



Oil & Gas

Blending and Handling of Ethanol and Bio-Diesel

Dharmesh Shah

Business Leader

Storage & Distribution Solutions – Asia Pacific

 **Enraf** | Terminal Automation

Honeywell

- Honeywell - Corporate Overview
- Storage & Distribution Solutions
- Bio-fuel Blending and Handling
 - Ethanol
 - Bio-Diesel

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- **116,000 employees in nearly 100 countries**
- **A *Fortune* 100 company – sales of \$31.2 billion in 2006**
- **One of 30 select companies represented by the Dow Jones Industrial Average**
- **“Most Admired Companies” – #7 in the Aerospace & Defense industry**
– *Fortune* magazine 2005
- **“100 Best Places to Work in IT 2005”**
– *ComputerWorld* magazine
- **“Hottest Company of the Year”**
– *Start* magazine (Aug. 2005)
- **“Top 25 Most Military-Friendly Employers in 2005”**
– *GI Jobs* magazine

- **AEROSPACE**

- World's premier supplier of aircraft engines and systems, avionics for airliners and spacecrafts

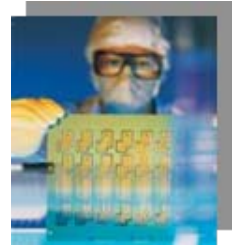


- **AUTOMATION AND CONTROL SOLUTIONS**

- Leading technology and Integration leader providing services and solutions to improve productivity, safety, security, comfort and efficiency

- **SPECIALTY MATERIALS**

- World leader in high-performance materials
- Fluorocarbons, specialty films, advanced fibers
- Packaging, reflective coatings, ballistic materials



- **TRANSPORTATION SYSTEMS**

- Leading innovator of automotive turbochargers
- Engine downsizing, emissions, fuel efficiency
- Maker of consumer automotive product brands



Automation and Control Solutions (ACS)

- A 'sensing and control' pioneer; today's technology and integration specialist
- Solutions for homes, commercial buildings, manufacturing plants, infrastructure, vehicles, devices
- Six business units
 - Honeywell Process Solutions
 - Honeywell Building Solutions
 - Environmental and Combustion Controls
 - Sensing and Control
 - Fire Group
 - Security
- \$11 billion global sales
- 40,000 employees across nearly 100 countries



- **Established in 1988**
- **Headquartered in Pune with 8 regional Offices**
- **Technology leader committed to “Creating Value” for customers**
- **4 Business Units**
 - Honeywell Process Solutions (HPS)
 - Honeywell Building Solutions (HBS)
 - Sensing & Control
 - Environmental & Combustion Controls
- **First automation company to achieve double certification of ISO 14001 and OHSAS 18001**



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- Crude & Product Pipeline SCADA
- Terminal Management Solutions (Hydrocarbon Liquids / Chemicals & Petrochemicals / LNG / LPG)
- City Gas Distribution Automation (CNG/PNG)
- Integrated Fire & Gas Solutions
- Retail Automation
- RFID based Cylinder tracking Solutions
- Sealed Parcel Delivery (SPD) / Fleet Management
- Advanced Solutions (Secondary Planning & Distribution)
- Additive Injection / Blending Automation
- Airport / Aviation Fuelling Automation
- Custody transfer metering / Small Volume Provers

Enraf Additive Injection Systems

1 **MeQ-Pak**
The MeQ-Pak turbine driven injector provides a rugged, low maintenance mechanical device, capable of injecting from 0.2 to 2500 ppm. The self powered turbine produces the energy to drive the injection system, therefore the MeQ-Pak requires no additional power supplies or boost pump systems.



2 **Mini-Pak 6**
The Mini-Pak is a multiple stream additive injection control system capable of managing up to six MonoBlock III's. The controller can handle multiple additives into multiple flow streams simultaneously, and offers even more extensive control functionality than the MP3000.



2 **Mini-Pak 3000**
The MP3000 controller in conjunction with the MonoBlock III creates a complete additive injection system for accurate measurement and control of small volume chemical injections. It uses an infrared handheld controller for easy setup and configuration.



Enraf Blending Systems

7 **MicroBlender V2**
The MicroBlender V2 is the latest intelligent blend controller for all single stream Bio-Ethanol and Bio-Diesel blending applications. Utilising the latest advancements in micro processor technology, highly accurate PD metering with temperature compensation, and bespoke single piston control valve expertise, the MicroBlender V2 brings unparalleled accuracy to terminal blending applications.



7 **Multi-Stream Blender**
Configurable in both horizontal and vertical arrangements for two to six arms, the Multi-Stream Blender utilises the same accurate linear control principles as the MicroBlender. With its optional hydraulic valve control, stabilized control valve actuation is ensured, even in the most fluctuating of loading environments.



Enraf product overview



Enraf Tank Level Systems

2 **ATG/XTG Servo Gauge**
The ATG/XTG servo gauge ranges are a very reliable, versatile and accurate automatic tank gauges, capable of accuracies to 0.4mm.



2 **SmartRadar FlexLine**
SmartRadar FlexLine is the latest development in tank gauging which combines modern technology with maximum flexibility. This modular system with its new algorithm development is the most accurate and reliable radar gauge, in all installation conditions, available on the market.



2 **Opti-Level Conductivity Level Probe**
The Opti-Level system is a highly accurate, cost effective, solution for measurement in both horizontal and vertical tanks.



1 **Entis XS**
Entis XS is a scalable, open and flexible concept for inventory management, automation and control of bulk storage terminals.



Enraf Temperature Systems

2 **Vito Temperature Probes**
Vito is a range of temperature measurement products for bulk storage tanks.



Enraf Loading Automation

2 **1010 Load Computer**
The 1010 load computer is designed for truck and rail car loading applications. The load computer has the capability to operate from 1 to 4 product loading arms and communicates directly with Enraf additive and blending controllers.



10 **1030 Gate Entry Computer**
The 1030 is designed to control access to secured sites, loading and unloading terminals. Entry and exit can be controlled by touch key, RFID, Smart-card or biometric identification.



2 **Securiterre**
The Securiterre provides safe, effective grounding of road and rail tanker vehicles during the loading and unloading of flammable liquids.



1 **SmartLoad Fuel Management Software**
SmartLoad Fuel Management Software is a proven software solution for communication with all loading systems and their associated field instruments. Seamlessly managing all product transfers, load scheduling, BOL printing, report generation, and transaction record logging.



Enraf Verification Products

9 **Syncostrak**
The Syncostrak flow prover, is a high accuracy, low pressure drop device used for the custody transfer proving of Corros, turbine and positive displacement meters.



5 **UTI2000**
The UTI2000 is a portable, gas tight, liquid level gauge designed to operate on top of closed petroleum and chemical tanks.



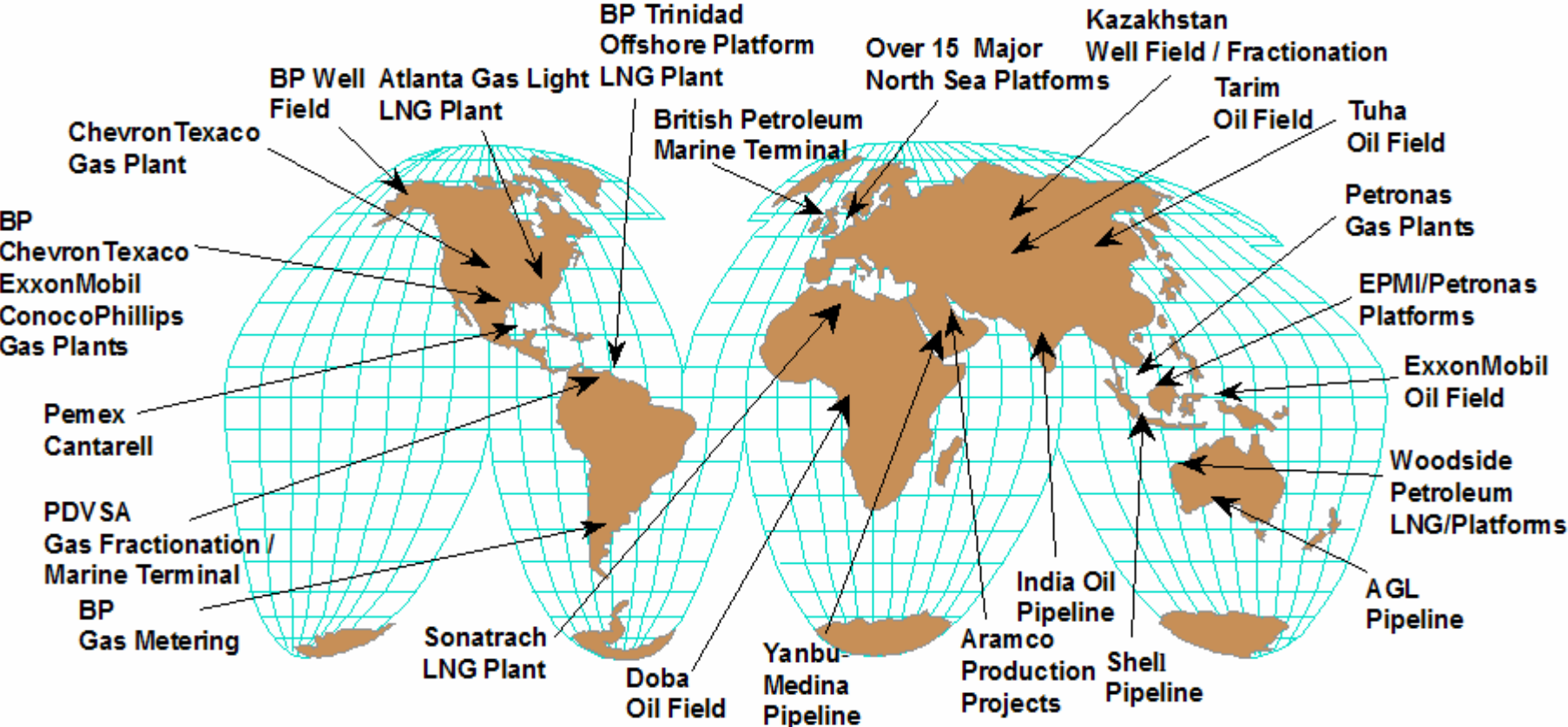
5 **Onecal**
The Onecal is an intrinsically safe, portable digital thermometer.



2 **OTEX**
The OTEX is a portable liquid level gauge, designed to be operated under 'open conditions' on petroleum and chemical tanks, where open gauging is permitted.



Honeywell – Oil & Gas Industry Experience



AGIP
Amerada Hess
Aramco
Ashland
British Gas

British Petroleum
Britoil
Botas
ChevronTexaco
ConocoPhillips

Dakota Gasification
Diamond Shamrock
Dome Petroleum
ELF
El Paso Natural Gas

Enterprise
ExxonMobil
Kuwait Oil
Marathon

Northwest Pipeline
Occidental
PDVSA
Petronas
Shell

Statoil
Sun
Total
Transok
Woodside

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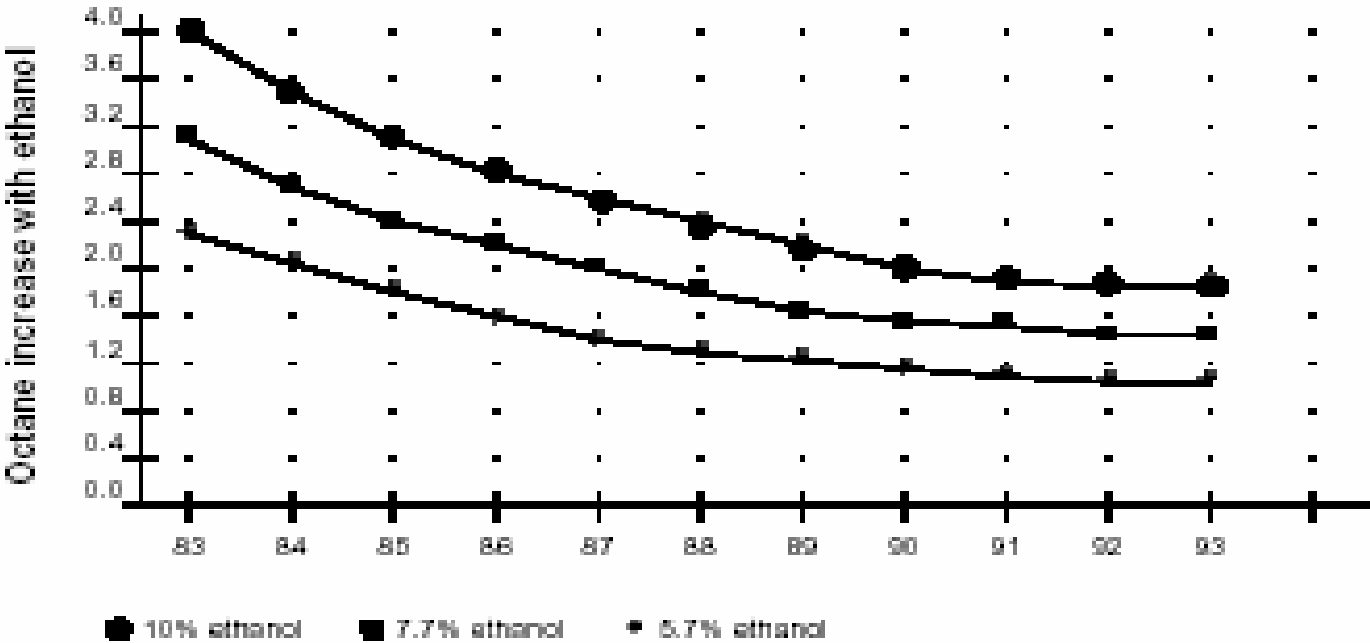
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- **North America / Latin America**
- **Thailand**
- **Turkey**
- **Australia**
- **All of Europe will have Gasohol by 2010**
- **India**
- **Many others looking at the benefits**
 - **Japan, Philippines and more**

- **Ethanol Blended Gasoline Properties**
 - Octane
 - Volatility
 - Water Tolerance
- **Additive Requirements**
 - Deposits
 - Corrosion
- **Special Operational Needs**
 - Material Compatibility
 - Special Equipment
 - Changing Tanks

Octane Value of Common Oxygenates

ESTIMATED_
BASE GASOLINE OCTANE INCREASE
WITH ETHANOL BLENDING



Not all Ethanol is created equal!!!!

It is now being supplied from large and small mom and pop sources. Control of these sources is critical since the quality of product is dependent on this – water content, purity, entrained solids, denature product used and measurement of denature, also anti-corrosive issues.

California presently sees supplies from:

- ADM – Corn Base Ethanol
- Brazilian Sugar Cane base Ethanol
- Jamaican Sugar Cane base Ethanol
- South East Asia Sugar Can based Ethanol
- Mom/Pop – Co-op – Sugar Beet base Ethanol
- Cheese Mfg – Cheese waste base Ethanol
- Orchard Co-op – Fruit harvest waste base Ethanol
- Orchard Co-op – Nut shell waste base Ethanol
- Waste Processors – Old Beer/Wine/Juice base Ethanol

- **Preset Rack Blending**
 - Ratio Blending
 - Sequential Blending
- **Header Supply Wild Stream Blending**
- **Splash Blending**
- **Wild Stream Rack Ratio Blending**

Sequential Rack Blending

- **One component at a time**
- **One custody transfer meter**
- **One flow control valve**
- **Multiple product block valves**

- **True Ratio Blending**

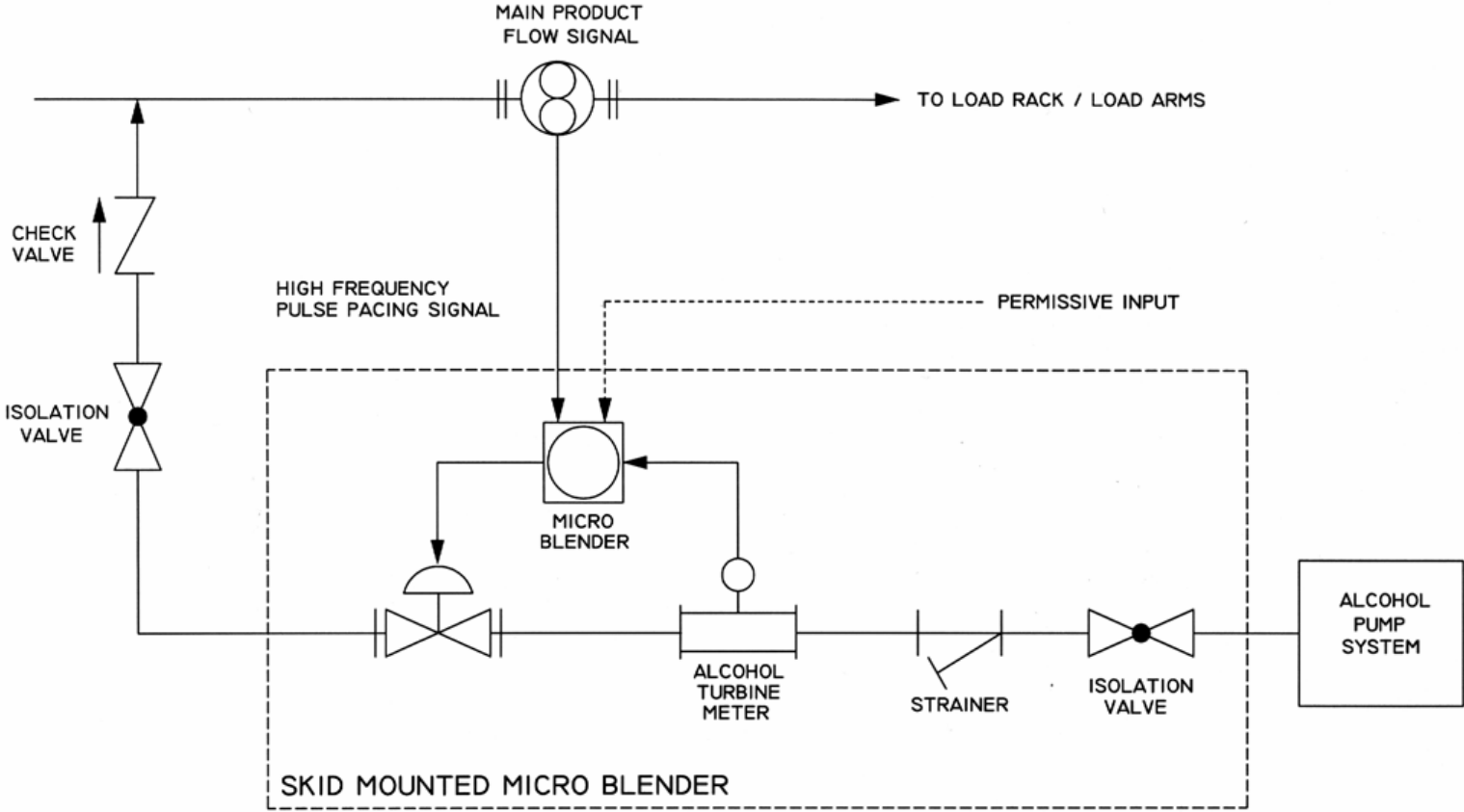
- All components at same time
- Multiple meters and flow control valves
- Blend in load arm always on spec

- **Batch Ratio Blending**

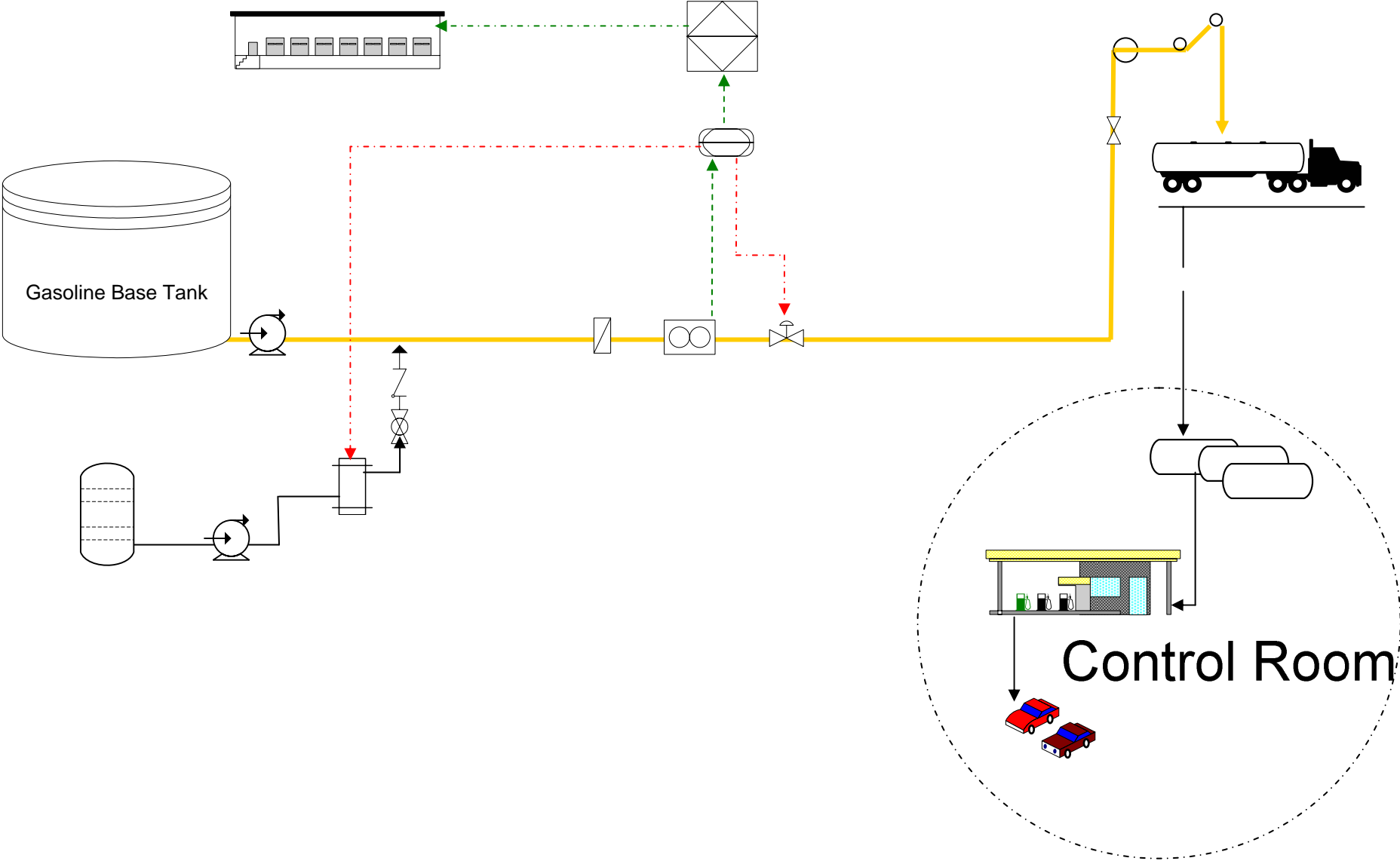
- Multiple meters and flow control valves
- Blend in completed batch always on spec

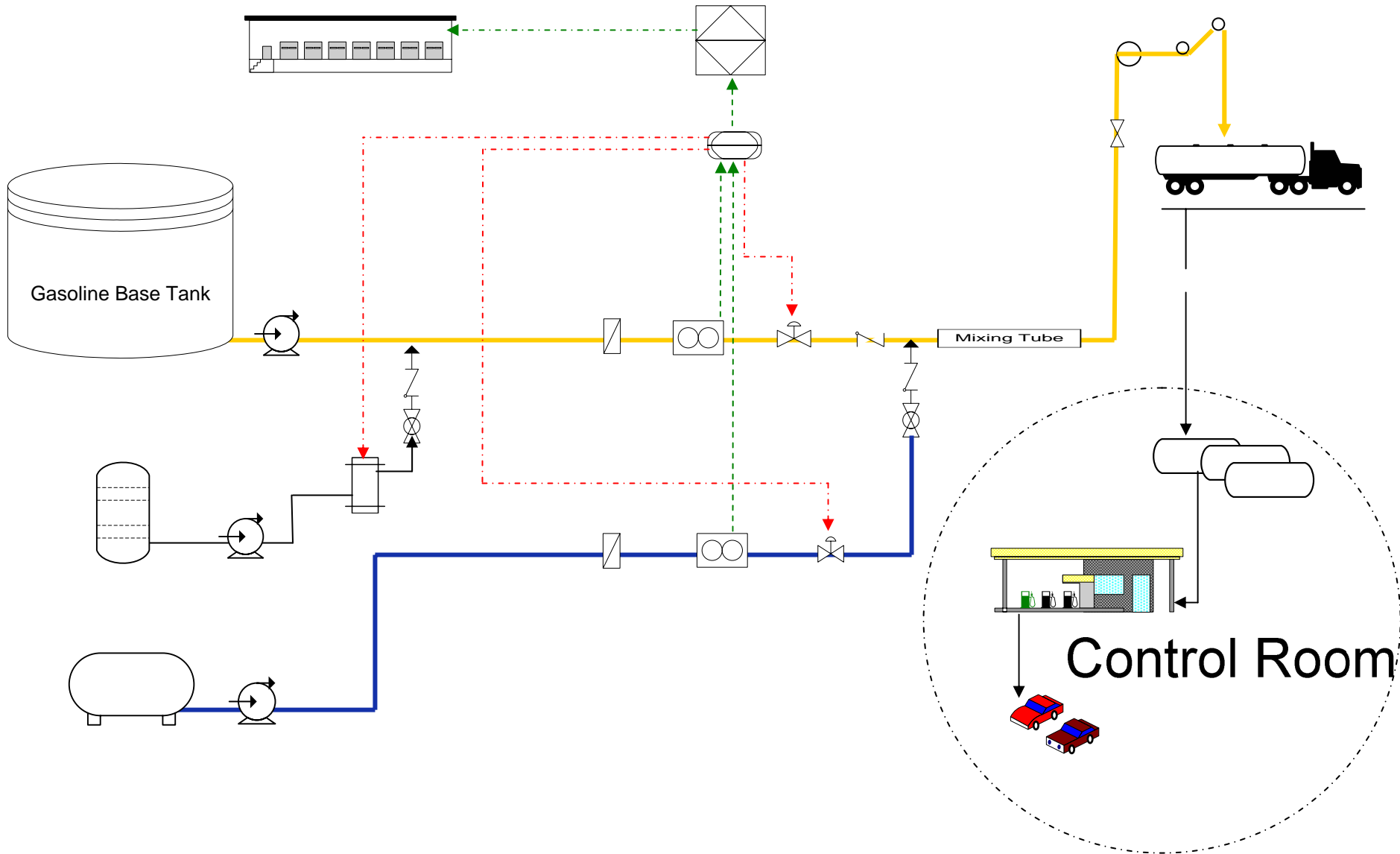
- **Contrec 1010**
- **FMC Smith AccuLoad II**
- **FMC Smith AccuLoad III**
- **Brooks Petrocount**
- **Dan load 6000**
- **Old Gate City SAS presets**
- **Top Tech Multi-load**
- **Others**

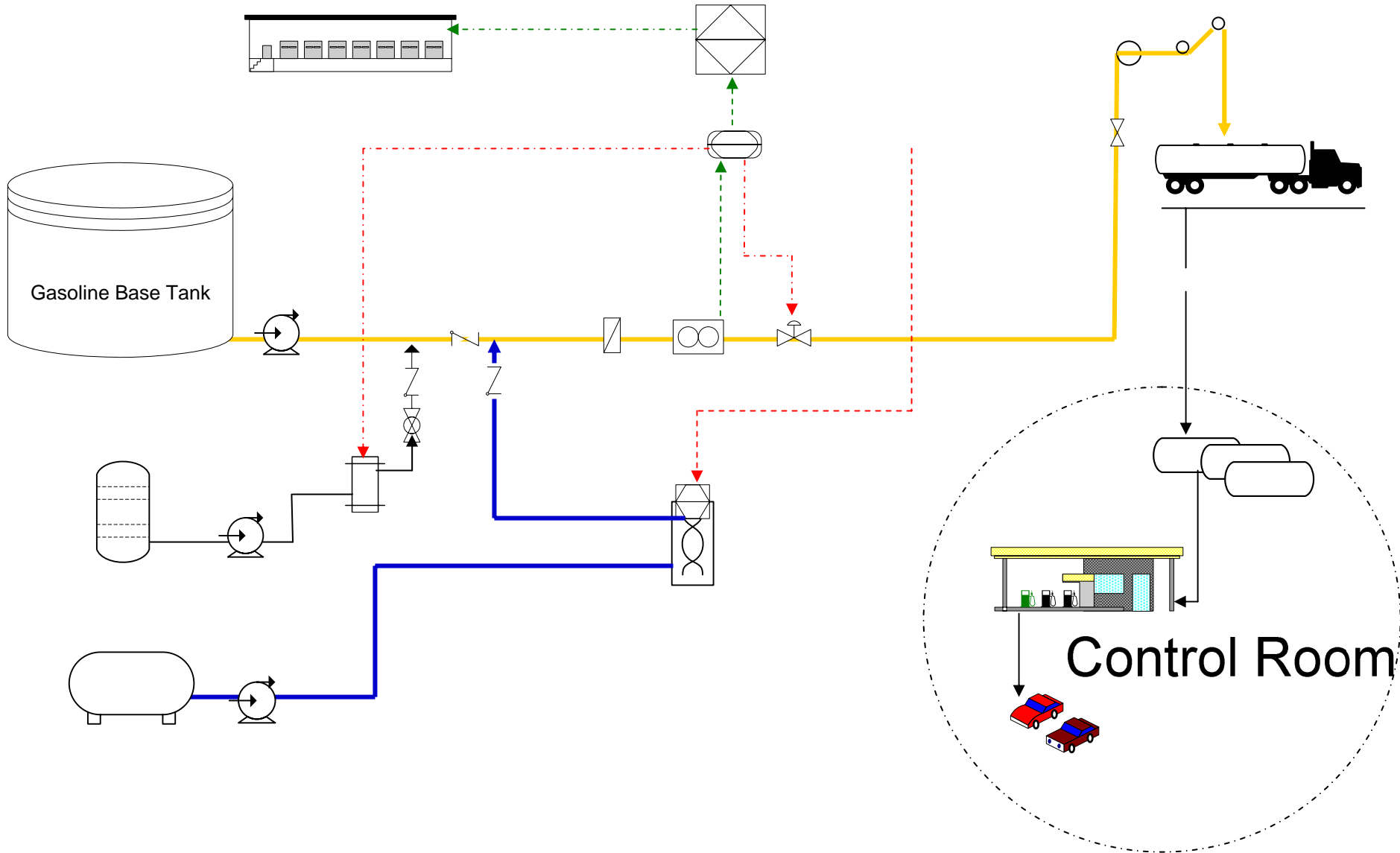
Wild Stream Blender P&ID



- **When you mix Ethanol with Gasoline there is growth factor that occurs.**
- **90 liters of Gasoline and 10 liters of Ethanol equal 100.+ liters of blended**
- **The factor varies with Ethanol quality and type**
- **Recent test results by some of the major oil companies indicate 0.2 to 0.4 growth.**







- **Load Rack Preset Blending**
 - **Redesign and Rebuild Load Rack Piping**
 - **Upgrade Presets and TAS**
 - **Use Blender skids with existing presets**
- **Wild Stream Rack Blending**
 - **Add Blending Skids to Existing Bays or in Tank Farm**
 - **Use Existing Presets and TAS with only Minor Changes**







Bay Blender with Micro-Blender Controller



Vertical Design Ethanol Blending Skid



Vertical Blender with Micro-Blend Controllers



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- **Basic material is called B-100**
- **B-100 is Soy Methyl Ester (100% active) In USA**
- **Palm Oil, Coconut and Jatropha Based in SE Asia**
- **Rape Seed Oil based in Europe**
- **Numerous facilities across the World are now producing B-100**
- **U.S. consumption 2004: 60,000,000 gallons formulated bio-Diesel**
- **B-100 is being formulated and used as fuel:**
 - **99% for Tax Credit**
 - **Typically 2% to 20%**

- **Strong agricultural (farm) lobby in the U.S. government**
- **Farm states are the most active initially**
- **Minnesota: gov't mandate for at least 2% biofuel in every gallon of diesel sold in the state by year end 2005**
- **Other states to mandate soon:**
 - Iowa, Indiana, Illinois, Wisconsin
- **New York Makes Biodiesel from recycled cooking oil**
- **Malaysia**
- **Thailand**
- **South America**
- **Europe**

Why Biodiesel is being used ???

- **U.S. government subsidizing the use of Biodiesel through tax credits**
- **Higher the price of diesel = the more Bio-Diesel is consumed (crude is ~\$53 per barrel and going higher)**
- **To lower the dependence on imported oil**

Are there any standards for Bio-fuels?

- **Undiluted base products –**
 - 100% Bio-fuel known as B100
 - 100% Ethanol known as E100
 - Blend of 80% petrol & 20% ethanol known as E20
 - Blend of 95% diesel & 5% bio-diesel known as B5
- **EN 14214**
 - International standard outlining the minimum requirement for Bio-diesel.
- **EN590:2004**
 - Defines properties for diesel fuel to be sold in the EU. Allows up to 5% FAME
- **ASTM D 4806-98**
 - Standard Specification for “Denatured fuel ethanol for blending with gasoline, for use as automotive spark-ignition engine fuel”
- **EN 228:2004**
 - Defines properties for unleaded fuel to be sold in the EU.

How are bio-fuel blended?

- **Storage or loading terminals**
- **Common locations for Blending**
 - Storage tank
 - Load Rack Headers
 - Load Arm
- **Common Types of Blending**
 - Sequential Blending
 - Ratio Blending
 - Side Stream Blending

- **Why blending at Loading rack?**
 - Storage tank blending requires
 - ◆ Each blend requires dedicated storage tank
 - ◆ Increases cost of operation
 - ◆ Capital Investment and less flexibility in dynamic blending
- **Typical Blending at Load Rack requires**
 - Ethanol / Bio-diesel Storage
 - Boost Pump Pressure Skid
 - Blending Equipment

- **Pulse Blending**
 - High Capacity Injectors
- **Continuous Blending**
 - Micro-Blender system

Standard Mono-Block Injectors

- **For 0.1% - 0.5% blend rates up to 3**
- **Interfaces to Standard Presets and TAS**
- **Interfaces to Pipeline Measurement Systems**

- **For 0.5% - 5% blend rates up to 30 GPM**
- **Operates like a tradition additive injector**
- **Interfaces to Standard Presets and TAS**
- **Interfaces to Pipeline Measurement Systems**

EFT High Capacity Injector

Honeywell



Vertical Design Blending Skid



5-Stream Bio-Diesel Blender



Bio-Diesel Blending Skid



Why Honeywell?

- **Consultation to Conceptualization up to Commissioning**
- Rich **Domain** Expertise and **Application Experience** across geographies
- **Massive installed base**
 - 60,000 additive injection systems
 - Over 700 Biofuel blending systems
 - Multiple truck loading modularized gantry systems
- **“Global Company with Local presence”** having 10 regional and sales Support office network to ensure prompt and better Life Cycle Support
- Custom designed and engineered solutions utilizing standard products
- Full systems integration capability from the Honeywell family of companies.
- **One Stop Shop from Solutions to Support & Services**
 - **Micro Blender**
 - **Multi stream Blender**
 - **Mini-Pak 3000 – dedicated additive injection controller**
 - **Mini-Pak 6 – Multiple injection on each load rack**
 - **Tank Gauging System & Load Controllers**
 - **Continuous R&D investment – Minimum risk of Obsolescence**



**We are building a world...
that's safer and more secure,
more comfortable and energy efficient,
more innovative and productive.**

We are Honeywell