The multiple faces of a Custody Metering Project
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Key message of the Presentation:

- Project is made by People
- Engineering is the lead = people
- Communication is the key
Qualification Face: background
Qualification Face: background

On December 2\textsuperscript{nd} 2014, Turkish Republic Ministry of Customs and Trade issued a change in the customs regulations stating:

\textit{“All petroleum products (including LPG) entering and exiting the depots shall be measured by measuring systems on main pipelines according to the specifications of regulation (EK-81/A)”}

EK-81/A regulation has a clear reference to EU MID (Measurement Instruments Directive MI-005 \textbf{Accuracy Class 0.3})

The transition time for installing the measurement systems is given by the law as 15 February 2015 with extension option \textbf{up to 02\textsuperscript{nd} December 2015} (one year after law enforcement date). \textbf{Otherwise the Depot licenses of the companies will be aborted}, preventing them to import oil and gas products.
Qualification Face: Customer Need

According to existing regulation, the government is taxing the imported products by tank gauging systems. Now government will use **skid mounted mass measuring systems** for tax purposes. Due to the catastrophic impact of loosing import licenses Companies started the bid processes more or less immediately.

The specific market demands was for 30-37 metering skids, **to be build, installed and certified in 8 months.**

>>> a very fast track project!!!
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Development Face

Barry Clark
Flow Metering System Specialist

Lütfü Bilgen
Managing Director SC_TR

Bora Sarihan
Sales Manager SC_TR

Andrea Calo’
Sales Manager Solutions
Development Face: quickwins

- Experience in the management of fast track projects (engineering, procurement, fabrication)

- Local presence in the market

- Knowledge of metrological aspects

- Technology Owner

- Proposal of Coriolis Mass meter as measuring principle
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Development Face: quickwins

NO TIME FOR DETAILS.

The small time for development left us and the customer with small time for the detailed technical definition of the package. PO need to be issued ASAP by customer to prove he is on the right side. But delivery date is never changed for the same reason.

BUT DETAILS ARE IMPORTANT!

Definition of technical details such as piping class, vent & drains, hook up etc. are left to the execution.
Qualification Face : Normative requirements

There is no worldwide agreement on the total uncertainty for custody metering however it would be fair to say that a custody system should achieve at least ±0.35%.

European OIML R117-1 is the only standard which specifies target accuracy class for different metering applications, API does not.

<table>
<thead>
<tr>
<th>Class</th>
<th>Type of measuring system</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>Measuring systems on pipelines (see 5.7) (With exception for what is stated for accuracy class 1.0 and 1.5)</td>
</tr>
</tbody>
</table>
| 0.5   | All measuring systems, if not differently stated elsewhere in this table, in particular:  
  - Fuel dispensers for motor vehicles (other than LPG dispensers) (see 5.1, 5.9, and 5.10)  
  - Measuring systems on road tankers for liquids of low viscosity (see 5.2)  
  - Measuring systems for the unloading of ships' tanks and rail and road tankers (see 5.3)  
  - Measuring systems for milk, beer, and other foaming liquids (see 5.6)  
  - Measuring systems for loading ships (see 5.7)  
  - Measuring systems for refuelling aircraft (see 5.8) |

Accuracy class 0.3 means that the total uncertainty of the system will need to be at least ±0.3% this can be considered as the best available system accuracy.

All the standards provides guidance to guarantee that the total system uncertainty is maintained during the whole operation.
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Quotation Face:

Tobias Linsner
Proposal Manager Solutions

Emre Erensoy
Industry Manager SC_TR

Daniel Sturm
Proposal Engineer Solutions

Alp Camci
Project Manager
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Quotation Face: negotiation

The Classic PM Triangle:

\[ t \times C = k \]  
Time has a cost. If time is less, cost is more.

\[ \frac{q}{C} = k \]  
Quality has a cost. If quality is more, cost is more

\[ t = k \]

\[ q = k \]

>>>>>> Negotiation is also FAST
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Quotation Face : Award

Shell and Turcas Petrol A.S.
Two locations Antalya and Derince, each with:
2x50% dia 6” – 150 metering lines with 6” Coriolis Flow Meter for Diesel Oil

Cekisan Depolama Hizmetleri Ltd.
Location Antalya
Nos. 1 1x100% dia 4” – 150 metering lines with 4” Coriolis Flow Meter for Jet A1
Nos. 1 1x100% dia 6” – 150 metering lines with 4” Coriolis Flow Meter for Diesel Oil
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Quotation Face : Award

BP Petrolleri A.S
Two locations Gemlik and Atas Mersin
nos.1x100% dia 6” – 150 metering lines with 6” Coriolis Flow Meter
for Diesel Oil (Gemlik)
nos.2x50% dia 10” – 150 metering lines with 10” Coriolis Flow Meter
for Diesel Oil (Atas Mersin)

Petgaz A.S
One location - Mersin
nos.2x50% dia 10” – 300 metering lines with 10” Coriolis Flow Meter for LPG
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Quotation Face : Award

Ipragaz A.S.
Three locations M. Ereglisi, Dortyol and Yarimca
nos. 2x100% dia 6” – 300 metering lines with 6” Coriolis Flow Meter for LPG (Ereglisi)
nos. 2x100% dia 6” – 300 metering lines with 6” Coriolis Flow Meter for LPG (Dortyol)
nos. 2x100% dia 6” – 300 metering lines with 6” Coriolis Flow Meter for LPG (Yarimca)

Socar / Foster Wheeler AMEC
Two locations in Aliaga
nos. 2x100% dia 12” – 300 metering lines with 10” Coriolis Flow Meter for Gasoline
nos. 2x100% dia 16” – 300 metering lines with 12” Coriolis Flow Meter for Reformate
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Execution Face:

Alp Camci
Project Manager

Riccardo Cremascoli
Head of Project Operations

Mario Bertolotto
Project Engineer

Onder Yildirim
Head of Project and Service

Tolga Cabuk
Project Engineer

Yu Zhao
Project Engineer

Silke Diewald
Project Logistic

Christophe Gautier
Project Engineer

Nadia Shultheiss
Project Administrator

Endress+Hauser

Associazione Italiana Strumentisti

ISA Italy Section
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Execution Face: a very fast supply!

One Year in Total

7 Months for execution
Execution Face: skid assembly
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Execution Face: Metering system

The product is entering first into the air eliminator. Here the air is separated from the air and evacuated from the top nozzle. The fluid is then sent into one/two metering streams, each one equipped with:

- Air Eliminator
- Inlet manual valve
- Mass Flow meter
- Flow Control Valve
- PT & TT
- Outlet manual valve
Execution Face: Metering system

Each metering stream can be connected with a Master Meter. This can be done by closing the stream outlet double block and bleed valve and opening the double block and bleed ball valves to/from to the master meter.
Execution Face: Metering system

The two Flow Control valves in each stream regulate the flow scheduling. Up to 50% of the total flow rate only the first CV is open. When the 50% threshold is reached the flow computer commands the opening of the second control valve so that 2 x 50% flow rate is managed. A ramp down is also available when the flow rate decrease from 100% to 50% or less. In this way we can guarantee that for low flow rates only one meter is in function with a created accuracy. The air eliminator is equipped with 2 High / low level switches.

A low level is reached when a big presence of air is coming into the Vessel. In order to avoid that the air is carried into the metering streams and therefore create disturbance to the metering accuracy, when the LLS is activated a signal is sent from the flow computer to closed the FCV in order that the level rise again into the Air eliminator.

When the level reach the high level switch another signal is sent to the FCV to open again 100% as the normal conditions are re-established.
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Execution Face: very distant target

Plan from the End
and Implement every requirements from the **engineering phase**:

- SAT and verification
- Erection and connections
- Shipment and Logistic
- Fabrication
- Procurement
- Engineering

in one word: Planning!!
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Execution Face: Plan the Site works

Early involvement of Site people (from Turkey) during FAT
Execution Face: Plan the Erection

Ikea Instruction

- Spool is out of skid
- Flange connection is marked
- Listed in the Packing List
- Bolts/nuts in the marked box
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Execution Face: Plan the Erection

Ikea Instruction

We can’t afford to loose time on site!
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**Execution Face : Plan the Construction**

Technical standards

- **PTFE pads under the pipes and HDG U-bolts sleeved with PVC to prevent corrosion.**
- **All bolted pipe supports are earthed to the main skid frame.**
- **Galvanized cable trays closed with cover and supported by uni-strut.**
Execution Face: Plan the Construction

Technical standards

...but this pipe and all the instruments should also be dismounted.

Elbow and pipe are supported with special support.

A std support with u-bolt here was perhaps easier...

Valve flange sits on a saddle.
Execution Face: Plan the Construction

- Cables: fire resistant / flame retardant, armored, shielded
- Cable glands: double lock (armored), SS / brass nickel plated, with PVC shroud
- Fitting: double ferrule
- Cable trays: hot dip galvanized, with closed cover, and special parts (tee, fittings)
- JB: SS, GRP high resistance, self extinguish
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Execution Face: Design

Project execution is divided in three Engineering phases:

- **Design and Basic Engineering:** Sizing (Flow meter, lines, vessels etc.), PID, Data Sheet, Cable block Diagram, System Architecture, Foundation plot plan

- **Detailed Engineering:** Piping details, Typical Installation details, JB and cable specs, cable trays layout, Cabinet and flow computer details, shipping drawings

- **Fabrication Engineering:** Steel structure, Isometrics, wiring diagram, loop diagrams,
Execution Face: Design Reviews

Internal Design Reviews are carried out to guarantee:

- compliance with Contract, technical specifications & International standards
- ensure that OIML R117 standards are followed into practice
- risk analysis (safety, hazards and operation), accessibility, operability.
- congruity between design data, drawings and purchased/manufactured materials
- dismantling & transportability of materials
- feasibility of installation, operation, maintenance
- technical–economical optimization

Communication is the key

Applicable Design Standards
- Shell Design and Engineering Practice’s (DEP’s)
- BP General Practice’s (GP’s)
- Joint venture Shell and BP

+ 1 line / 2 lines - mono / bi directional
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Close Out Face:

Daniel Wassmer  
Service Manager

Taner Hatabay  
Service Engineer

Onder Yildirim  
Head of Project and Service

Erkan Bayar  
Service Engineer

Endress+Hauser
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Close Out Face: Site works

Commissioning

Training

Close out

Together with the commissioning of the skid, the Verification as per MID should take place. EH has therefore appointed Notified Body for the certification of the skids and the relevant sealing.
Execution Face : MID Certification

MODULE B: EU- TYPE EXAMINATION
EU-type examination’ is the part of a conformity assessment procedure in which a notified body examines the technical design of an instrument and verifies and attests that the technical design of the instrument meets the requirements of this Directive that apply to it.

MODULE F: CONFORMITY TO TYPE BASED ON PRODUCT VERIFICATION
A notified body chosen by the manufacturer shall carry out the appropriate examinations and tests, or have them carried out, to verify the conformity of the instruments with the type as described in the EU-type examination certificate and the appropriate requirements of this Directive.
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Close out face: Customer acceptance
Thank You !!!

...any questions?