

Centralised vacuum supply system for beef packaging in Denmark

by Uli Merkle, Manager Marketing Services, Busch Dienste GmbH, Germany.

Since 2014 DC Beef, a division of Danish Crown, has operated a cattle abattoir and meat processing facility in Holsted, Denmark. It has a capacity of 900 animals per day and is one of the largest and most modern facilities of its kind in the world. The vacuum required for packaging the final products is supplied by a Busch centralised system.

Danish Crown has manufactured food products for more than 125 years, and is now the largest abattoir and meat processing corporation in Europe. It employs 23,000 staff and is one of the top three meat exporters in the world.

As the beef division of Danish Crown, DC Beef's activities are cattle slaughter and beef processing. DC Beef operates two abattoir and deboning centres in Denmark and one in Husum, Germany. Two processing centres are also operated in Denmark.

The new facility in Holsted was constructed in early 2014, and employs 350 production staff in a two-shift system to slaughter, debone and process cattle.

Latest standards

Every aspect of the production process is designed to the latest standards. The EUROP classification guarantees top quality beef processing. Every half carcass is scanned automatically to determine its dimensions, fat content and the position of fat layers.

This information is analysed and used for sorting purposes, with the objective of delivering beef of similar quality to the individual processing lines. This fully automatic system is supplemented by DC Beef staff, who conduct an additional visual check. The half carcasses are then stored for at least 24 hours at below 7°C before further processing.

DC Beef products from Holsted are exported throughout Europe. All products leaving the factory are vacuum packed, from quarters of



The pump room showing installed R 5 rotary vane vacuum pumps.

beef to commissioned packaged units for end users.

DC Beef uses a variety of packaging machines, depending on the packaging size, number of units and cycle times required.

Thermoforming, tray sealing and rotary vacuum sealing machines are operated, all of which require high vacuum levels. The packaging lines were designed from the outset for a central vacuum supply. The benefits of centralisation are apparent, and have been confirmed by experience at other sites. No vacuum pumps are installed in the production area, providing the following advantages:

- No heat emissions to cooled rooms, thus saving energy.
- Optimal hygiene, no aerosol emissions in the production area.
- Outstanding reliability.
- No downtime for maintenance: easy-access servicing without production stoppages.
- No maintenance tasks are carried out in the production and packaging areas.
- Low operating costs.
- High energy efficiency.
- Consistently high vacuum levels.
- No noise emissions at work-stations.

The contract to design and implement the central vacuum supply was awarded to Busch, as Busch equipment had previously been supplied to other Danish Crown sites.

An additional argument in favour of Busch products was the presence in Denmark of Busch A/S, which has a special department for the design and manufacture of centralised vacuum systems and supplies complex custom-made vacuum systems.

Busch vacuum specialists in Denmark designed and built the DC Beef central vacuum supply, and the system was commissioned in early 2014. The entire stainless steel pipework system was also dimensioned, installed and commissioned by Busch.

The vacuum system is installed in an intermediate floor directly above the packaging lines, and is powered by R 5 rotary vane vacuum pumps.

These were requested specifically by DC Beef, as previous experience of these models had been extremely positive. In addition, several R5 units formerly in service at other sites could be incorporated into the system. The central vacuum supply thus comprises new and factory-reconditioned R5 vacuum pumps.

Two R5 units with a pumping speed of 400m³/h each supply three tray sealing machines to pack minced beef under a permanent vacuum of 30mbar. Five vacuum pumps of the same type and dimensions supply vacuum at 150mbar to three thermoforming machines and two rotary vacuum sealing machines (carousel).

The vacuum system is designed so the pipework between the packaging machines acts as a reservoir in which vacuum can build up between evacuation cycles. This has the advantage that vacuum is applied instantly at the start of the packaging evacuation.

The arrangement also saves the installation of a separate vacuum reservoir, and increases the production rate by reducing the evacuation times. The vacuum supply control system was also supplied by Busch, and was integrated into the site control system.

High efficiency

Of all the advantages of centralised vacuum systems, none is appreciated by DC Beef more than high efficiency. The number of vacuum pumps running at any given time is determined by the control system, which activates only the units required to meet the current demand.

The packaging machines never run at full capacity simultaneously, so the full output of all the vacuum pumps is seldom required. In comparison to decentralised systems, the central vacuum supply provides enormous energy savings in both the packaging machines and the supply network.

The central vacuum supply has been in continual two-shift and single shift operation since the first animal was slaughtered at the site in 2014. The DC Beef management report that in more than a year of operation no faults or system failures have occurred. Minor servicing tasks such as inspections and the replacement of oil and filters were carried out by DC Beef personnel.

A maintenance contract agreed with Busch provides servicing by Busch technicians. The single-shift units are serviced once a year, and the two-shift units – with twice the number of operating hours – every six months.

Busch Denmark maintains a stock of reconditioned R5 rotary vane vacuum pumps, which if required can be supplied, installed and put into service within four hours. ■