

# Meeting market demands



**JOE  
GALLEHUGH,  
OIL AND GAS  
INDUSTRY  
WRITER,**

**explains how FMC Technologies  
Measurement Solutions, USA,  
teamed up with CLH to meet  
Spain's demand for biofuels.**

When the driving public demands a new fuel and a company traditionally supplies 80% of a country's retail fuel needs; the busy vacation time starts in less than 120 days, how does the company meet market demands? This question was posed to Spanish logistics and distribution company, CLH, in December 2007.

The task was daunting, even for experienced veterans. Alberto Argos, CLH Project Engineer in Madrid for the company's biodiesel project, pointed out that although the company is proficient at receiving, storing, transporting and delivering light oils, the compressed time frame caused some sleepless nights.

60% of passenger vehicles in Spain (approximately 11 million) have diesel engines. If CLH was to capitalise on the biodiesel trend during the peak spring and summer driving months, the company needed a steady supply of biofuel stock, or fatty acid methyl esters (FAME), to make products. It also needed dependable variable flow rate blending technology and extremely accurate custody transfer systems to totalise delivery. Furthermore, because of the precarious nature of the biofuels market in Spain, CLH needed to proceed with caution when approaching this still unproven market.

Argos and his team knew there was more to it than just plugging in a few hoses and offloading to tanks. They needed to offload 30 000 t of diesel from each ship using the ship's existing uncontrolled main line, while simultaneously injecting FAME into the diesel main line to form biodiesel, precisely controlling the

blend despite widely fluctuating flow rates. To fill all the pipes, purge all the entrained air, and allow the terminal tank's floating roof to leave the landed position, the ship's 16 in. main line needed to run at the lowest flow rate for a period of time before ramping up to a

*Figure 1. CLH's Torrejón terminal near Madrid, Spain.*



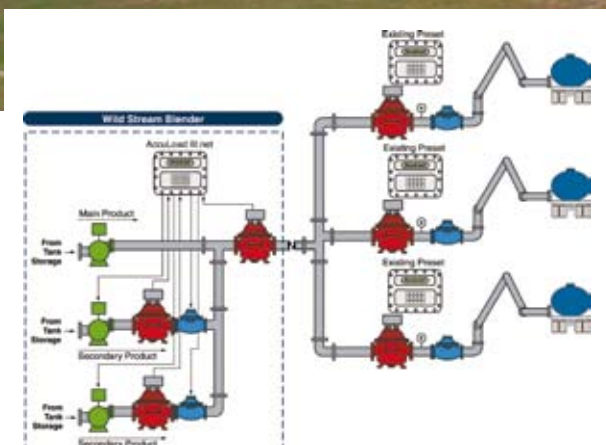


Figure 3. The type of wild stream blending that was designed by FMC flow control engineers to help CLH meet Spain's growing demand for biofuels. This blending configuration illustrates how secondary lines of FAME are injected into the tank storage mainline during unloading. The stream is blended, measured and tracked to make biofuels and to accurately record custody transfer before being loaded onto trucks for delivery.

maximum flow of 2500 m<sup>3</sup>/h through the end of the unloading process. Flow rates for the 12 in. lines ranged from a minimum of 200 m<sup>3</sup>/h up to a maximum of 1500 m<sup>3</sup>/h.

## A tight schedule

Maintaining accurate blends of biodiesel with variable flow rates was the main issue, but the company also wanted to standardise its equipment to reduce parts inventory and training costs. The existing equipment played a role in the process but the primary driver was the timeline. A fully operational system had to be built in four months.

CLH joined forces with FMC Technologies, Inc. to design and deliver the highly accurate custody transfer measurement system. FMC had previously worked with CLH to implement preset truck loading and blending systems and to install product pipeline metering (with turbine meter) and inline metre proving. CLH, the only metrological approved laboratory in Spain to calibrate oil meters up to 1100 m<sup>3</sup>/h, also uses FMC bidirectional meter provers.

## Evaluation

Initial meetings began early in December with FMC evaluating CLH's existing equipment infrastructure and the parameters of the blending protocol. The goal was to help CLH blend


its desired percentage of biodiesel without increasing loading or unloading times. After the equipment evaluation, an engineering project request was written with a general specification. That general spec was reviewed, amended and revised with the addition of extra features. Computer code for CLH's existing AccuLoad III software used by FMC was rewritten to regulate the percentage of FAME injected into the main diesel line to regulate this wild stream blending.

Luis Carballo, FMC Petroleum Engineer, who was heavily involved in the project, pointed out that by not using control valves in the main line, and having a highly fluctuating flow, software was required to actuate opening and closing of the FAME line control valve so that variations in the main product flow could be compensated for; this enabled a constant blending ratio.

Until the development of wild stream blending firmware in the AccuLoad III, all blending control was based on maintaining a preset ratio by actuating on the control valves. By not using control valves in the main line, which was governed by the ship's pumps, and having a highly fluctuating flow, the software was required to actuate on the FAME line control valve, adjusting to the main line flow rate.

CLH wanted a blending configuration with two or more meters of the secondary product working in 'cascade' due to the high flow range required in the blending operation. This allowed AccuLoad to dynamically select one of the FAME meters depending on the flow range. The flow controller needed to be fast enough to allow the minor product to follow the blend ratio based on the flow rate of the main line, but also needed to assure a stable flow control.

Based on the CLH system description, FMC's electronics marketing and software departments defined the application as 'on the fly blend recipe with cascading meters,' and worked out a basic specification that was incorporated into the AccuLoad III software. Once the software was rewritten and tested, the wild stream blending component was released in April 2008, within the timeframe CLH required to go to market with volume supplies of B5 (5% FAME, 95% diesel) biodiesel.

As Argos remarks, any company that competes in any market must make adjustments in order to be successful; whether those adjustments are to competition, to market conditions, or to changes in customer preferences. 

**FMC Technologies**

[www.fmctechnologies.com/measurementsolutions](http://www.fmctechnologies.com/measurementsolutions)