

Success Story

Process Automation Opportunities

Mariner Foods Trading Ltd, UK



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Company description

Mariner Foods Trading Ltd were founded in 2013, and are based in Grimsby UK. Mariner procure, prepare, pack, and supply fish to a range of customers. Although dealing primarily in cod, haddock and salmon, other species are processed as and when required. The business directly employs around 15 fulltime staff.

Goal

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

Motivation/Starting Point

The current production space and process flow at Mariner Trading is shown in Figure 1, and current basic processes are given in Table 1.

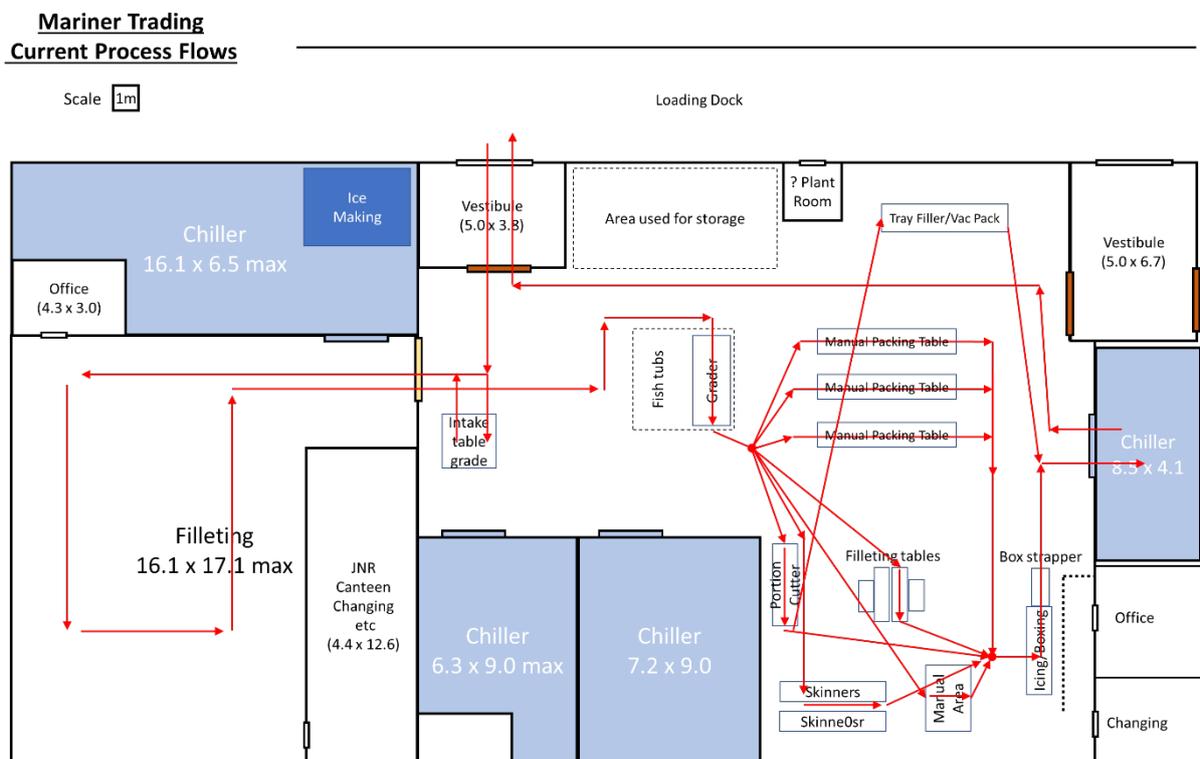


Figure 1. Current layout and process flow

Table 1. Basic processing

1). Raw material arrival	
2). Sorting (dependent on incoming raw materials)	
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4). Grading	
5). Optional processes (dependent on customer requirements) Skinning / Portioning / Skinning and portioning / Scaling / Pin boning / 'Flicking'	
6). Packing in EPS a. Place portions/fillets into boxes b. Icing c. Box lidding d. Box strapping e. Boxes to pallets	6). Vacuum/Tray Packing a. Place portions into trays on pack m/c c. Tray to crates d. Crates to pallets
7). Pallets to dispatch chiller	
8). Dispatch	

SME Support Activities

Opportunities for Automation

The operations at Mariner Trading are typical of a manual fish trading/processing facility. Species and relative volumes of fish processed vary daily depending on market prices and customer orders. The operations carried out vary as are dependent on product specifications for each individual customer. As such, it would be expected that this inherent need for flexibility would be prime ground for robotic or cobotic applications. However, as with processing most discrete, biologically variable, and naturally derived foods, fish processing is not a simple process to automate; most tasks require a high degree of dexterity, decision making, product sensing, and considerable knowledge and experience. The product itself presents additional problems; fish and fish sections are variable in size and shape (even from the same species), they are slippery and difficult to grasp, and possess non-rigid, temperature-influenced properties. Although some dedicated automation solutions for specific tasks are commercially available for the fish processing sector, these tend to be complex, costly, and can only adjust to only a limited small variation in product sizes, and hence are only commercially relevant for businesses with very high throughput volumes of similarly sized fish. Mariner does not fall into this category.

There is substantial staff time used in transfer of products between processes in boxes, crates, and trays that also form process buffer stocks before and after most operations. Due to the piecemeal and variable process needs, fixed conveyor transfer between operations is not a feasible proposition. The use of concertina roller conveyors (e.g. Figure 2) could be implemented to ease transfer between operations. These can be extended or collapsed to suit different transfer distances between operations and flexed if required to bypass obstacles. Trays, boxes, bins, or crates can be moved along them by manual pushing, gravity, or by powered rollers. Typically, extensions of 3x minimum length are possible. Costs depend on construction materials and lengths. As a guide for unpowered concertina roller conveyors, a short 1m unit starts at c.£200, and a longer unit capable of extending to 5m at c.£2,500.



Figure 2. Examples of concertina roller conveyors

There is opportunity at a later stage to consider automated guided vehicles (AGVs) and/or other automated materials handling solutions to relieve the manual handling duties at Mariner Trading. However, few (if any) current AGV systems are suitable for wet fish processing environments, and there is an associated required level of process digitalisation that is not yet present at Mariner.

Around 60-70% of production is currently placed into expanded polystyrene (EPS) boxes, top iced, lidded, and strapped. There is potential for box handling and palletisation automation at the icing and strapping station as, 1). the majority of products require this operation, and 2). little flexibility is required as fewer than 10 EPS box sizes are handled. Automated equipment for dosing ice to EPS boxes is commercially available. Currently 1-2 staff are required for this station and with an estimated robot and automation installation cost of c.£60,000 this could give a return on investment (RoI) of less than 2 years. Further more detailed studies would be needed to assess technical and commercial feasibility if this concept is of interest to Mariner.

Alternative plant layouts for improved process flow

Although immediate applications of ro/cobotics is not currently suitable for Mariner, some layout changes to the facility may provide intermediate efficacy improvements. Flow is somewhat constricted after the current grader (Figure 1) and transfer to the vacuum packer (an increasing customer product demand) could be improved. Potential equipment and process layout changes to improve process flow were proposed.

The first layout suggestion (Figure 3) is to move the portioner closer to the infeed of the vacuum packer as most portioned product will be vacuum packed. This also decongests the area at the lower right of the site plan. Ideally the output products should exit through Vestibule B for best flow in the factory space; to get dispatch product to vestibule A, flow streams would cross.

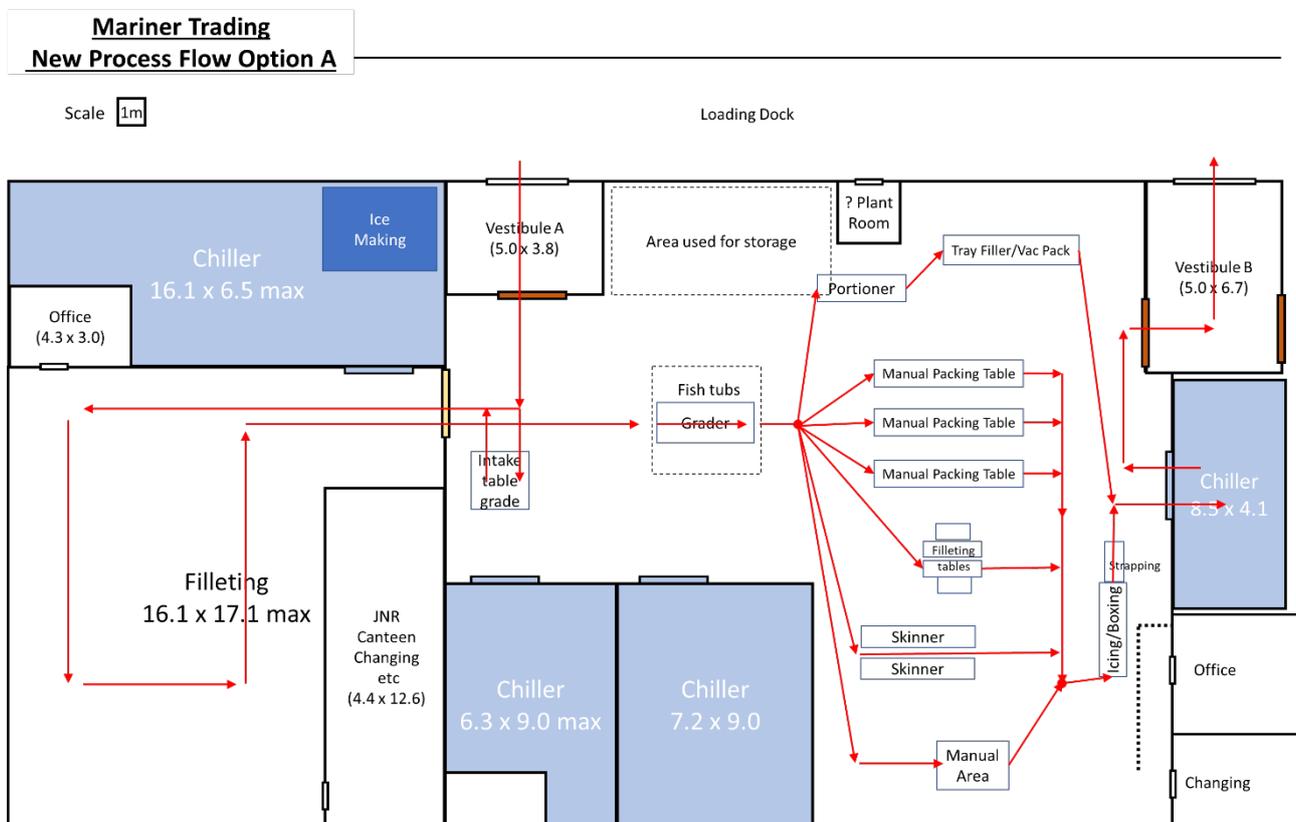


Figure 3. Possible revised layout A

The second layout suggestion (Figure 4) flows the products in a loop around the right end of the site plan. This puts the boxing and icing closer to the larger chill rooms (storage before dispatch), and closer to the ice supply (reducing the ice transfer operations). This re-arrangement also generates more space around the operation should robotic box handling, icing, and palletisation be adopted in the future.

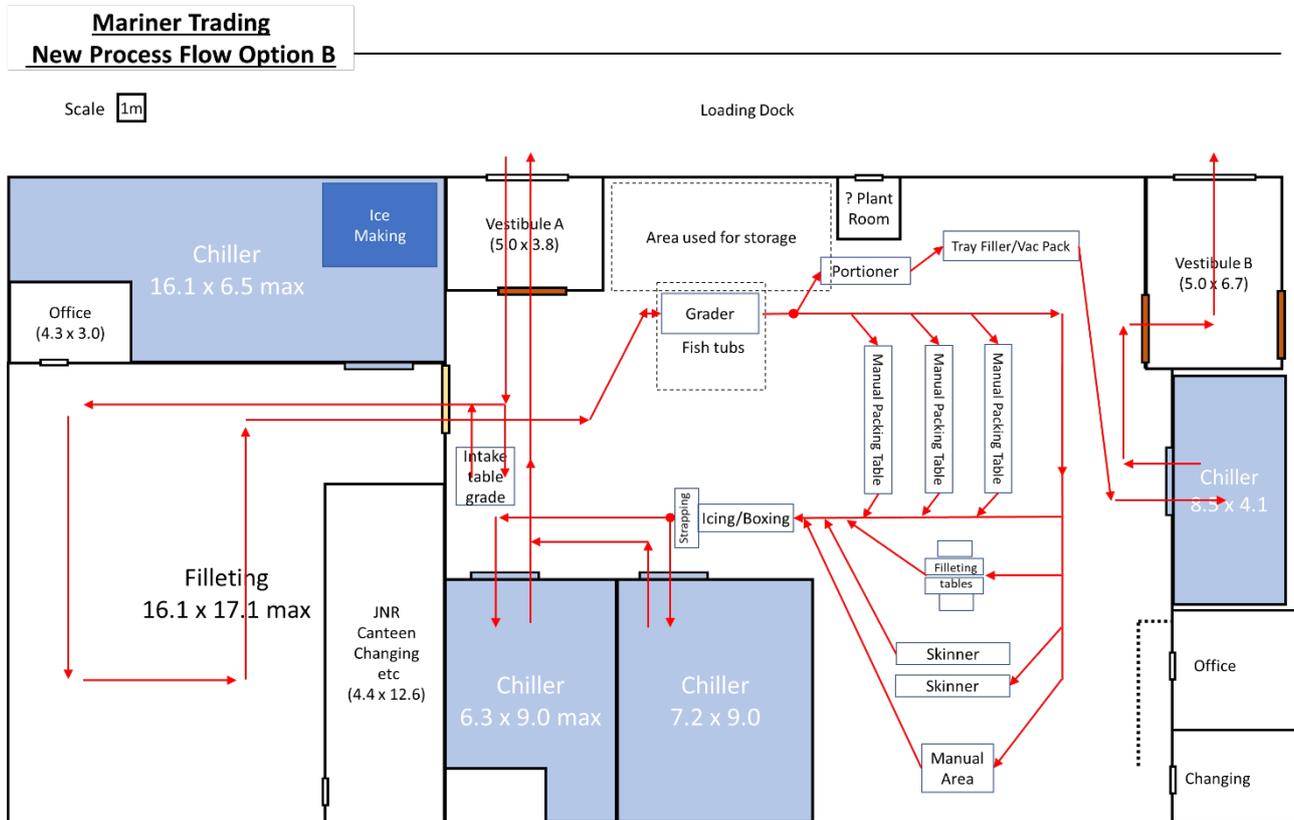


Figure 4. Possible revised layout B

Implementation

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

Interview

Impact on the Business

Adam Fanthorpe (Manager at Mariner Trading) commented on the COTEMACO engagement saying;

“This COTEMACO process has been useful to help us understand what is feasible. Some benefits could be achieved at relatively low-cost; i.e. alternative layouts of the factory. The use of flexible roller conveyors would allow easier product movement and make for less repeated lifting for staff. We will consider these in due course. Robotised icing and pallet building is further down the road for us.”

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.

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