



Competitive Analysis

MTG™ Vs.

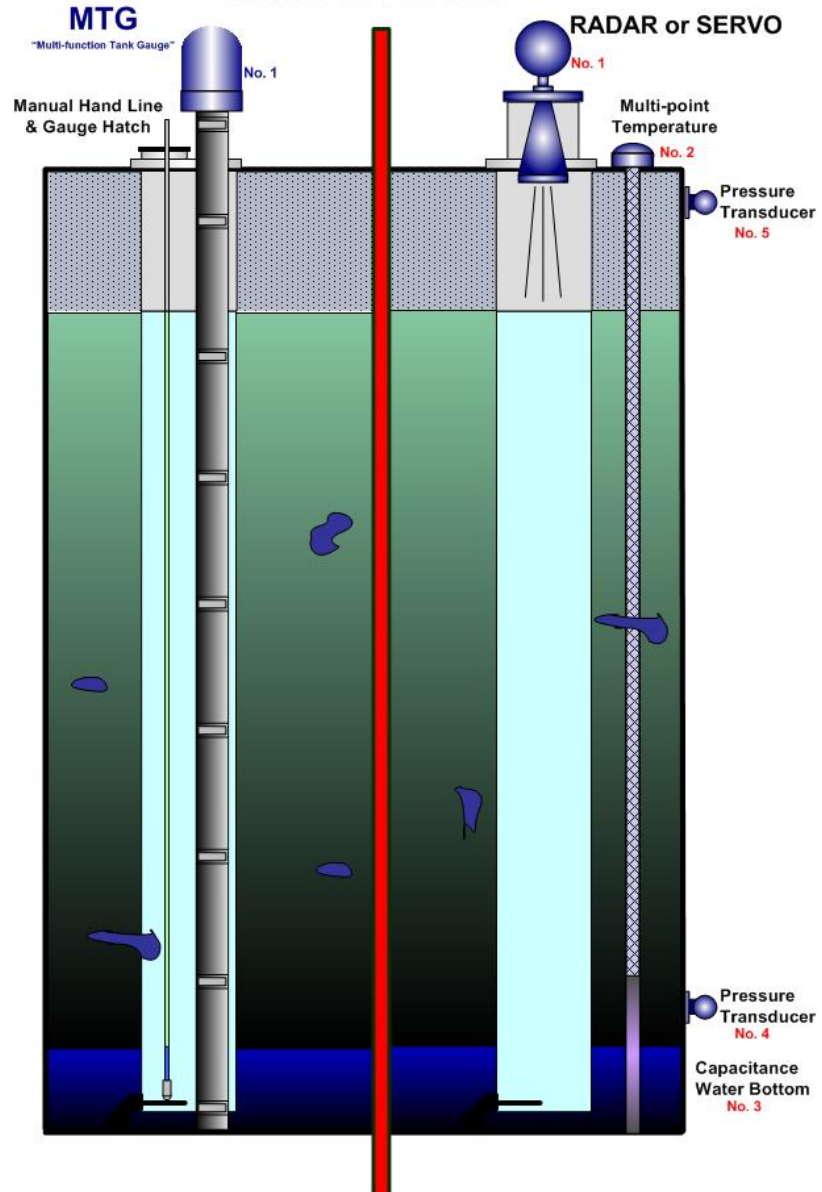
Hybrid RADAR Systems

In order to measure the volume of petroleum in storage tanks, there are two accepted methods by either the American Petroleum Institute (API) or International Standards Organization (ISO); Hydrostatic method (Mass and Density) or Hybrid method (Level, Temperature, Density, and Water).

The greatest difference between MTG and Hybrid Radar Systems involves the physical point of measurement and the number of volume data

- MTG is a patented technology
- MTG is metrology certified for custody transfer
- MTG is a "Single Instrument"
- MTG provides accurate mass volume
- Installs within the gauge well; Thus, allows for manual hand gauge and samples at the same time, others don't
- No moving parts
- One tank opening
- One conduit run
- Installs in service
- Self calibrating
- Self diagnostic
- Measures entrained water, others don't
- Measures free water in emulsified product, others can't do correctly
- Measures multi-strata density, others don't
- Measures atmospheric pressure and temperature, others don't
- No bubbles, tubes, or nitrogen bottles required
- No false reference bottle calibration

MTG vs. Level Hybrid Measurement





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MTG™ vs. Hybrid Radar Systems

variables measured by the system to determine Net Standard Volume (NSV) and Weight in vacuum (WIV).

According to API and ISO standards, manual hand lines and samples are used as the means for verification and calibration of automatic tank gauges. The hand line, cup case or electronic temperature measurement, and samples are normally taken from one physical location on the tank, i.e., within the gauge well.

It is critical for accurate measurement to reference not only level measurement to the datum plate, but to reference temperature, density, and water measurement in the same manner. Before the MTG this was an impossible task, however, the MTG can be directly installed within most gauge wells, thus allowing the manual hand lines, electronic temperature measurement, or samples at the same time as receipt of automatic tank gauge data. The MTG is the only automatic tank gauge that allows direct comparison of all variables (Mass, Level, Temperature, Density, and Water) to that of the automatic readings for accuracy.

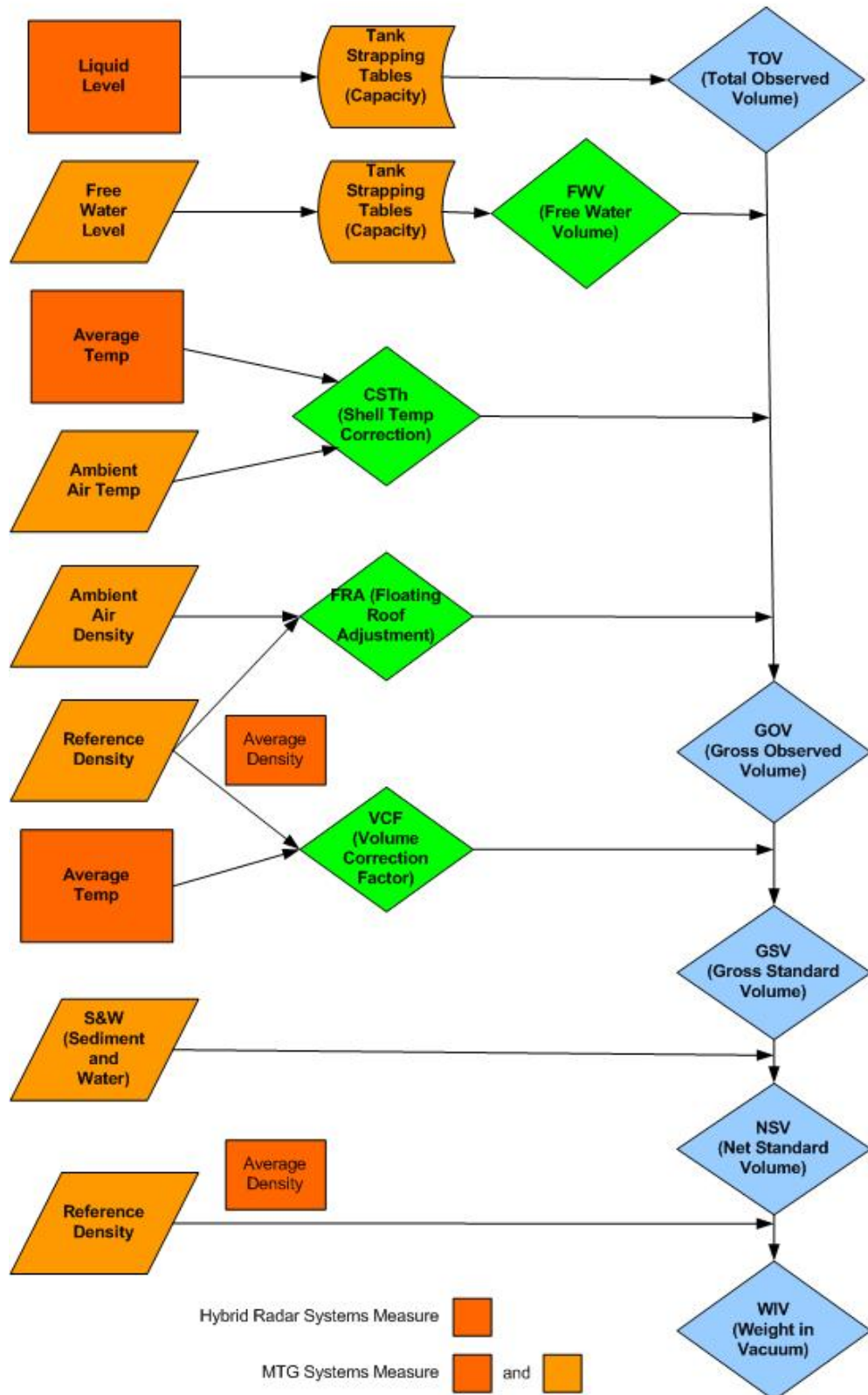
Questions: Is measured temperature the same within the gauge well as compared with the larger tank area. Is the gauge well slotted? Are the slots sufficient for uniform movement of product though the tank or would they represent too large an opening to still the product for level measurement?

Does the density of product within a mounting leg of a pressure transducer represent the density of product within the gauge well? What effect does the temperature (Snow or direct sunlight have on the density of product in the mounting leg? Is the product in the lower mounting leg stagnant? Does it really matter if it will only produce an average (reference) density reading which is inherently incorrect in the calculation of volume?

What technology is being used to measure water with the Hybrid Radar System? Capacitance, displacer, or float? All of these instruments lack custody transfer accuracy and possibly inventory accuracy when measuring free water within an emulsified product. Within finished product they may be accurate enough for custody transfer. MTG provides both free and entrained water even in emulsified product.

Hybrid Volume Calculation Flowchart

Hybrid Volume Calculation Flowchart



To eventually measure Weight or Mass of product in Vacuum, i.e., Mass Measurement

	Hybrid Radar System	MTG - Mass Tank Gauge
Maintenance Cost:		
No Moving Parts	Water Measurement?	Yes
Self Calibrating	All Instruments (Density)	Yes
Self Diagnostics	All Instruments	Yes
Single Instrument & Single tank entry	No	Yes
	No	Yes
Installation Cost:		
Gauge Well	Needed (reference error)	Preferred, but Not required
Tank entries required	Multiple	One, 4" flange
Hot work / taps	Yes (Density)	Not required
Instruments to install	Multiple	MTG
Voltage required (Electrical)	110Vac ?	12 - 24Vdc
Wiring (conduit) connections	Multiple	Single
Communications / Integration	MODBUS RTU, others	MODBUS RTU, Others
User configurable register map	No	Yes
Alternative communications	Not standard	Standard options
Equipment Cost:		
Local display / Interface	Add	Add
* Level or Mass Measurement	Base	Base
** Temperature Measurement	Add	Included
*** Free & Entrained Water	Add	Included
**** Density Measurement	Add	Included
	Radar Total	MTG Total
* Installed cost	Multiple Instruments / Calibration	One probe
Data provided: (Primary Instrument)		
Mass	Additional Instrument	YES
Level	Yes	Yes
Multiple Spot Temperatures	Additional Instrument	Yes
Multiple Density Strata	No	Yes
Free Water (Interface)	Additional Instrument	Yes
* % of Water in Product	No	Yes
2nd Interface	No	Yes
* % of Water in Emulsion	No	Yes
Vapor Pressure	Additional Instrument	Yes
Vapor Temperature	Additional Instrument	Yes
Leak detection (Mass)	No	YES
Alarm - Multiple Level Sensors	No	Yes
Alarm - Mass	No	Yes
Alarm - Multiple Spot Temperatures	No	Yes
Alarm - Multiple Pressure Points	No	Yes
Alarm - Multiple Density Strata	No	Yes
Alarm - Vapor Pressure	No	Yes
Alarm - Vapor Temperature	No	Yes
Real-time Tank Profile	No	YES
* = Crude Oil Service		