

Healthy Workplaces Good Practice Awards 2023–2025

CASE STUDY



Robotic barrel unloading system to reduce risk of musculoskeletal injuries



ORGANISATION/COMPANY

Midleton Distillery of Irish Distillers, Pernod Ricard Group

COUNTRY

Ireland

SECTOR

Manufacturing alcoholic beverages (distillery)

TASKS

Handling and unloading stacked wooden barrels from large shipping containers

Introduction to the case study

Manually unloading of stacked 60 kg barrels from containers put operators at Midleton Distillery in Ireland at high risk of musculoskeletal injury. With workers' health and safety as top priority, the company invested in a tailored autonomous mobile robot with AI vision to minimise manual handling while keeping a human-in-command approach. As a result, the barrel unloading process has seen a 100 % reduction in accidents.

Background

Midleton Distillery, with over 240 workers, is a key player in Ireland's whisky production. The distillery is owned by Irish Distillers, a subsidiary of the global Pernod Ricard Group. With a long-standing tradition of excellence and a commitment to craftsmanship, Midleton Distillery handles large volumes of whisky barrels daily. The safety and health of employees is their top priority, striving for zero accidents implemented through their *Taking Care of Each Other* programme.

Empty barrels are transported to Midleton Distillery in large shipping containers, stacked three high with up to 208 barrels per container. Until recently, the barrels were manually unloaded onto a carousel by two operators. The team at Midleton Distillery identified this unloading operation as a high-risk activity with several musculoskeletal risks due to: the heavy weight of the empty barrels; the risk of barrels falling onto operators due to the potential dislodgement of barrels during transit; and operators not being able to stand upright inside the container, meaning that they needed to drop empty 60 kg barrels from the top layer to remove them from the container or walk in an awkward posture on top of the base row of barrels. The consequences of such operations were lower back injury, crush injuries,

and exposure to dust in confined spaces. Despite implementing organisational controls to mitigate risks, such as rotation of operations, reduction of the barrel stacks to two, additional personal protective equipment and increased training, accidents continued to occur.

Aims

The company seeks to explore automated or robotic solutions that will eliminate as many occupational safety and health (OSH) risks from its barrel handling process as possible to improve employee safety, health and wellbeing.

What was done and how?

Midleton Distillery consulted with Pilz, an automation technology firm, in 2017 to explore automated options regarding barrel unloading. A project team was formed, comprising Pilz consultants, members from the health and safety, engineering and operations teams at Midleton Distillery. It also included the operators who would eventually run the equipment.

No off-the-shelf solution was available, so they decided to develop an innovative and previously untested

concept using a combination of robotics and AI to automate the barrel handling process. The project team worked together from the initial concept through the design, commissioning and operational stages.

Consultation with safety representatives also took place on a regular basis, and both were very closely involved with the project. Various options were evaluated until the team finally agreed on the development of a tailor-made autonomous mobile robot (AMR) guided by an AI vision system that offered full flexibility in reach, travel path and 360-degree orientation. It was selected for its ability to minimise manual intervention and effectively address the identified risks.

Over a three-year period, the AMR system was developed, installed and commissioned at Midleton Distillery. It became fully operational in the summer of 2024.

What was achieved?

The AMR system increases safety and efficiency, addressing the risks associated with manual unloading and accommodating the variability in barrel placement and sizes. As a result, there has been significant improvement in worker health, safety and wellbeing at the facility. The system has a high-performance level for all primary safety features, including safety circuits, light curtains, e-stops, safety gates, 2D floor scanners and a trapped key Safety System. This level of protection enables a number of critical operator interactions with the system, while ensuring operator safety at all times.

Using the trapped key, operators can protect themselves and alert the system to their presence. This is done while accessing a bay adjacent to the robot to prepare for the arrival or departure of another truck without stopping operations. In the event of an inadvertent step towards a working robot zone, the light curtains that segregate each bay will bring the robot to an immediate stop. The 2D floor scanners also protect operators by stopping the robot's hazardous movements when the safety zone is entered.

Success factors

- Health and safety is a priority at Midleton Distillery, with a zero accidents objective implemented through their *Taking Care of Each Other* programme.
- There has been a 100 % reduction in accidents.
- Senior management's commitment and the genuine collaboration between management and workers contributed to the programme's success.
- Involving the operators in all stages of the project gave them a sense of ownership and was key to its effective implementation.
- The robotic system is engineered to minimise manual intervention while maintaining a human-in-command approach. This ensures operators always remain in control of the process.

- The design ensures operators can safely operate equipment and make decisions from a secure area, with protocols in place for safe interventions when necessary.
- The system complies with machinery safety standards and Pernod Ricard's Machinery Safety Operating Requirements.



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Transferability

The robotic system could be adapted for use at other Pernod Ricard sites or similar distilleries that take in barrels. In fact, other distilleries have already expressed interest in the technology, and Pernod Ricard and Irish Distillers are keen on transferring knowledge and sharing the benefits of this technology.

Due to its scalability, this type of technology is also suitable for use across many industries and sectors that handle barrels of various sizes and other containers.

Costs and benefits

The significant cost of the robotic system is immaterial when compared to the costs associated with poor health and safety, injuries to workers, lost hours and insurance costs. Since its introduction, no accidents related to barrel handling have been reported.

The fact that the system can unload barrels stacked in threes rather than twos (as would have been the case with other solutions) is estimated to reduce the number of containers by 463, with a cost savings of EUR 1.38 million per year.



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Key features of good practice example

- **Significant risk reduction** – The level of operator manual interaction and associated high-risk tasks have been greatly minimised.
- **Container capacity** – The system can handle containers with barrels stacked three high.
- **Cask size variability** – The system can effectively manage variations in cask sizes.
- **Operator upskilling** – The system was designed in consultation with operators who

were involved in all stages of the process, including an extended commissioning and training phase. This enabled operators to gain experience and develop new skills.

- **Future enhancements** – The technology has potential for future upgrades to handle larger barrel types.
- **Scalability** – The solution can be adapted for use at other Pernod Ricard sites that handle barrels.
- **Compliance** – The system fully complies with both local legislative requirements and Pernod Ricard standards, including risk assessment.

Further information

Further information can be found at

<https://www.pernod-ricard.com/en>

The AI-based robotic system is engineered to minimise manual intervention while maintaining a human-in-command approach.