



# Next Generation Potato Handling

Founder and chairman, Rod Herbert, presents his opinion of the 'People v Power' tools and technologies in the potato handling industry

The following, is an excerpt of Rod Herbert's presentation, for the World Potato Congress 2009 in New Zealand.

Over the past few decades 'power' has been in the ascendancy but the question is, will it be in the future and will it win the battle? Looking back briefly over the last 20 to 30 years, development of all types of potato machinery has been happening on a regular basis.

## Harvesting & Grading Potatoes

In the field, there have been changes from 2 row-trailed harvesters through 4 & 6 row machines and then on to self-propelled. Cleaning systems have increased in terms of ability to handle higher volumes and more difficult lifting conditions. "On farm" grading has likewise had similar developments with a key factor being the need to handle the crop more effectively and at increased speed. In the early 1980's, 900mm and 1200mm wide machines were the order of the day, now most modern systems are 1800mm or 2400mm giving massive grading capacity but only just keeping ahead of the high speed modern harvesting technology. A wider range of cleaners has evolved to cope with the more difficult lifting conditions.

## Fresh Pack Potatoes

The packing industry likewise has radically changed in appearance from the early days of the 1970's. Labour reduction has been a major consideration throughout as the need to drive down cost has become ever more important. Changes from large paper and Hessian bags to small "breathable" packaging has meant pack-houses regularly changing their end of line packing machinery in order just to survive in what became, in the late 80's and 90's, a very cut throat business. In the UK the consolidation and rationalisation of the supermarket supply chain in the 90's has subsequently led to fewer packers.

## Processed Potatoes

The Processing sector has enjoyed some strong periods of growth with an increase in market share based on a demand for the end-processed product. More recently however this has been affected by the trend and promotion to eat "healthy" fresh potatoes. The advancements in technology are seeing major companies increase efficiency with improvements in peeling, cooking, inspection and packing machinery. Electronic inspection of peeled products has been a major step forward and this sector of the industry has welcomed this development much quicker than others.

## Key Driving Factors

Today, if we look at technology for the potato industry there is a wide variation in the level of sophistication, due to the needs of farmers, packers and processors and to a greater extent, the geographical location. The main drivers for investment are Health and Safety, cost and reliability of labour, the need to increase efficiency and of course, end customer requirements.

The UK Fresh pack potato industry is generally accepted as one of the more advanced and to some degree complex in the world. It therefore follows that many of the latest technological advancements have been tested in the UK before being accepted by other companies around the globe, where the demands by the end user are perhaps not so great.

## Technologies

Automated in-feed systems allow product to be delivered out of boxes or bags at high speed, but with great control of transfer so as not to cause any damage. Combined with "rolling road" box handling technology, modern day intake grading lines need very little or indeed no forklift activity, with boxes being delivered, filled and dispatched all under the control of a central management system. When installed in conjunction with a fully integrated

tracking package you also have a system which needs very little human intervention. Safety fences and light beams satisfy the Health & Safety aspect and the speed and efficiency combined with reduced box wear also means that the company gets a return on their investment.

Likewise, if potatoes are being handled in bulk there are many ways in which large holding bins can be accurately and efficiently filled and again, much of the factors are common with box handling when you look at areas of saving. Many pack houses generally operate with boxes within the size range from 1 to 2 tonnes. By tagging these boxes it is very easy to attach all information relating to the potatoes in the box, this information then travels with the unit load until it is dispensed into the line further in the process. Automated vertical warehousing for this boxed product are also becoming more commonplace with the system able to fill, transport, store and re-distribute individual boxes of specific size and variety. The boxes can then be automatically transported and tipped into a line without the need for any forklift or human assistance.

Electronic sorting has been one of the most closely watched developments in recent years and the opportunity to reduce labour cost at higher speeds with easier management of quality is appealing to all. There are several different types of electronic sorter on the market using different methods for both transport and ejection of selected tubers. There are systems such as track and freefall, which have a number of advantages and disadvantages discussed during the presentation, however probably the best compromise is a roller transport system, which offers the quality of grading as potatoes turn continuously under the cameras, and gives excellent throughput as potatoes are analysed in rows. This system is also extremely gentle on ejection



of selected product. However, the success of this technology by whichever method to give real benefit is directly attributed to the effort put into its operation.

Turning to weighing and packing, as mentioned earlier, the need to continuously update machinery in recent years has meant very few weighing machines are seeing their lifespan out, in their original intended application. Bagging technology has likewise developed hand in hand with these Multi-head and linear weighers. Vertical and linear form fill systems using "on roll" feeds are now commonplace. These machines, although more complex than their predecessors, are proving very effective and reliable at these new high speeds. Faster, more efficient, complete packing systems, capable of throughputs in excess of 100 units a minute, are now being used.

To some extent this increase in packing is linked to the need to invest in electronic sorting, as the labour and space required for manual inspection at these rates is generally not realistic. The electronic systems can comfortably inspect at these rates but using a much smaller footprint.

At the end of these packing and process lines more and more people are investing in "end of line" solutions to put produce packs into trays, cartons, cages and other shippers. Automated tray handling has been a growth area with systems not only needing to deliver at high speed but also be able to cater for a wide range of trays in line with end customer requirements. Link these tray systems with robotic technology, and you will see totally unmanned systems, placing packs into trays and then trays automatically dispatched, collated, stacked and wrapped ready for collection. Again, there are different methods for pack placement which include 6 axis robots, single arm action and linear pusher technology, all of which have both plus and negative points. We are also now seeing more companies looking at fully automated despatch areas, where loads are collated and automatically placed into the outgoing container without the need for pallet trucks etc. All of these current systems have the capability to be integrated

into a traceability system, so the full history of any particular load arriving at a factory can be followed, monitored and recorded for future reference.

### What of the Future?

Health and Safety legislation is putting more and more emphasis on the potato operator to reduce risk and have a safer working environment. Some of this will be achieved by a continual replacement of manual labour with automatic solutions but there will always be a degree of intervention. Labour costs increase year on year and the difficulty in finding a good, reliable resource of labour will remain, so again any technological advancement which gives labour savings, will be of great interest to the industry. Customers will continue to demand high quality at reduced prices and so efficiencies of operation remain paramount in any organisation.

Developments on farm will see a push or change dictated by packers and processors to reduce the transportation of soil and waste. The changes will require more washing on farm; better cleaning systems and electronic defect detection of foreign objects. This has started already in the UK and will undoubtedly see a growth spurt in development and demand in the next couple of years.

The further development on automated intake areas will be an important aspect, with further integration of management information to decide on routings for product, based on quality, combined with automatic quality sampling. Indeed, the ability to make live adjustment of grading and routings based on continuous sampling may not be far away.

The use of dedicated boxes or containers will also increase to ensure automatic delivery, filling, warehousing, despatch and tipping is more fully controlled. Automated warehousing of raw material, pre-process will also become more prevalent as the opportunity to reduce labour, forklift movement and the potential for mis-management increases.

A further move to offline high-speed pre-

washing is likely to be made in the packing sector. This will enable high output cleaning of the product and should benefit from advances being made in the controlled storage of both washed and dirty potatoes. The move to offline washing will take away the current restriction of capacity in standard wash lines and give operators much more flexibility.

The associated high capacity electronic sorting systems will compliment this change and give greater efficiencies further in the process. In hand with this, further advancement in electronic sorting will be made and some enhancement of surface defect detection will happen by natural progression. The most interesting development in this area is likely to be around the relatively new use of X-ray and infrared for both foreign object and more importantly sub-surface defect detection. In-roads have already been made in some key areas of this but more work is required before a stable system is offered to the industry. There is also likely to be a continued evolution of hybrid systems based on successful integration of electronic inspection from other industries such as fruit.

In weighing and packing the boundaries will be stretched further and even higher; speed weighing and bagging solutions will be developed to further increase efficiencies. This may be linked to a requirement to reduce the number of options on pack size etc in order to get longer runs of like product.

### Summary

Standstill is not an option and therefore it is the commitment of handling companies such as Herberts to invest in R&D, which will play its part in driving the industry forward. It is also paramount for all companies to work together to find tomorrow's solutions for today's problems. Our progress in technology development is directly related to the feedback of our customers. It would seem therefore that the empowerment of people by re-training to understand new technology will make businesses embrace, understand and above all benefit from our industries future developments.