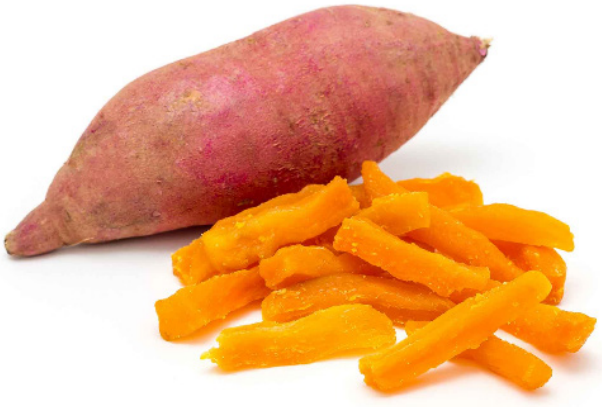
Interreg North-West Europe
COTEMACO
European Regional Development Fund

Success Story

Process Automation Opportunities

Fairfield Fresh, UK



Automation

Company description

Fairfield Fresh Ltd are a fruit and vegetable preparation company based in Swineshead, Lincolnshire. The business sources and prepares fruit and vegetables that are supplied to a variety of supermarkets, hotels, banqueting venues, and event caterers in the United Kingdom. Fairfield Fresh are located in Lincolnshire which is at the centre of the UK's vegetable and salad production. This is a major advantage for the business and offers many cost, quality, and environmental benefits in sourcing products.
Fairfield Fresh use a combination of hand and machine cutting to process sweet potatoes, butternut squash, and other produce to customers specifications.

Goal

The aim of this COTEMACO support is to assess the current production at Fairfield Fresh and provide advice and support to underpin future business growth. Primarily, this involves options for plant layout to improve process flow and suggestions for automated equipment to improve production efficiency.

Starting Point

The current production space at Fairfield Fresh is set up for chipping sweet potato and preparing butternut squash. The current basic processes are given in Table 1 and the current site layout in Figure 1.

Sweet Potato

1. Bulk bin tip of product
2. Elevator
3. Chute to PAA (peroxyacetic acid) wash tub
4. Elevator
5. Manual inspection and trimming conveyor
6. Elevator
7. hipper machine
8. Elevator
9. Sliver removal machine
10. Elevator &Inspection
11. Filling of lined crate
12. Adjustment of crate content to weight
13. Bag folding over
14. Metal check
15. Stack crates to pallet
16. Pallet to dispatch chill store

Butternut Squash

1. Pallet truck bulk bin to production space.
2. Manual transfer to PAA in Tote bins
3. Peeling (some automated, some manual)
4. Manual trimming
5. Manual cutting into bowls & tops
6. Tops to bulk bin
7. Manual scooping of seeds & pith from bowls
8. Bowls to bulk bin.
9. Bulk bins to dispatch chill store

Table 1. Basic Process Descriptions

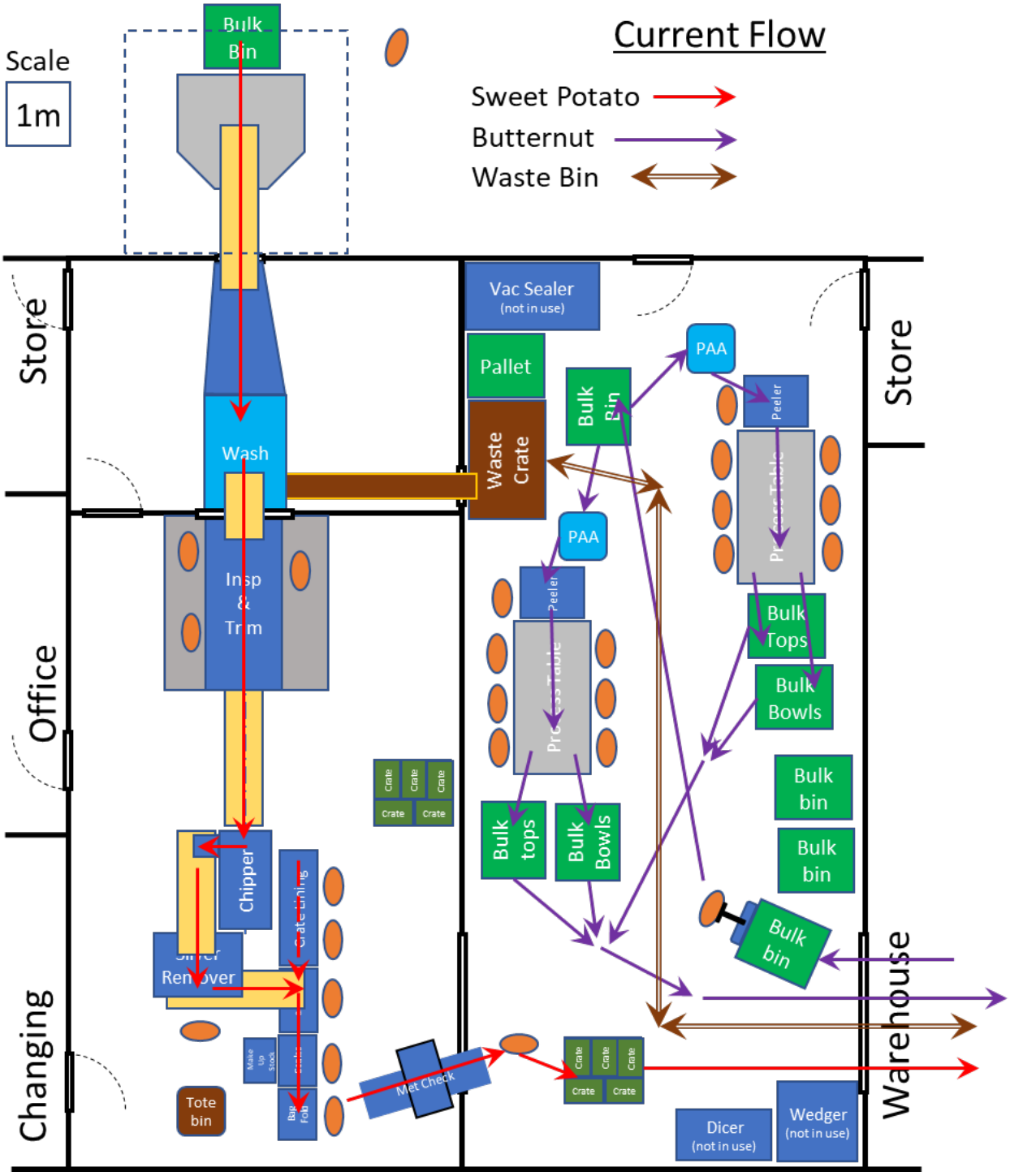


Figure 1. Current process Layout and Flow

Initial observations and discussions with staff identified areas for potential improvements without expenditure on additional automated equipment.

SME Support Activities

Potential equipment and process layout changes to address the identified issues were investigated and presented to Fairfield.

Space in sweet potato room

Mounting the chipper on a lower frame, would reduce the length needed for the elevator, thus reducing line footprint length by approximately 2m (Figure 2), and also reduce the fall distance and reduce any chips bouncing out problems in this area.

Sweet potato wash station

Improved setup and synchronisation of the sensor and infeed conveyor would improve process flow. Failing this, pragmatic physical solutions can be implemented such as flaps on the infeed chute to reduce sweet potato velocity or taller side panels to prevent sweet potato falling to the floor.

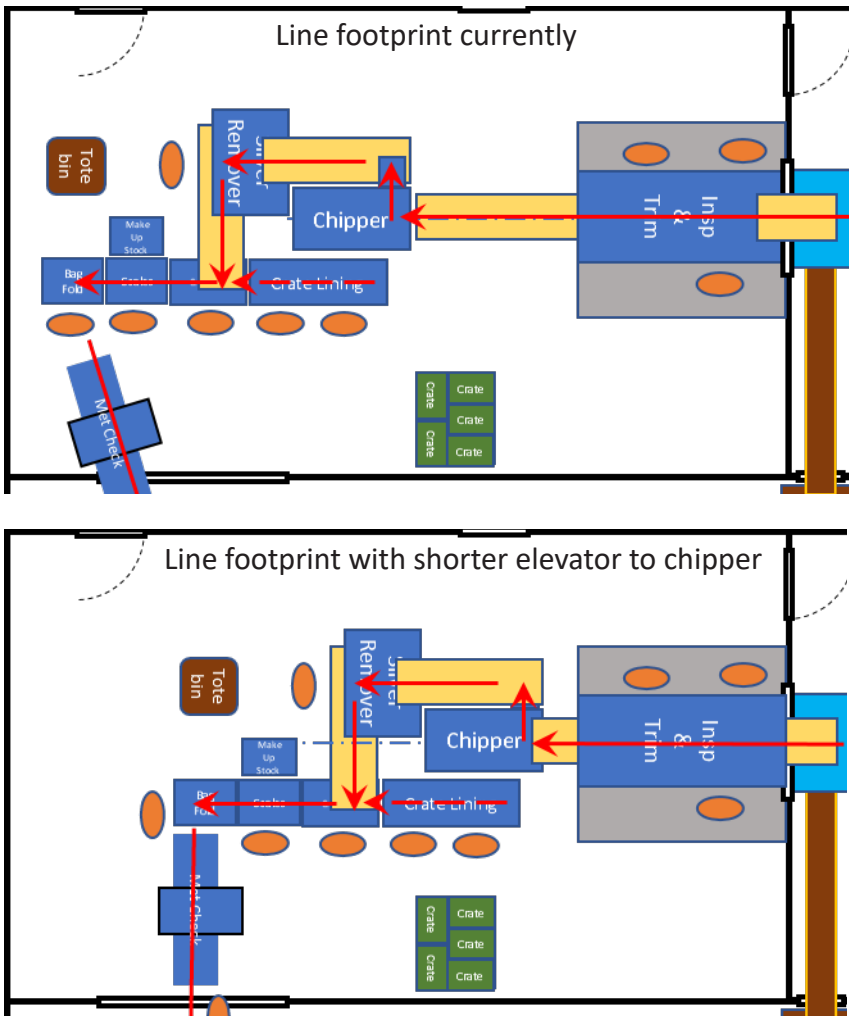


Figure 2. Effect of lower chipper and shorter feed elevator on floorspace

Flooring of sweet potato chips

Various measures are required, primarily based on how/where chips are escaping the process line. Further investigations are suggested to determine proportion of chips coming from each escape location. Individual solutions for the various escape locations were developed and presented.

Implementing dedicated automation at the crate filling station was recommended as more secure transit route for chips from elevator to bag, and in addition bags/crates can be automatically filled to a pre-determined weight. This would also reduce the headcount at filling by at least 2 staff. Whilst automated filling of the current format of lined crates is possible, it is recommended that options for sealed bags also be explored with customer(s).

Initial discussions with manufacturers suggest ballpark costs of £50k-70k for an automated filler capable of c.150% of current throughputs. A projected payback would be 12 -17 months at current throughputs, or 8-12months if the higher throughputs of the automated filler could be matched along the remainder of the line.

The footprint of the auto filler depends somewhat on the precise specification, but a number of possible layouts (Figure 3) can be considered if the elevator to the chipper is shortened as previously suggested.

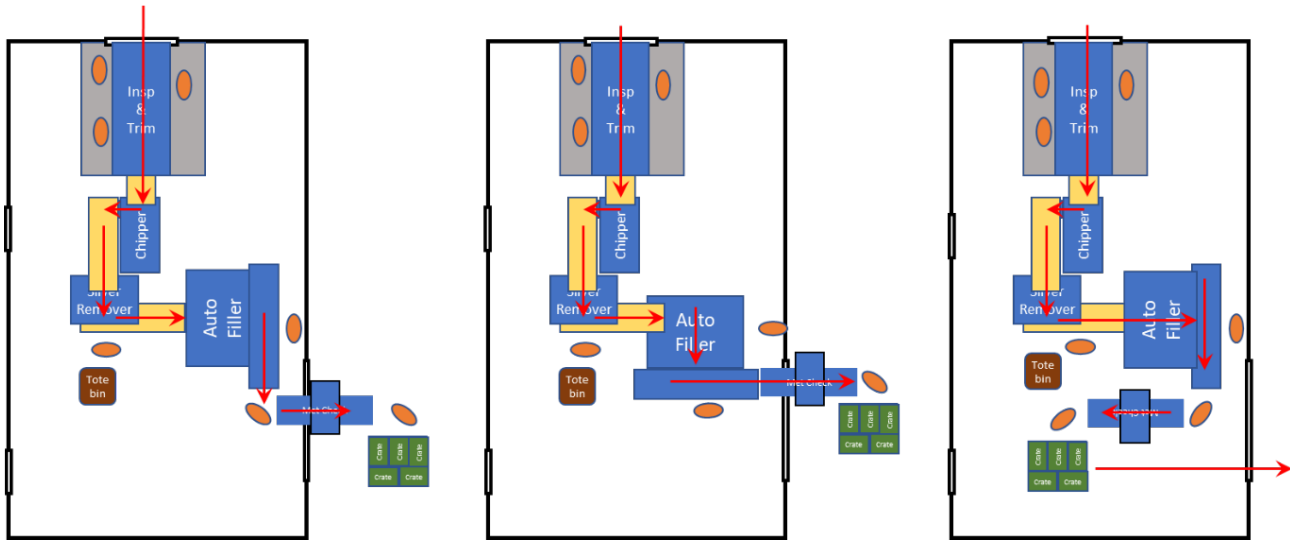


Figure 3. possible layouts for auto-filler

Robot for sweet potato crate stacking

Stacking 14kg crates of sweet potato onto the pallet at a mean rate of 10s per crate is an arduous and heavy task. Introduction of a robotic palletiser could be considered. However, the relatively heavy crates and relatively fast cycle time would very likely require a robot (rather than cobot) and thus the guarding requirements would potentially occupy too large a footprint to be feasible in the current facility.

Butternut Squash

Butternut infeed through wash room

Pallet trucking bulk bins of butternut to the far end of the room disrupts the processing operations. In addition, the tote-bin-based wash is inconsistent and requires double handling. Replicating the sweet potato infeed equipment for butternut could be considered, i.e. bulk tip outside the processing space with an elevator plus chute into the washroom, then a new opening to bring washed product into the butternut room (Figure 5). This would reduce disruption, improve washing, create more floorspace in the butternut room, and reduce manual handling requirements for butternut infeed.

Waste bin(s)

Relocating the waste bin to outside the processing space and installing a conveyor to take waste through the wall would free up space in the butternut room. Waste from the butternut peeling would go to the conveyor in approximately the same location in the room as the current waste bin, and a secondary waste bin could be added at the out-feed end for other wastes from the production tables. This would allow the waste bin to be removed and emptied without disrupting the processing. This configuration would also allow the later addition an ABL automated peeler (Figure 4).

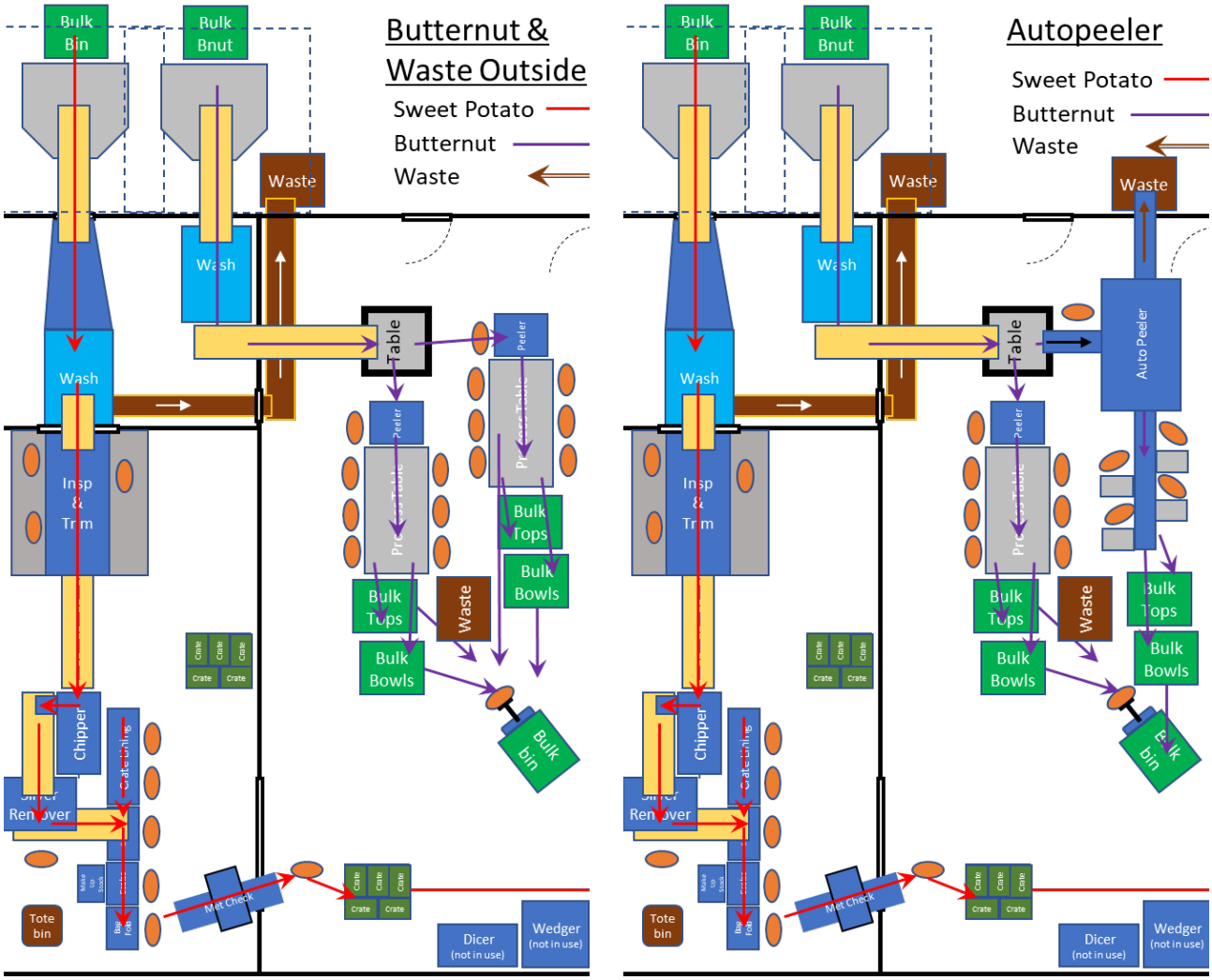


Figure 4. Revised infeed, wastes with scope for automated peeler.

Wall removal for flexibility in other layouts

The current 6m wide rooms limit possibilities for line layout. Removal of the dividing wall could allow for line reconfigurations that can make better use of the overall space available. Options will depend on other line change decisions made, but one example is shown in Figure 7 where the 2 butternut lines remain, but the end of the sweet potato line can be rotated through 90° allowing space for another line for Celeriac, more Butternut, or other products.

Implementation

The business has made initial enquiries with customers into potential for changing processes that would give slightly altered output products or formats. A quotation for dedicated automation for butternut peeling has been received. Outline specification, costings and RoI for bagging automation has been determined.

The business is currently considering these options and further steps will be taken and implemented as time progresses and the enterprise grows. Business growth will be both the driver and financial enabler for further changes and adoption of automation.

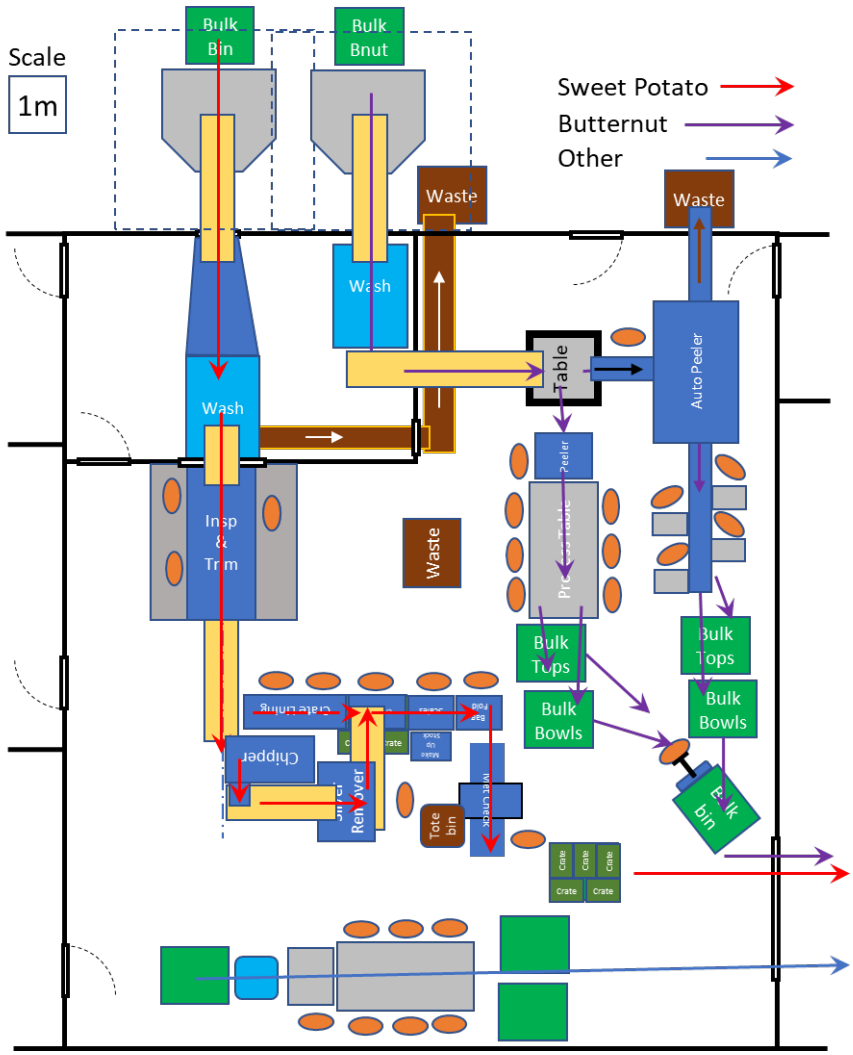


Figure 5. Example layout made possible if dividing wall removed

Interview

Impact on the Business

The key benefits of introducing automation will be in the improved production capacity whilst being able to move staff from some tedious handling tasks to more rewarding (and value adding) tasks.

The Co-Owner & Director commented on the COTEMACO support; “This process has identified some really good ideas for smoother & more cost-effective process flows and business efficiency. There a some very quick wins, and we are keen to move forward once customer contracts are in place to confirm continued requirements for these products.”

The technical director stated “You have left us with a lot of useful information to think about and we definitely want to apply as much as possible to the factory and other areas on site. We are looking forward to developing the relationship with the university and working together on many of these projects.”

How could COTEMACO support you?

Via the SME support programme, COTEMACO engages with SMEs from the automotive and food sectors through field labs. These regional field labs in the UK, the Netherlands, Belgium and Germany are showcasing key production steps in the automotive and food industries, in order to tackle current low sectorial awareness and knowledge gaps. The field labs will exchange knowledge on different manufacturing tasks, such as handling and (un)loading.
With the COTEMACO programme, manufacturing SMEs are guided through the process of adopting collaborative robotic and shop floor digitalisation technologies, from the exploration of technological opportunities to the detailed definition of a business plan.

What is COTEMACO?

The project, which is an initiative of Interreg North-West Europe, aims to support around 60 SMEs in the automotive and food manufacturing industries with so-called „test environments“ and to encourage them to integrate collaborative robotic systems and digital technologies into their business. Accordingly, in addition to increasing production flexibility, the relocation of production abroad will be curbed and the number of jobs in manufacturing increased, which will generally lead to an improvement in the competitiveness of the companies involved.
In the project new technologies are implemented in application examples - the aim is to move from the prototype in the laboratory environment to the transfer to production, taking into account the legal situation and certifications.

You want to become part of COTEMACO too?

You are interested in further Best Practice implementations?

Then visit our website at:
www.robot-hub.org/cotemaco

Implementation partner:

University of Lincoln – National Centre for Food Manufacturing

Lincolnshire County Council

FRPERC – Food Refrigeration and Process Engineering Research Centre

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