

# Addressing The People & Productivity Conundrum In UK Food Manufacturing

Experts in Man and Machine

A White Paper by Craig Forrester, General Manager of Stäubli UK



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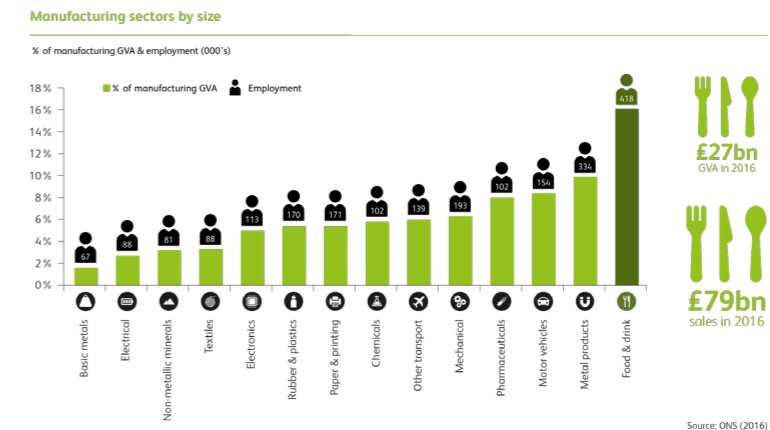
## Section 4: Conclusions & Recommendations

**“Food and drink manufacturing businesses will need to recruit an additional 140,000 individuals by 2024 to meet the demands of a population that is fast approaching 70 million.”**

## Executive Summary

Within the UK, the food and drink manufacturing sector is the largest, bigger than the automotive and aerospace sectors combined. It is no surprise therefore that over 400,000 people are employed within this important manufacturing sector. However, this in turn highlights the reliance that the sector currently places on the ready availability of manual labour.

The following sections of this White Paper discuss how the sectors relationship with and reliance upon manual labour is likely to change in the near future, influenced both by the changing labour market and the realisation of the benefits which a greater uptake of robotics and automation could bring to the sector in terms of increasing productivity, quality and yield.



In recent years, many UK food manufacturers have relied heavily on EU nationals to bolster their workforce and in fact at its peak, almost 1/3rd of those employed in this sector were from the EU. As the UK heads towards a changing relationship with Europe in 2019, we are already seeing a decline in the number of EU nationals working in this sector. Furthermore, statistics from the Food & Drink Federation predict that food and drink manufacturing businesses will need to recruit an additional 140,000 individuals by 2024 to meet the demands of a population that is fast approaching 70 million.

As an industry that is currently heavily reliant on manual labour, and where many of the jobs are other than highly skilled, there is likely to be ongoing and significant challenges in the recruitment and retention of the numbers of people needed to maintain required production levels. If this sector is to meet and sustain future production demands, and mitigate the effects of labour or skills shortages, then it must embrace change.

Another factor that must be addressed is the UK's productivity levels, which fall significantly short when compared with those of the other six G7 nations. With such high levels of manual labour within this sector, there is a strong relationship between people and productivity.

**“The UK Food & Drink sector represents around 16% of manufacturing GVA”**



# 1.0 People

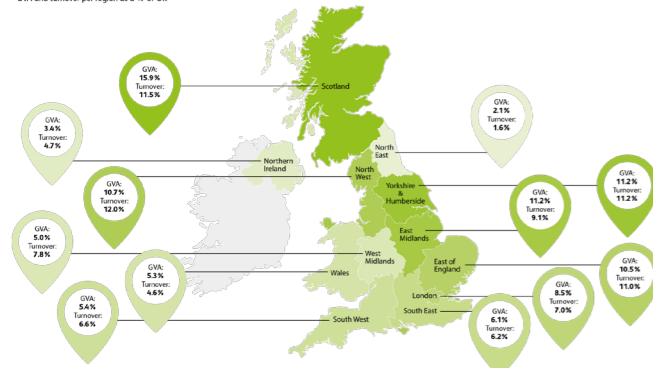
## Sector Reliance On Manual Labour

As outlined within the executive summary, the UK's food and drink manufacturing sector remains heavily reliant on predominantly low and semi-skilled personnel across many production areas. Whilst humans are ultimately flexible and able to adapt to just about any task presented to them, there are a number of negative factors and influences.

The low pay environment means that all too often there can be a high turnover of production staff, which in turn means ongoing recruitment and training by HR together with the ultimate learning curve as new operatives are placed on the production line. Also many of the tasks that people currently undertake within this sector are simple and repetitive, such as picking, placing, packing, loading and unloading.

Output and turnover in food & drink across UK regions

GVA and turnover per region as a % of UK

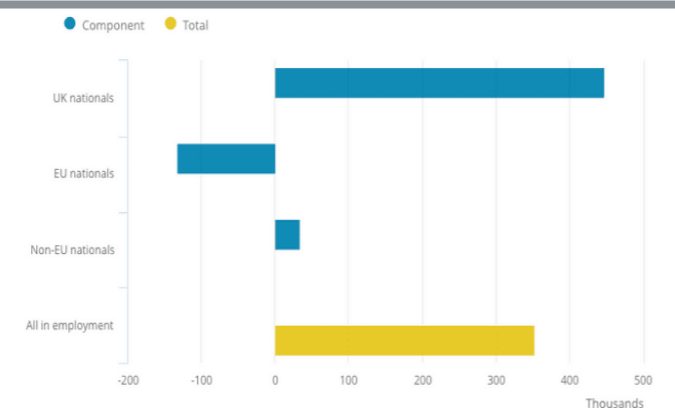


“Food and Drink manufacturing is important in all regions of the UK. ”

Ensuring that the people undertaking these tasks each and every day continue to feel valued and remain motivated is difficult, as generally there will be little opportunity for ongoing skill or career development. As a result many individuals will have no hesitation in moving on if they are offered a slightly better hourly rate or a more interesting role. There is also the issue of unauthorised absence that blights many manufacturing companies across different sectors, where operators fail to arrive for shifts without notice. This in turn can affect production output, productivity and quality either due to insufficient numbers of operators or the negative effects of new or less well trained operators being introduced to the line. As for every sector in the UK, food and drink also suffers from the combination of an aging workforce and the dilemma of encouraging young people to enter the sector. Food science, food nutrition and product development roles will be attractive

to University graduates and of course apprenticeships will attract those interested in engineering related opportunities, however the production operative role in itself is not a particularly attractive option for young individuals seeking both employment and career progression, and it is in this area where there is likely to be the greatest shortfall in recruitment numbers.

Figure 4a: Changes in people in employment by nationality in the UK between July to September 2017 and July to September 2018, not seasonally adjusted



“Figures from the ONS show a drop of 132,000 in the number of citizens from other European Union countries working in Britain ”

## Influences

The “Human Factor” can influence manufacturing processes in a variety of ways, some positively and unfortunately some in a negative way. With the food and drink sector so heavily reliant on manual labour this means that there are many opportunities for operators to impact the manufacturing process.

### A) Hygiene & Food Safety

All food production environments are subject to rigorous hygiene standards and adherence to regular cleaning regimes for production equipment and machinery. This ensures that there is little opportunity for product contamination. However, where any unpackaged or fresh product needs to be handled, and where humans are involved, there are greater opportunities

for contamination, even from very small amounts of bacteria which may be present on the person despite well disciplined cleaning regimes. As one would expect, systems have been devised to minimise the risk of contamination. Typical methods used to control and manage bacterial contamination from operatives include the use of PPE (Personal Protection Equipment) – hairnets, masks, overalls, boots and gloves etc. There is however a cost for the provision of this equipment and the subsequent laundry costs for the re-useable items. In addition, management of changing areas and locker rooms is also significant and adds further to the overall impact of the control of potential contamination from human sources.

### B) Consistency, Quality & Yield

Product consistency and quality are demanded not only by the consumer, but also by the major retailers, as they wish to protect their brand and reputation in the face of stiff competition. It is essential that products look the same on the shelf, and have a consistent make up. The last thing a retailer wants is the consumer browsing through and disturbing multiple products to find the one that looks best, or the pizza which has the most pineapple. Consistency is key.

Many of these product handling and placement tasks are still performed by operators, and even although they may work to visual reference guides, there is still going to be an element of difference between one product and the next. The fact that the product is probably on a moving line adds to the potential for variation between one product and the next.

With operators performing these simple yet highly repetitive and often boring tasks across a shift, there are plenty of opportunities for variation in quality. Whilst some of this can be attributed to “natural variation” and remain within overall specification, there will be instances where the variation is too great and the product will be removed, either for re-work or scrapped. This will have a negative impact on yield.

### C) Feeding the supply chain

Supplying into the major retailers requires not only consistency in quality but also consistency in supply. These major retailers expect to take delivery of a pre-agreed number of products within their distribution warehouses often within a narrow time slot.

This in turn brings us back to productivity and yield, which must attain acceptable levels at all times if these delivery criteria are to be met. However in certain cases, the performance levels required are once again heavily influenced by manual operators.

As the requirement for manual labour resource is predicted to grow, and if the expectations on reduced availability of EU workers materialise, then manufacturers could face serious issues with insufficient operators to meet future production demands from the retailers. There has to be a limit in terms of how long the sector can rely on the number of hours worked by manual labour as a means of achieving output and growth.

## 2.0 Productivity

**“At the national level improving productivity contributes to boosting living standards by improving profitability to pay for higher wages, higher consumption levels and with it improved economic and social indicators” \***

Productivity is one of the key drivers in manufacturing, if you can't make the product – you can't sell it. In the areas where the manufacturing process is automated, save for unexpected breakdowns, productivity levels will be both high and predictable.

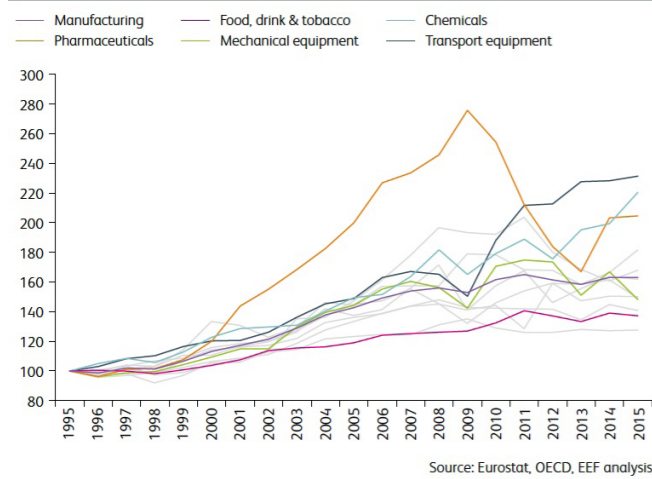
As there are still also so many different areas within the food and drink sector where operators are involved, they then become the limiting factor in productivity levels.

Of course, if additional manual resource is available, then it is possible to quickly raise production output and productivity levels – assuming that upstream processes, which may be automated, are able to meet the increased demand. This is one of the benefits of manual labour - if it's available you can quickly scale up with no capital investment. This concept is a regular occurrence at certain times of the year as manufacturers gear up for a peak in demand in their products. However it should be noted that for these events, recruitment planning begins months ahead of the actual requirement to ensure sufficient numbers are in place.

In normal day-to-day production, fluctuations in availability of suitably trained operators will have an adverse affect on productivity. This can even change between shifts, for example all operators may be available for one particular shift but for different reasons, a reduced number turn up or are available for the next shift, making for a potential shortfall in overall output. The UK as a whole performs poorly in productivity terms when compared to many other countries.

\* Source (EEF - The Manufacturers Organisation Report “Unpacking the Puzzle”)

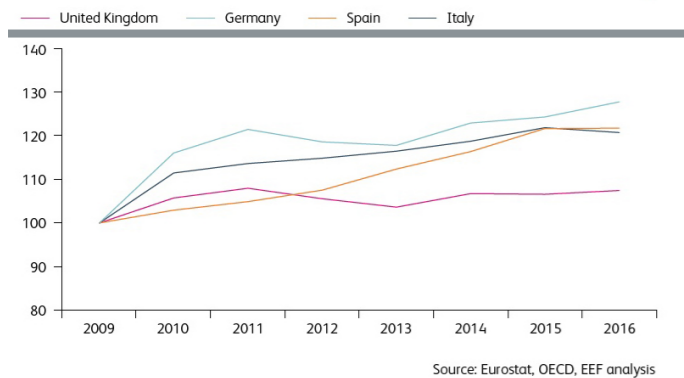
Real GVA per hour (1995=100)



## How UK manufacturing sub-sectors compare on productivity growth

Figures released by the Office for National Statistics in 2018, show a productivity gap for the UK of some 16% compared to other G7 nations, and in fact, labour productivity fell by 0.4% in Quarter 1 2018. This is an indication of the volatility that can affect labour intensive industries here in the UK.

Statistics from the EEF's Productivity Report 2018 show that UK manufacturing productivity levels were catching up with international competitors in the run up to the 2008 recession. However after this, and the collapse in productivity growth, this trend went into reverse. Today we have a lot of catching up to do. There are of course many influences which determine the levels of productivity in any manufacturing organisation, however if we contrast the differences between other sectors with those of the food sector there is a definite disparity.



## UK manufacturing productivity has underperformed since 2009

Although the current high levels of employment in the UK can be seen as a good thing, growth will be restricted if there are no more people to fill future roles in manufacturing.

The dilemma then is how to continue to grow the economy and improve productivity with a somewhat static labour force. This is where robots and automation can play a crucial role.



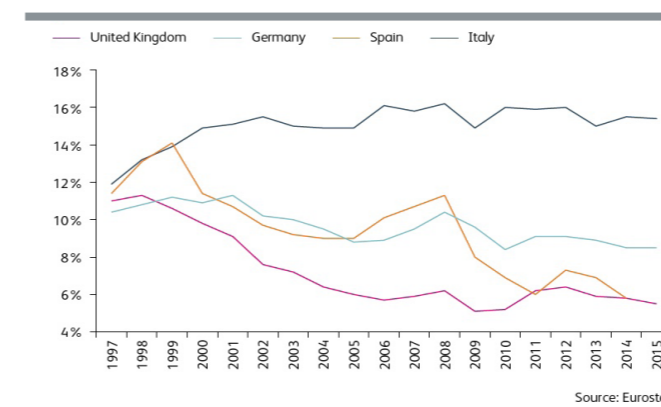
# 3.0 The Automation Influence

## “Will Robots Take Your Job?”

Latest research from the World Economic Forum suggests no. It forecasts that by 2022, robotics and AI could create over 130 million jobs, this is almost double the figure they are set to displace. The rapid evolution of machines, robots and algorithms in the workplace could create 133 million new roles in place of 75 million that will be displaced between now and 2022, according to the report. The figures are based on a survey of business chiefs and top strategy executives from companies across 12 industries and 20 developed and emerging economies, which collectively account for 70% of global GDP.”

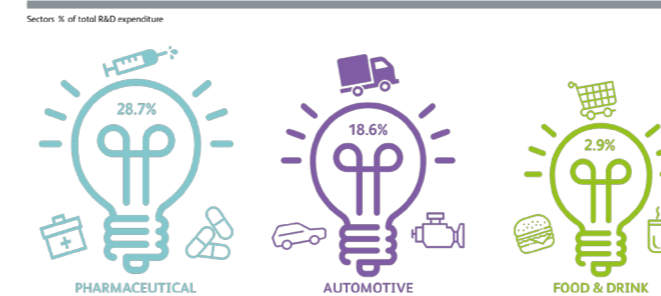
There are a number of theories relating to which factors affect productivity growth in UK manufacturing. One of the most dominant is under-investment in capital equipment. There is perhaps a synergy between this theory and the UK's ethos of “make do and mend” which tends to keep old equipment running despite poor OEE figures and high levels of maintenance.

Manufacturing investment in machinery and equipment as a % of GVA by country



## The UK overall lags behind in terms of investment in machinery & equipment

Food & drink sector's low R&D intensity represents an opportunity for manufacturers



## The UK's Food & Drink Sector also has a lower R & D intensity when compared to other sectors

This, coupled with high levels of manual labour, which is often seen as a more palatable cost than investment in new capital equipment, restricts the potential for improving productivity.

The solution therefore, in a declining labour market must be both a change of emphasis by management - this is not an HR issue but an Engineering opportunity - and a significant

investment in technologies such as robots and automation. There are however still a few perceived barriers to automation. There is little doubt that robots and automation have at some points in time suffered from “Bad Press” largely due to inaccurate perceptions of the technology and how it is reconciled with jobs for humans.

## “Robots cost jobs”

There are few who would argue that robots and automation have been the key drivers behind the success of the UK's automotive sector, and yet these plants still employ many thousands of human workers who benefit from job security and good wages. The high levels of consistency and productivity that robots and automation bring to manufacturing processes of all types, help companies in many ways, often allowing the company to grow more quickly and in turn create more jobs.

The introduction of robots also opens up the opportunity for manual operators to be either re-deployed to areas where additional resource is still required, or to gain new technical or quality related skills. Enhancing the skill level of a workforce can only be a good thing.

## “Robots are too complicated”

Today's robot systems are ultra reliable, and with each new generation have become more flexible, simpler to programme and operate. Robots are no more complicated to operate than any other item of automated production equipment, however they offer much greater levels of flexibility.

## “Robots are no good for low volume and high mix production”

In the case of early first generation robots, this statement was probably true, however the ongoing development of end effectors, sensing technologies, machine vision and the robot arms and controllers, mean that robots can be configured to produce a batch size of one.

\* Source (EEF - The Manufacturers Organisation Report “Unpacking the Puzzle)

## “Robots are not suitable for High Care areas”

Not true - today there are variants of robot arm designed specifically for operation in areas which demand the highest levels of cleanliness. Robots have been working with the Medical Device and Life Sciences sectors for years, so their credentials for cleanliness are well established and well proven.

## Inhibitors to Investment

In addition to the often unfounded mis-conceptions surrounding the technology, there are also other possible “inhibitors” which require consideration.

### “Uncertainty over contract security”

Food and beverage manufacturers work extremely hard to secure supply contracts from the major supermarkets and retailers. In addition to manufacturing the product, suppliers must also constantly consider factors such as price, shelf space, exclusivity, continuity of supply amongst many others.

In certain cases, these factors may have an influence on the duration or security of the contract between the manufacturer and the retailer.

This, together with a traditional short term view on payback on capital projects, is often cited as a reason to avoid capital investment in new equipment or technology such as robotics or automation.

Instead, the company will continue to rely on manual labour to perform tasks which could in many cases easily be automated. Taking an alternative view, either on the duration of the payback period and / or considering flexible financing options such as hire or leasing, may open the door to the introduction of the technology which could potentially transform productivity levels. Improvements as a result of this investment may actually contribute to the security of the contract.

The flexibility of robots, for example, allows them to be used for new products or new contracts and their inherent reliability means that they will provide years of service. Having technology in place when bidding for new contracts can also differentiate suppliers and provide a competitive advantage.

## “Concerns over brand, heritage and tradition”

Companies with a long established heritage and who manufacture products with a “Traditional” reputation may be steering away from the latest technology for fear of losing their long established reputation for tradition and quality.

Failing to embrace the opportunities that Robotics and Automation can bring could result in not only higher costs, but lower productivity and yields. For food products, the tradition is often in the recipe, not in the way the product is handled. We all know that it’s not actually Mr Kipling baking the cakes or Auntie Bessie creating perfect roast potatoes, high levels of automation will be at work here in many areas.

Whilst these are examples of very high volume manufacture, it is still possible for manufacturers producing smaller volumes or artisan type products to introduce robots, without damaging the brand.

For many, the introduction of a Collaborative Robot(s) may be the answer - the craftsman is still there but output can be more consistent and productivity also improves - man and machine in perfect harmony.

### “Knowledge and expertise”

For the industries which currently have high levels of automation and robotics, there are well established guidelines, procedures and standards relating to the configuration, installation and operation of the technology within their specific sectors. In addition, there are numerous system integrators available who have an extensive track record of implementing robot and automation systems within these environments.

As a relative newcomer to Robotics, the food and beverage sector is unable to draw upon the decades of expertise available to other highly automated sectors, such as automotive. For some manufacturers, the absence of these automation skills in-house and the limited number of system integrators with the track record and experience of introducing robot systems within the sector is seen as a potential barrier.

Help is available however from a number of sources including (EHEDG) - The European Hygienic Engineering & Design Group. Founded in 1989, this is a non-profit consortium of equipment manufacturers, food producers, suppliers to the food industry, research institutes and universities, public health authorities and governmental organisations.

EHEDG has available a wide range of guideline documents which cover many different topics relating to design criteria, best practice and standards for the production of food

manufacturing systems, including the use of robots and automation in this sector.

There are robot suppliers and system integrators who have been working closely with EHEDG and who can provide a valuable insight into taking the first steps into food automation.

## 4.0 Conclusions & Recommendations

### Embrace the opportunities and benefits of change

Robots have evolved tremendously since they were first introduced into UK manufacturing. We now have an enormous range of robot types, from 3 axis cartesian robots, 6 axis articulated versions to very high speed SCARA and DELTA types, not to mention the latest collaborative robots.

Combine these robots with state of the art machine vision systems, sensors and intelligent gripping systems and there are very few applications where robots might not be a suitable option. There are already food manufacturing lines where robots operate at high speed, picking and placing even the most delicate products, proof enough that the technology works, so how can companies set out to explore the potential benefits?

### “Robots - the future resource”

The issues surrounding the potential shortfall in the availability of manual labour should be the key driver for contingency planning.

Manufacturers should as a priority, begin to evaluate which areas of their production, currently reliant on significant numbers of people, could be the prime candidates for automation.

The resource of the future, most certainly the one which can be relied upon to be readily available when needed, will be the robot.

### “Consider or re-consider opportunities”

Manufacturers who therefore rely heavily on manual labour for product handling, transfer or placement operations should take the opportunity to look closely at the wide range of technologies and solutions which are available today.

Also, companies who may have considered the introduction of robots in the past, but decided at that time to continue with the traditional manual approach, should re-visit those applications. Technology has developed at a significant pace in recent years, potentially opening up a host of new opportunities for food manufacturers.

### “Seek advice from the experts”

Robot manufacturers with previous experience of the food sector will be able to offer sound advice on a wide range of topics including:

- The suitability of robots for the task being considered
- Which robot type or configuration will be most suitable for the application: 6 axis, SCARA, Collaborative etc.
- Insights into cycle times
- Ideas on gripping technology
- Recommendations and guidelines on hygiene, cleanliness and safety
- Which system integrators may have the necessary expertise



# Stäubli Food Sector Solutions

Hygienic processing and packaging

## Stäubli - A Partner To The Food Sector

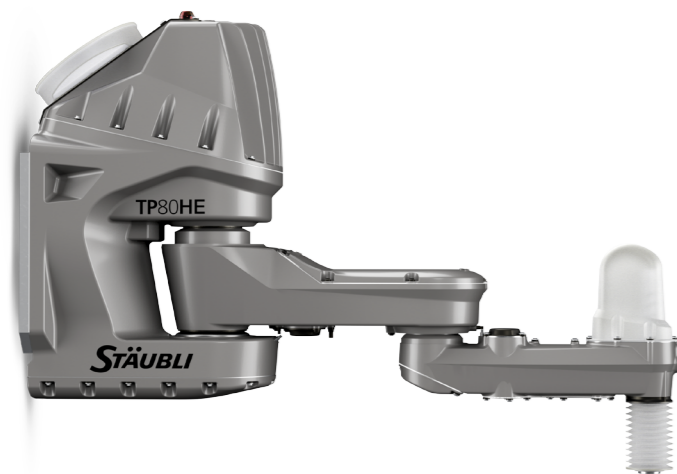
Equipment used within the food sector operates continuously at speed and therefore must be ultra-reliable if high productivity and efficiency levels are to be achieved.

Stäubli automated solutions maximise efficiency levels by minimising downtime and increasing flexibility. Automation also ensures a hygienic process by eliminating the risks of human contamination.

Stäubli is an expert in the food and beverage industry, offering economic robotic solutions for even the most demanding applications. Our HE robots are a prime example of our high level of expertise in the food sector.

These robots are designed for use in sensitive and high care environments where they can be exposed to washing and disinfecting solutions as part of a daily cleaning cycle.

The FAST picker TP80 HE is the world's fastest picker, fully designed for hygienic packaging and processing, entirely based on EHEDG recommendations. Its unique design makes this robot completely airtight to work in humid environments.



### High Performance

Up to 200 picks per minute with a consistent repeatability of  $\pm 0.05$  mm across the entire work envelope of 1600 mm diameter.

### Hygienic and washable design

Compatible with lots of cleaning and decontamination solutions. Fully enclosed and pressurized structure designed for highest hygienic requirements.

Stäubli robotic arms are designed to handle all applications, from upstream processing through to sorting, packing and end-of-line palletising.

## Stäubli Added Value

### Designed for high production volumes

- World's fastest picker
- Perfectly suited to work in primary and secondary handling applications
- Optional VALtrack software for single and multiple robots on conveyor(s) including queuing functionalities
- Compatible with all kinds of vision and sensor systems
- Reliable and safe handling of sensitive products

### Easy and efficient robot integration

- Easy to exchange
- Easy accessibility
- Low integration costs

### Compatible with most cleaning, decontamination and sanitising solutions

- Robot resistant to pH 4.5 – 8.5 environment

### Fastest picker with optimum work area

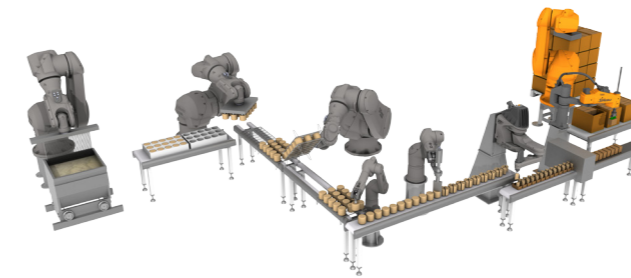
- 1600 mm work envelope
- Up to 200 picks per minute (ppm)
- Consistent repeatability  $\pm 0.05$  mm across the entire work envelope
- No limitation of camera view due to unique Kinematic

### Reduced cleaning costs

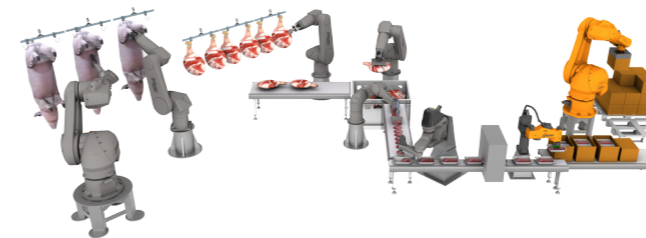
- Foaming and rinsing identical to the rest of the line

### Designed with no compromise in performance

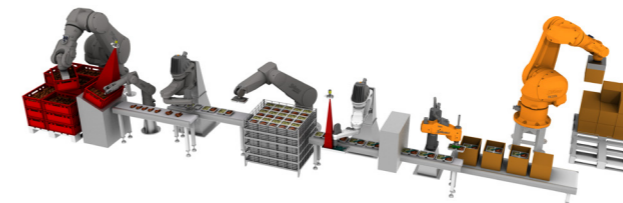
- Tool and critical parts made of stainless steel
- Consistent high performance with H1 food oil, NSF compliant
- Bellows



*Cheese production : Stäubli HE robots are used in unpackaged product zones, with standard Stäubli robots being utilised once the product is sealed.*



*Meat processing : Stäubli have robots suitable for both handling and processing of product in sensitive working environments.*



*Ready-meal preparation : Utilising Stäubli 4- and 6-axis robots, the large variety of recipes and rapid changes in production are easily accommodated.*



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