

Beamex Case Story

Shell Nederland Raffinaderij B.V. (Pernis refinery)
The Netherlands



An integrated calibration solution that meets refinery's demanding safety and regulatory requirements.

beamex

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With its many process plants and installations Shell Pernis refinery is one of the largest and most extensive petrochemical complexes in the world. Here the refining and petrochemical activities operate side-by-side giving both economic and technical advantages.

Shell Nederland Raffinaderij processes raw materials, predominantly crude oil; Shell Nederland Chemie converts part of the refined products into chemical products. The refinery processes about twenty million tons of crude oil each year via the Shell Europoort oil terminal.

Pernis refinery is fairly unique in that it is able to process diverse raw materials from many parts of the world. Shell exports about 2/3 of the production of Pernis refinery; almost 1,000 different products are manufactured. Pernis is connected via a network of pipes to Shell Chemie Moerdijk, to Amsterdam Schiphol airport and to customers in Germany.

Ed de Jong is instrument maintenance engineer for the various process units for the Pernis refinery, focusing on maintenance strategy, field instrumentation, benchmarking, and legal compliance to such matters as CO₂ emissions (based on fuel measurements). He has intimate knowledge of the refinery and has been closely involved in providing solutions to several issues, including calibration.

The situation

“Calibration is a very important part of the refinery’s control and automation. Until recently calibration was mainly driven by economic motives: even the smallest of errors in delivery quantities are unacceptable in Shell’s operation due to the vast sums of money involved for both customers and governments (fiscal metering)”, Ed de Jong starts.

Nowadays calibration has an important role especially for the license to operate. For the efficient combustion in furnaces and the associated emissions, the calibration of instruments is crucial. Government regulations demand that specific instruments must be calibrated, for example instruments related to CO₂ and NO_x emissions. Government regulations require that instruments associated with safety systems are regularly calibrated and the results documented in accordance with the IEC 61511 standard.

“One of the most important aspects of implementing the Beamex integrated calibration system was the need to meet regulatory requirements and audits (“Nederlandse Emissie Autoriteit”, the Dutch Emission Authority) related to CO₂/NO_x emissions”, Ed de Jong explains. Periodic calibrations must be performed, the records must be stored and the data needs to be available and easily accessible during the audits. The Beamex integrated calibration solution made of Beamex® CMX Calibration Software and Beamex® MC5 Multifunction Calibrators meets these requirements.

“The CMX Calibration Software used by Shell is GID scripted (Shell proprietary worldwide IT system) and can easily be extended by acquiring additional user licences. This means that the Beamex calibration system is utilized as an international calibration solution for Shell”, Ed de Jong describes. The system is in use in other sites as well, even outside The Netherlands. In Germany, CMX Calibration Software and MC5 Multifunction Calibrators are operating as a standalone application; the intention is to migrate the system to the GID scripted version of the CMX. Several other Shell plants are also investigating the use of this calibration system.

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The solution and main benefits

“Shell’s current calibration system is serving several purposes”, Ed de Jong states. “First of all, the system exists to provide a secure, automated and auditable instrument validation and calibration infrastructure with interface to SAP to prevent non-compliance with Dutch emission authority (RTS department), NMI (Dutch National Measurements Institute), and IPF requirement by Production Unit/ Plant (Global Asset Management Excellence process) and other calibration requirements for critical instruments. Secondly, the calibration system needs to provide automatic exchange of scheduling data between CMX and SAP. It is the intent that the work-management system (SAP) will be connected to the CMX Calibration Software, so that management can see business statistics such as overdues and instruments outside specification”, Ed de Jong explains.

In the refinery, a group of instruments is defined as “critical”. Emission-related instruments are also considered to be critical, as they are associated with the “license to operate”. At the moment, the calibrated flow, pressure and temperature instruments associated with CO₂ and NO_x emissions are entered into the CMX. Due to the great potential of the calibration software, the intention is to add the other critical instruments, such as custody transfer and instruments related to IEC 61511, into the CMX.

Workflow is controlled by the work-management system, whereby instruments are planned/ scheduled for calibration on a yearly basis. The calibration procedures and calibration results are stored in the CMX. The calibrators provide the “as found/as left” condition of the instrument, with associated calibration information (time stamp, etc.). The CMX software stores the calibration results so that a calibration history can be built up

and presented to regulatory/government authorities. A requirement is that complete electronic records can be maintained and that this information is stored in a robust environment.

At this point the Beamex calibration system is predominantly used to support compliance with IEC 61511 guidelines. Based on this knowledge, it was easy for Shell Pernis to decide which route to follow; no other options were even evaluated.

Presently the Shell Pernis and Shell Moerdijk locations use CMX Calibration Software in a network environment and MC5 Multifunction Calibrators. The functionality of the CMX includes calibration history trend, report design, audit trail and SAP connector. The MC5’s are fully equipped and have various pressure ranges and HART communication. Beamex and their local sales partner in The Netherlands (HPR Techniek B.V.) have trained all personnel involved in calibration activities. Training is an important aspect of an efficient implementation of a calibration system; it ensures that Shell can make the most from their calibration investment.

The Shell Global Solutions testing facility has also been evaluating the MC5 Fieldbus Calibrator for the calibration of Foundation Fieldbus transmitters and it is a solution that can be used at the Shell Pernis refinery or other Shell locations.

“Implementation of the Beamex integrated calibration made of CMX and MC5 was justified on reputation, license to operate and quality. Cost savings are also anticipated”, Ed de Jong summarizes.



Case Story in Brief

Customer profile

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Solution

- Beamex® MC5 Multifunction Calibrator
- Beamex® CMX Calibration Software
- Professional Services: MC5 Training Courses
- Professional Services: CMX Installation
- Professional Services: CMX Training Courses

Main benefits

- The Beamex calibration system provides safety by supporting compliance with IEC 61511 and other regulatory guidelines
- Possibility to use calibration software in a network environment
- Integration capability to SAP® Maintenance Management System
- Robust, high quality calibration equipment and software
- Availability of training services

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