Setting the STANDARD -
The Case for
Integrating Meter Diagnostics
into Standards Documents

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Flow Meter Verification

• Flow meter diagnostics have always been used.
• Traditional (old school) external methods:
  – Mass balance (very limited resolution)
  – Check meter with similar meter (common mode?)
  – Check meter with dissimilar meter (inc. prover)
Internal / Integral Flow Meter Diagnostics

• A great advance in recent years is the improvements to internal flow meter diagnostics.

• This is across the board, e.g.:
  – Ultrasonic, Coriolis, DP meter diagnostics etc.

• Internal diagnostics can offer better resolution than most check meters.

• They aren’t perfect, operators still often need process knowledge to interpret some results, but…

• There is abundant evidence about their usefulness.
Example 1: A Liquid USM Profile Problem

Flow Direction

Tube Bundle

Meter

Velocity Profile

Velocity Profile
Example 2: Orifice Meter with Erroneous DP Reading

• GDF Power Station, 12” orifice meter.
  • DP transmitter wiring problem, +0.8% flow error.

• Problem found by diagnostics during system commissioning.
Condition Based Maintenance (CBM) Schemes

• Half the benefit of internal meter diagnostics is CBM, i.e. assuring that there isn’t a problem…
  – “If it ain’t broke don’t fix it!”

• This goes for all meters with internal diagnostics:
• Internal meter diagnostics can reduce routine maintenance, *therefore reduce safety risk!*
• Internal meter diagnostic logs can help with audits.
• Yet, most meter installations either don’t have, or have but don’t monitor, internal meter diagnostics.
• **WHY!??**
Opinions on the Reasons for the Slow Uptake

1. Technician Resistance?:

- “Technician in a box” – fear of redundancy

- Plausible deniability:

  Diagnostics see problems due diligence may not, you have to face previously unseen problems,

  - tell the boss & maybe get blamed!?

  - what if you can’t find the source of the problem?

2. no diagnostics, no problems, *ignorance is bliss!*
Technician Resistance

• “So what if we mis-measure? We can write a mis-measurement report as normal & re-allocate! It’s always worked that way just fine.”

• But, operating without diagnostics risks an unseen issue causing an unknown bias to persist for an unknown time. How do you re-allocate correctly!?

• The individual meter operator doesn’t lose income by mis-measurement… it’s government royalties, share holders etc. that lose.
2. Management Resistance

• Some managers have worked their way up... “That’s not the way we did it when I operated meters!”
  – *i.e. you can’t teach an old dog new tricks!*

• With age comes experience, but also a tendency to stick to what you know.

• Meter diagnostics are in a way *an insurance policy*! Selling *non-mandatory* insurance can be difficult...
  – How much!? CAPEX (?) & OPEX!? There is no budget for that! (False economy of course!)
3. Complexity & Lack of Technician Training

- User perception with diagnostics
- Manufacturer perception with diagnostics
- Where industry needs to go
- Not so smart
- Hard to use
- Easy to use
- No diagnostics
4. **Resistance from the Operator IT Depts.**

- If IT doesn’t want to do something it may not get done, regardless of senior management wishes.
- IT can & does resist new flow meter diagnostics systems because of the largely false *perception* of:
  - it taking a lot of effort to implement the software (& security) into their systems
  - diagnostic systems demanding large data storage capacity they will have to supply.
5. Resistance from the Operator Legal Dept.

- Operator legal departments are all powerful! If ‘legal’ doesn’t like it – it’s likely it doesn’t get done!

- Why would ‘legal’ not like flow meter diagnostic suites? There are 2 related reasons:

1. They potentially contain commercially sensitive information, i.e. the production / cash flow & any sales meter fault information (i.e. security risk!)

2. If a 3rd party is to monitor diagnostics then the 3rd party has access to this confidential information.
6. Resistance from Flow Meter Manufacturers

“Not Invented Here”

- Meter manufacturers (& the corporations that own them) like total control of their product package.

- 3rd party diagnostic systems mean partial loss of control of marketing / overall product package cost.

- Admitting 3rd party developed diagnostics are beneficial can be seen as a loss of face.

- Meter manufacturers & end users can have a close relationship, leading to more meter sales… so to the manufacturer “three’s a crowd”.
“Not Invented Here” cont.

• Which all leads to the bizarre counter intuitive situation of some meter manufacturers claiming ignorance of 3rd party diagnostic systems that make their meter more capable…

• …or perhaps worse, *falsely* claiming such beneficial diagnostic systems are superfluous to requirements, or of insignificant benefit!
7. Operator vs. Engineering House

- Operators have cut staffing & outsource to contractors the design & construction of facilities.

- Operators tend to let the contractor develop the facility & decide on all required equipment.

- Competing contractors keep their respective bid prices down by excluding non-mandated equipment.

- Both operator & contractor can like meter diagnostics, but they both consider championing diagnostic systems the other parties responsibility!
The Crux of the Matter:

• When industry requires to meter a flow, it requires that flow to be metered correctly.

• Meter diagnostics are so beneficial to that aim they cannot & will not be ignored in the long run.

• Arthur C. Clarke: “New ideas pass through three periods: 1) It can’t be done. 2) It probably can be done, but it’s not worth doing, 3) I knew it was a good idea all along!”

• So, how do we get from stage 2 to 3 as quickly as possible for the long term benefit of industry?
Standards & Regulatory Documents

• If it’s in the legal contract it will be done.

• Contracts are often based on the relevant standards.

• Operations also have to abide by the regions regulatory authority rules.

• If diagnostics are required by standards & regulatory authorities they will be required by contracts, & then all the perceived false obstacles will just vanish into thin air.
Standards & Regulatory Documents

A few documents do at least “beat about the bush”: 

Guidance Notes for Petroleum Measurement (DECC):
“It may therefore form the basis of a CBM…”

Directive 17 (Alberta Regulator):
“Internal metering diagnostics may be used…”

ISO 17089-1 (2010):
“USMs can deliver extended diagnostic information through which it may be possible to demonstrate the functionality of an USM.” May?
Conclusions

- Standards boards (& regulators) should demand meter diagnostics (i.e. use words ‘must’ & ‘shall’) instead of recommend (i.e. ‘can’ & ‘should’).
- If they did many contracts would demand their use.
- All these perceived problems would then disappear.
- This is in the long term interest of industry.
- More diagnostic use would give,
  - manufacturers impetus to improve diagnostics
  - users impetus to train to better understand them.
• Widespread use of meter diagnostics would bring current meter practice out of the 20th Century into the 21st Century!!

Thank You