ENGINEERING TOMORROW

Case story | VLT® Solutions

VLT® AutomationDrives **run Europe´s largest wheat biorefinery**

Annual production of the new Ensus biorefinery on Teesside is expected to meet about a third of the UK requirement under the Renewable Transport Fuels Obligation, which requires 3.5% of all transport fuel to come from biofuels in 2010-11.

The plant, located at Wilton on Teesside in North East England will use 1.2 m tonnes of wheat to produce more than 400 million litres of bioethanol and 350,000 t of high-protein animal feed per year which will reduce the demand for imports.

Alwyn Hughes, Ensus chief executive officer, said: 'We are taking in animal-feed wheat, of which the UK has a large surplus, and refining it into bioethanol and high-protein animal feed. At the same time, we are capturing all the CO_2 we produce for use in the food and beverage industries.'

The plant was designed and manufactured by Simon Carves Ltd, based in Manchester UK.
Simon Carves awarded the prestigious contract for the frequency converters to Danfoss, following careful evaluation of different manufacturers.

In summing up his experience of using Danfoss for supplying frequency converters for the project, Rob Simcock, Simon Carves Electrical Project Engineer says **"Danfoss provided excellent customer service, highly competitive pricing, simplistic and efficient installation and commissioning and excellent reliability".**

Danfoss VLT® Projects
Danfoss UK projects division supplied 50 VLT® AutomationDrives, more than 7 MW in total, ranging from 0.75 kW to 315 kW.
This includes 34 custom-built control panels with VLT® Advanced Harmonic Filters to ensure G5/4 compliance.
The panels were manufactured by Integrator Select Control Systems of Hebburn, Tyne & Wear, who were able to meet the project timescales, documentation requirements and flexibility required when working with large projects of this type.

Ensus Ltd:
www.ensusgroup.com

Simon Carves Ltd:
www.simoncarves.com

www.danfoss.com/drives

VLT® THE REAL DRIVE

Danfoss VLT® Drives Recommended by Ensus
Paul McLaren, E & I Engineer for Ensus says: "I've found Danfoss an excellent organisation for response to issues and technical information, friendliness and professionalism of staff and ease of use of equipment. I would recommend Danfoss as a provider of high quality and reliable drives.'"

Danfoss VLT® AutomationDrive
Danfoss VLT® AutomationDrives for this project include integrated Profibus DPV1 for communication with the Emerson DCS control system, SIL2 Safe Stop technology avoiding the need for costly & bulky contactors; and ATEX approved thermistor supervision simplifying the protection of Ex rated motors in hazardous areas.

Unique back channel cooling
VLT® High Power Drives exceeding 90 kW include a unique back channel cooling system, ensuring that 85% of the cooling air required is passed through a sealed IP55 back channel, thus avoiding contamination of the drive and panel electronics. This innovative design also reduces the size of the enclosure required and the associated door cooling fans.

For low power applications under 90 kW, IP55 enclosures were selected, avoiding the need for control panels. The IP55 VLT® AutomationDrive includes a lockable mains disconnect switch, integrated Profibus, safe stop and ATEX approved thermistor supervision.
The built in DC link chokes ensure low harmonics and mains input current, whilst avoiding derating associated with using series of AC line reactors.

Paul McLaren, E&I Engineer for Ensus, in front of a control panel with 315 kW VLT® High Power Drive and VLT® Advanced Harmonic Filter.

Hammer Mills powered by VLT ® High Power Drives.

Danfoss VLT® Training
During the building phase of the factory, training courses tailored to Ensus and Simon Carves electrical team were implemented.
This was achieved with on-site training days, covering best installation practices and hands-on exercises with VLT® AutomationDrives.
This success was followed up with advanced training for Ensus specialists at Danfoss training facilities in Graasten, Denmark.

Danfoss VLT® Service
Danfoss VLT® Drives are recognised as being the market leader for innovation and are renowned for outstanding reliability.
Even with highly reliable products, quality service and support is vital to customers and in particular to a refinery plant operating 24/7 production.

The Ensus refinery has the benefit of a tailored Danfoss Service Contract which ensures a fast response to site in the unlikely event of a drive failure, peace of mind, controlled maintenance budgets and maximum plant uptime.

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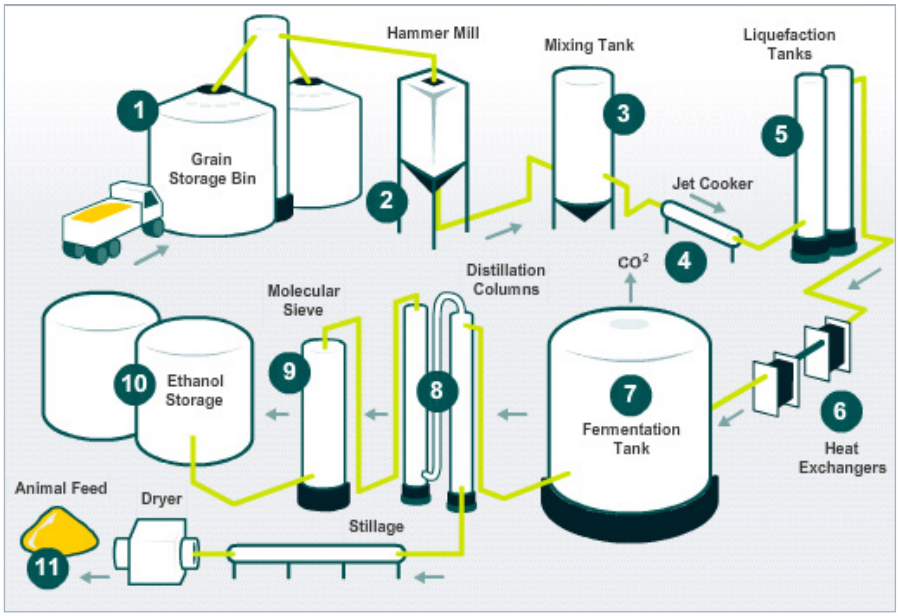
Biorefinery Production Process



Ensus Ltd:
www.ensusgroup.com

Simon Carves Ltd:
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1. Grain Handling: incoming wheat is tested for quality before being transferred into Grain Storage Bins.

2. Milling: the wheat first passes through hammer mills, which partially crush it into coarse particles commonly referred to as "meal".

3. Mashing: water and enzymes are added to the meal in a mixing tank to produce what is known as "mash".

4. Cooking: the cooking system heats the mash to around 100 degrees Celcius. This liquefies the starch and reduces the levels of bacteria in the mash.

5. Liquefaction: enzymes are added to the liqufied mash to convent the starch to dextrose, a simple sugar.

6. Cooling: the mash continues on through a series of heat exchangers that cool it to 30 degrees Celcius before it passes on to the fermentation process.

7. Fermentation: yeast is added to the mash to convent the sugars by the Sachrification method of fermentation. During a 50 hour process, heat, CO_2 and a beer solution made up of alcohol and non-fermentable solids is produced.

8. Distillation: during distillation the beer solution is continuously pumped through a multi- column system that seperates the alcohol and the stillage. The alcohol moves on to dehydration and the stillage is further processed into distillers grains.

9. Dehydration: the incoming 190 proof alcohol is circulated through a molecular sieve to remove any water. The resulting 200 proof ethanol is transferred to on site storage tanks. It can be denatured by adding a small percentage of automotive fuel.

10. Storage: Finally, the ethanol is pumped into storage tanks for onward shipment to fuel terminals.

11. Stillage: the stillage is passed through a centrifuge system that seperates the coarse grains solids from the solubles. The solubles are then concentrated into syrup by evaporation. The coarse grain solids and the syrup are then dried together to produce a high protein, nutritious animal feed known as Dried Distillers Grains with Solubles (DDGS).

source: www.ensusgroup.com