areas consist of:

- packing two differed bottle variant in one packing line
- avoiding complex change-over procedures at the case packing process between different bottle and case sizes.

The scheme of the machine is visible below. Each team will be given:

- bottles of different product variant
- cases
- Standard to show what the target products look like

Figure 2 Scheme of your machine





The development teams work with "Fast Cycle Principle" and therefore a demonstration of a functional prototype needs to be presented by the end of the day. At the same time, P&G does not intend to spend large sums of money until the technical and business feasibility is confirmed, therefore some manual steps and inaccuracies are tolerated as long as the team can explain how to address them in a real-life machine.

During the demonstration, the bottles can be put in the machine manually to simulate the bottle infeed. However, due to safety reasons short (>150mm) conveyor will have to be in place to prevent injuries inside the filler. Two different variant of the bottles will be transported into the case packer, where it will be placed inside the box. Similarly, to the bottle in-feed, the bottle out-feed can be simulated by manual bottle extraction by operator, but the same 150 mm clearance must be kept.



Success Criteria

The machine must comply with the target criteria of safety, quality, speed and reliability. For the purposes of this competition, the judging panel will also evaluate the technical ingenuity & execution of the solution and overall cost of construction.

Safety

Meeting P&G's high safety standards is a hard-point. In this simulation, we will check that no contestants were hurt during the demonstration. Additionally, the operator cannot touch the bottles while inside the machine.

Quality

Meeting P&G's high-quality standards is a hard-point. Even the slightest imperfection on the package that does not even impact the product performance may, in the eyes of the customers, undermine the confidence in the overall brand. We will look for damage to the bottles and cases and other differences vs. our standard.

Additionally, the orientation of the bottles, positions of variant are critical. Missing bottle is unacceptable.

Speed

Our benchmark speeds in traditional machines reach up to 24000 bottles / hour. In case of in-cases mixing, the speed can be reduced due to technical limitations. However, speed remains an important performance indicator as it directly impacts cost per capacity. We will measure the time to full one case.





Team Design. Case Packing



Reliability

Overall capacity and manufacturing productivity is enabled with reliable equipment. We will look for the number of breakdowns, machine stops and general smoothness of operation.

Technical Ingenuity & Execution

The judge panel will evaluate the combination of technical ingenuity and execution. Example of a good solution can be level of automation, blindness to bottle size and shape or scale-up potential.

Construction Cost

The basic materials for construction will be received "for free", but more sophisticated parts must be purchased from the BEST shop. Lower cost will be evaluated with higher points. Note that lower cost at the expense of the other success may not be the best solution.

