

Background of Presenter:  
Andrew Gore  
C.Eng., M.Inst.M.&C., etc.

Chartered Engineer, Project Manager  
retired after 50+ years in Design, Construction, Operations & Technical  
Safety Engineering of Process Systems.

Experience in a variety of Industries & countries i.e. Coal Mines, Glass  
Manufacturing, Petro Chemical, Food, Oil & Gas Industries  
Worked in UK, Europe, Middle East,  
Bangladesh, Singapore, USA, Australia

# Where did it all start?

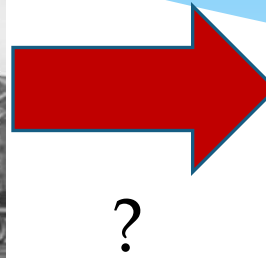
I left school with 5 'O' Level GCEs  
Then served an Apprenticeship as an Electrician in the Coal Mines.

This started me off on the long convoluted path to becoming  
Chartered Engineer and Project Manager in completely different  
industries?

There are other ways to achieve this!

Start  
Apprentice  
Electrician

End (nearly)  
Project Manager



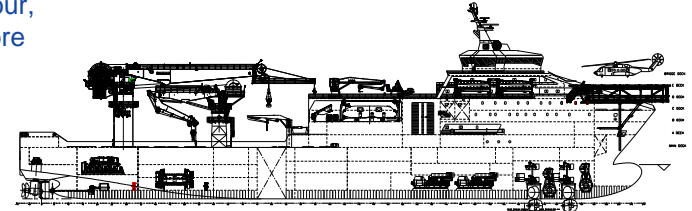
Over 5,000  
Feet (1 mile)  
down



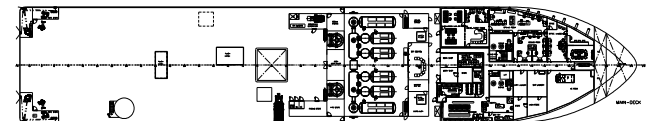
Jun 18 Queen Elizabeth Grammar School Penrith

Main Crane 300te harbour,  
300te offshore (OFE)

4,000 Te Vessel with Accommodation for 140



Two CRP Azimuths each 3.0MW  
One Centre Prop 4.0MW (BFE)



31700 m2 deck with under-deck  
storage and deckhouse laydown  
area (2400m2 + in total)

350m Dive System, 24 men, 2 x moon-  
pools (OFE)

# Pathway to being a Chartered Engineer

1. Degree Level Technical Qualifications
2. Then at least 5 Years Experience at a Senior Engineer Level.
  1. Day Release & Evening Courses at the Local Technical College (Start 1963 finish 1972)  
(9 Years, 2 ONCs., 3 HNCs., Plus other Endorsement Subjects  
Accepted as Equivalent to Honours Degree)  
  
Allowed Entry into Institute.
  2. Still need a number of years experience at a Senior Engineer Level???

# Pilkington Float Glass Process

Employed as an Instrument Technician  
(1968 to 1972)

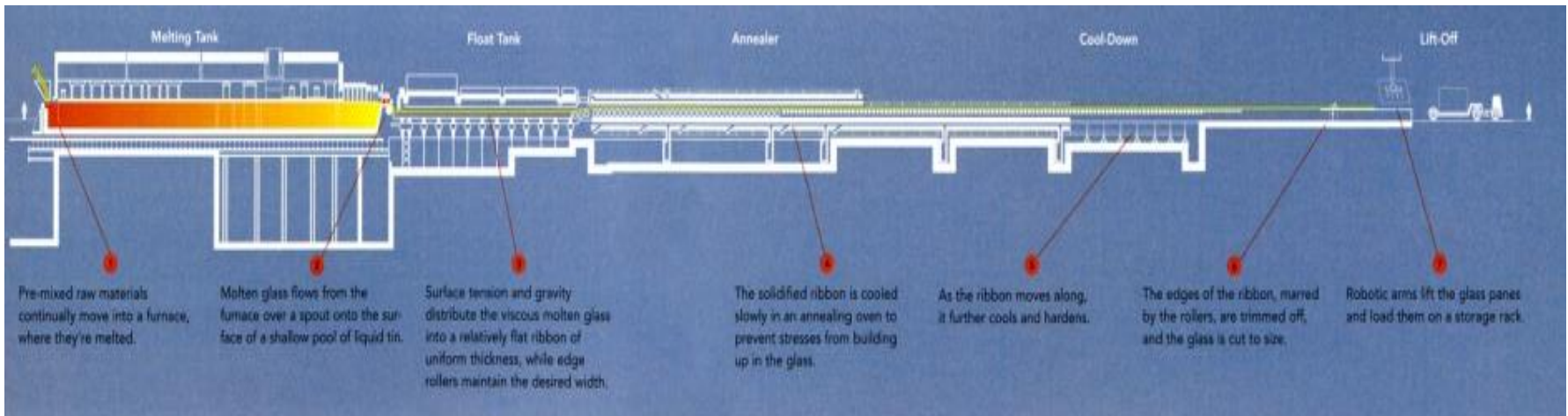
Sand, Calcium & Sodium Carbonate added to Furnace., Heated to over 1800DegC

Molten Glass Cools to about 1100DegC and Flows over a weir onto a Bath of Molten Tin

Glass and Tin are both Cooled to about 600DegC. Tin stays Molten but Glass is now solid.

Glass now is transported in a solid continuous Ribbon into treatment Chambers where it is Annealed and Coated as necessary.

The Moving Ribbon of Glass is Cut to length in a continuous process then transported to other finishing lines.



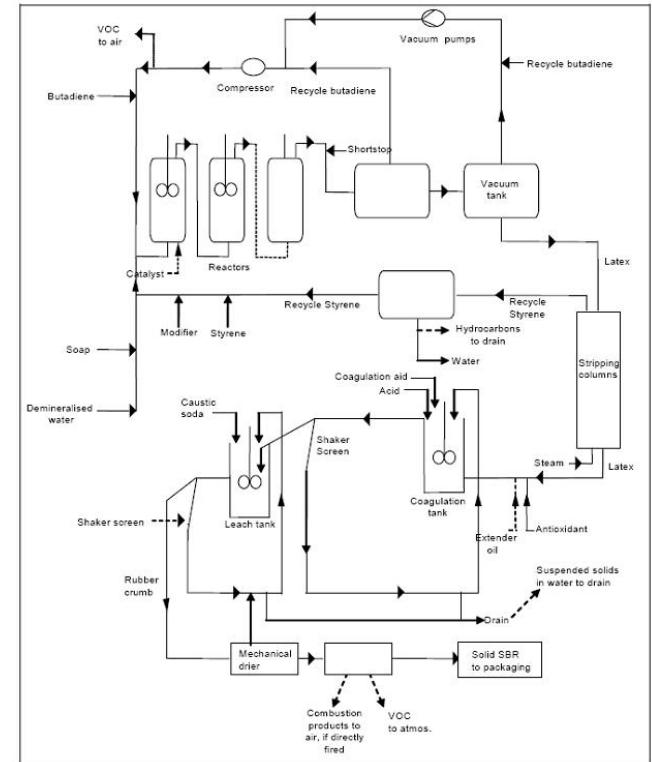
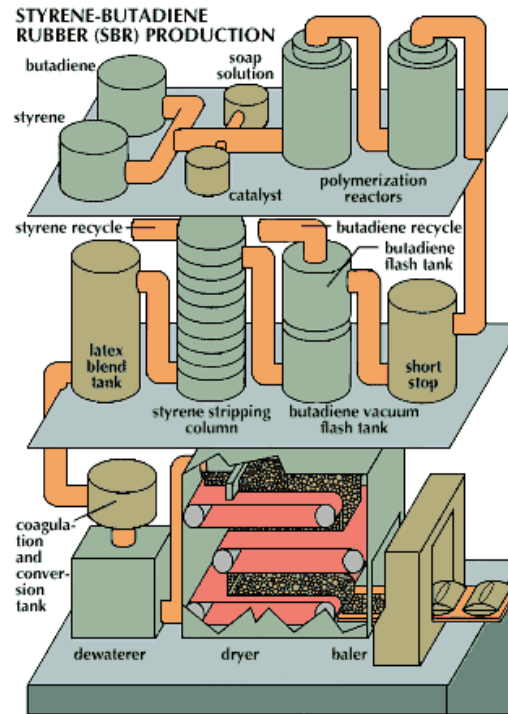
Over 300 Metres



# First experience as an Engineer:

## Responsible for the Control and Safety Systems on a Synthetic Rubber Production Plant

A Chemical Process using Butadiene a Bi-Product of Oil from local Refinery

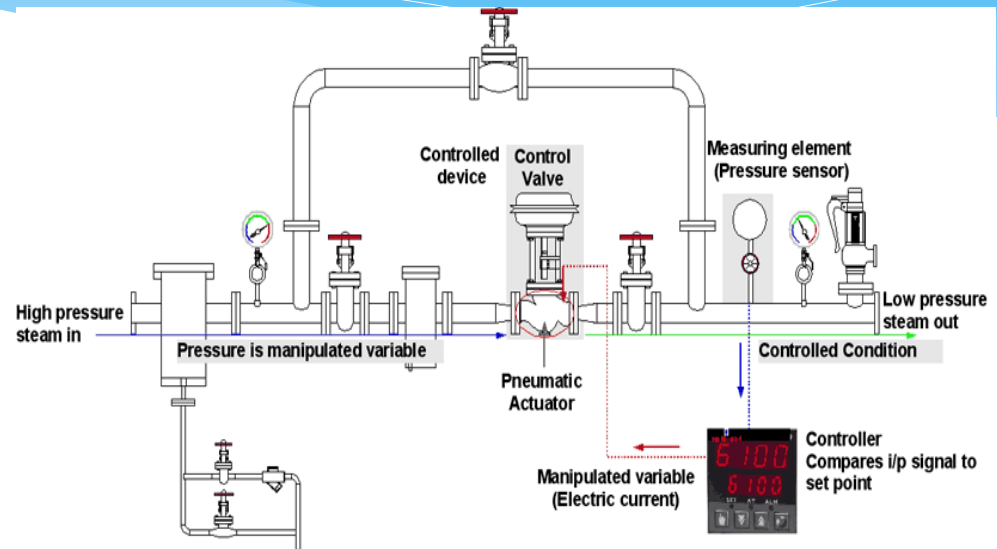


# Chemical Process Instrumentation & Control Room

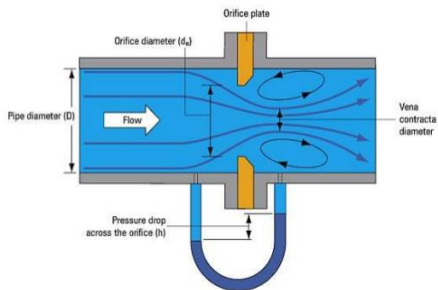
## What a learning Curve?



Boiler Operator Jeff Craigie sits in the Boiler Room and monitors flows, temperatures and pressures of the boilers and feed-water system. Photo by Peter Schmitt

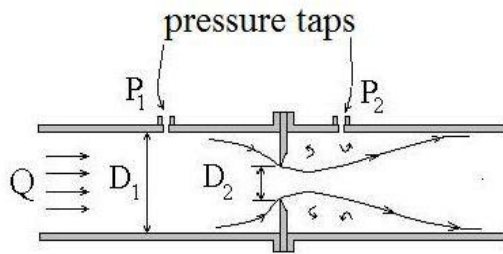


### ORIFICE PLATE



# Equations

## Flow Equation

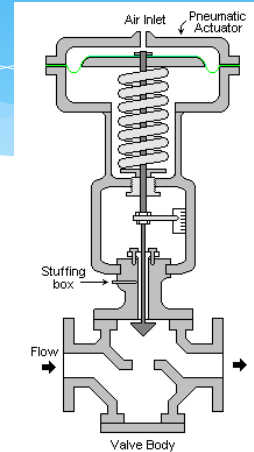


Orifice Meter Parameters

$$Q = C_d A_1 \sqrt{\frac{2gH}{\left(\frac{D_1}{D_2}\right)^2 - 1}}$$



<http://minstrumentation.blogspot.com/>



## Control Valve Equation

$$Q = C_v \sqrt{\Delta P / G}$$

Q = Capacity in Gallons per Minute

Cv = Valve Coefficient

ΔP = Pressure Difference psi

G = Specific Gravity of Fluid



# Change!

Once you have the Qualifications & Experience.

Your Skills are in Demand.

Done that now for something completely different.

# Food Industry Making Sausage Casings!!!

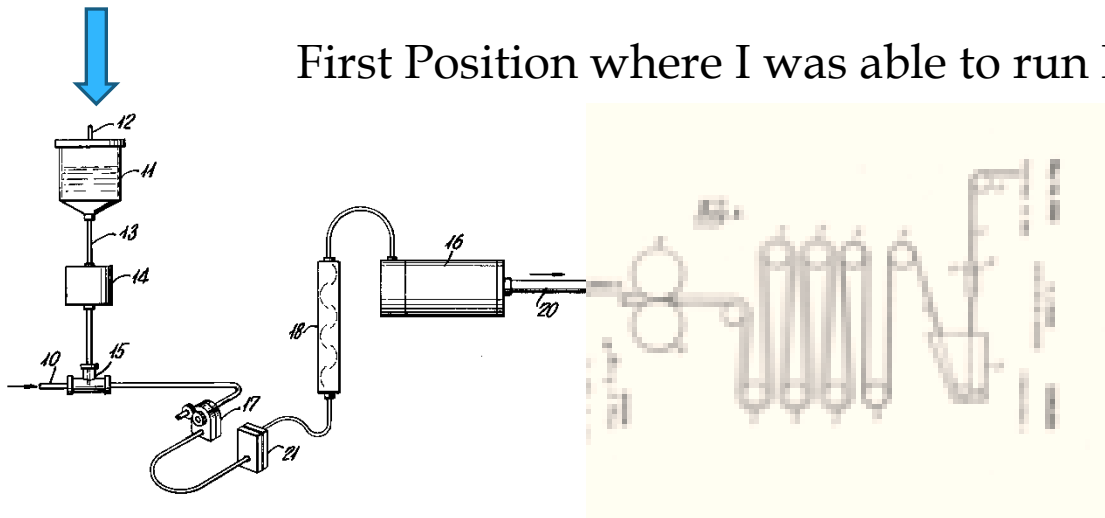
Design & Project Engineering for all Electrical & Control Systems

Factories 2 in Scotland, 1 in USA, 1 in Germany & 1 in Australia

Over 200 Lines running 24Hrs/Day 7 Days/Week 50 Weeks of Year.

Input  
Collagen,  
Cellulose,  
Water & HCl

First Position where I was able to run Multi Discipline Projects!



Output: Sausage  
Casings @  
100ft/Min (30  
Mtrs/Min)  
UK production  
lines approx: 200  
= 20,000 ft/min  
(3.8 miles/min)

# Change!

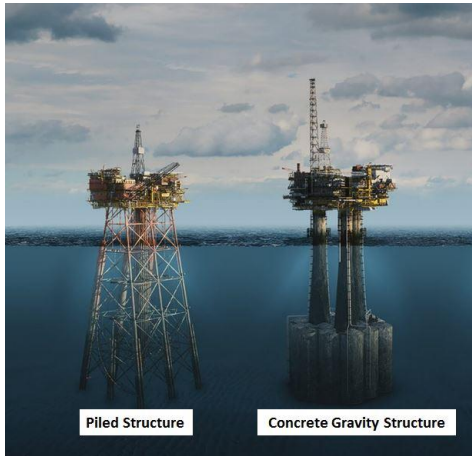
Now looking to use the Experience of Project Management.

Try something Different.

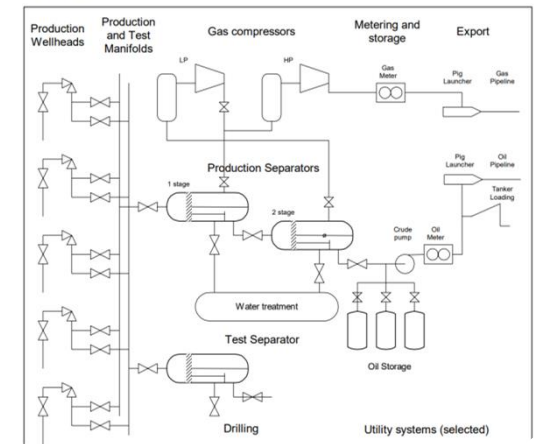
# What next?

Late 1970s, North Sea Oil!!!

Major Companies needing all kinds of Engineers to build Offshore Facilities and Processes.

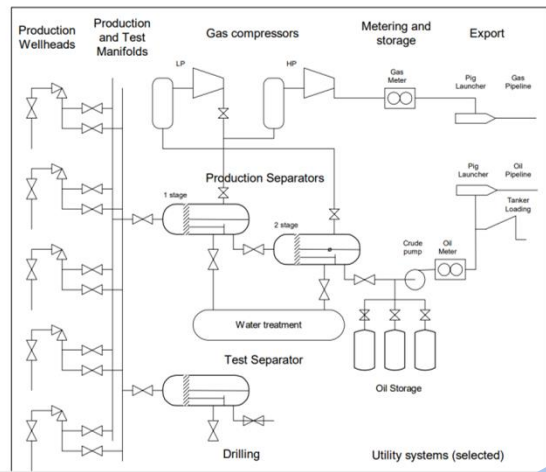


Although there is a wide range of sizes and layouts, most production facilities have many of the same processing systems shown in this simplified overview:

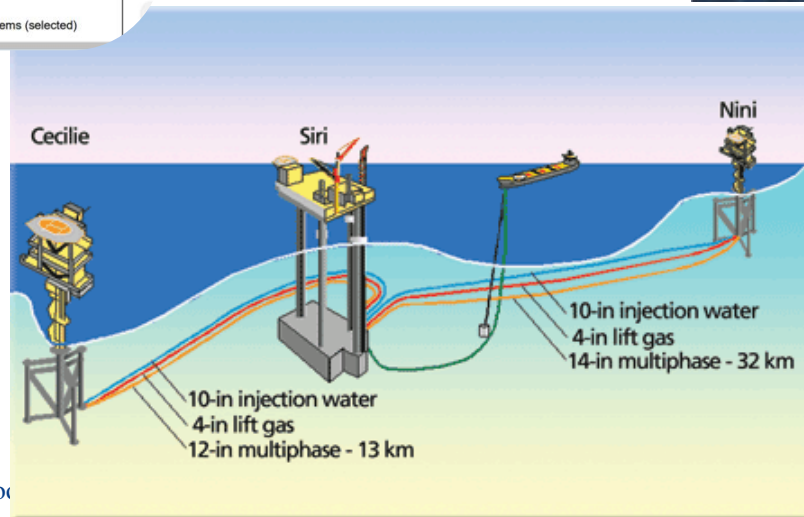


# Offshore Oil Platforms need a Multitude of Facilities.

Although there is a wide range of sizes and layouts, most production facilities have many of the same processing systems shown in this simplified overview:

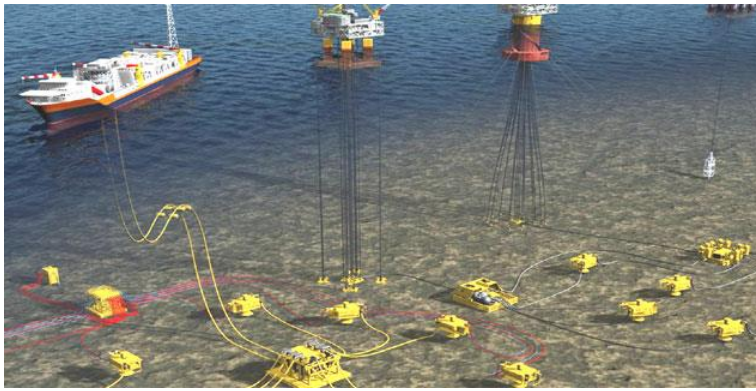


1. Hotel Accommodation
2. Catering Food 200 POB
3. Helicopter Landing
4. Supply Boat Load/Un-Load
5. Electrical Generation
6. Drinking Water
7. Escape Lifeboats
8. Satellite Communications
9. Drilling/Workover
10. Oil & Gas Process.
11. ++ etc ++





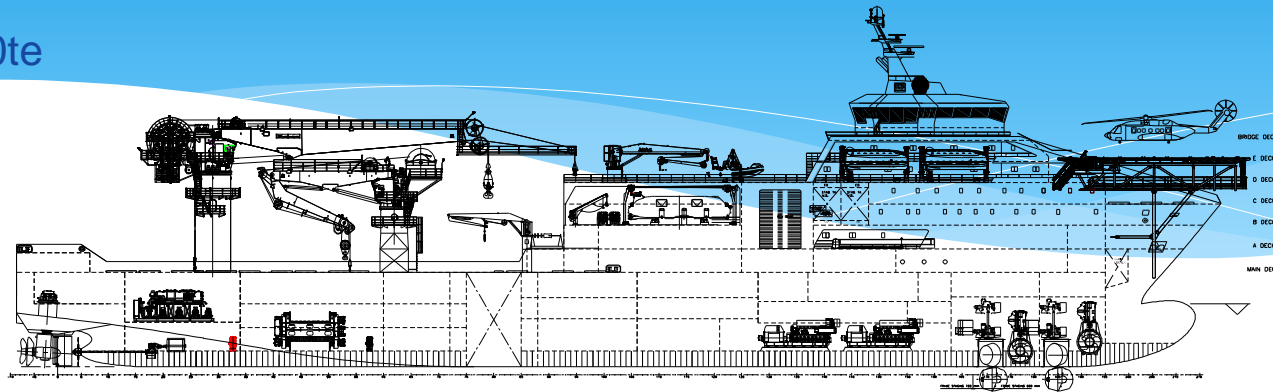
# Subsea Engineering



# NEW DSV

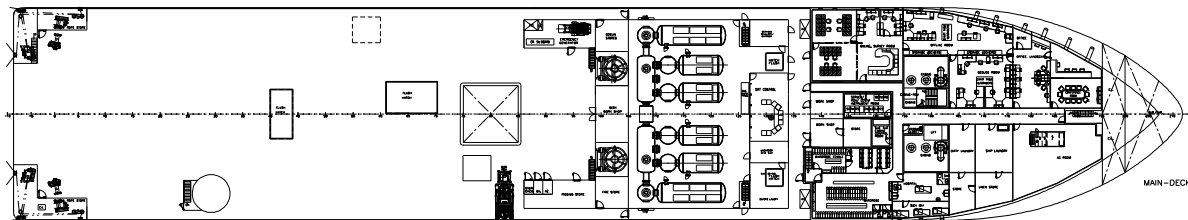
Accommodation for 140

Main Crane 300te  
harbour, 300te  
offshore (OFE)



Two CRP Azimuths each 3.0MW  
One Centre Prop 4.0MW (BFE)

Two Retractable Azimuths each 1.5MW  
Two Tunnel Thrusters each 1.9 MW (BFE)



1700 m<sup>2</sup> deck with under-deck  
storage and deckhouse laydown  
area (2400m<sup>2</sup> + in total)

350m Dive System, 24 men, 2 x  
moon-pools (OFE)

# Benefit of having a Engineering Education

You have the:

- Qualifications & Experience
- In Demand
- Ability to Learn new skills and disciplines
- Confidence to try something different

You can move to different Industries.  
If you want/need to.

# Worked Where?

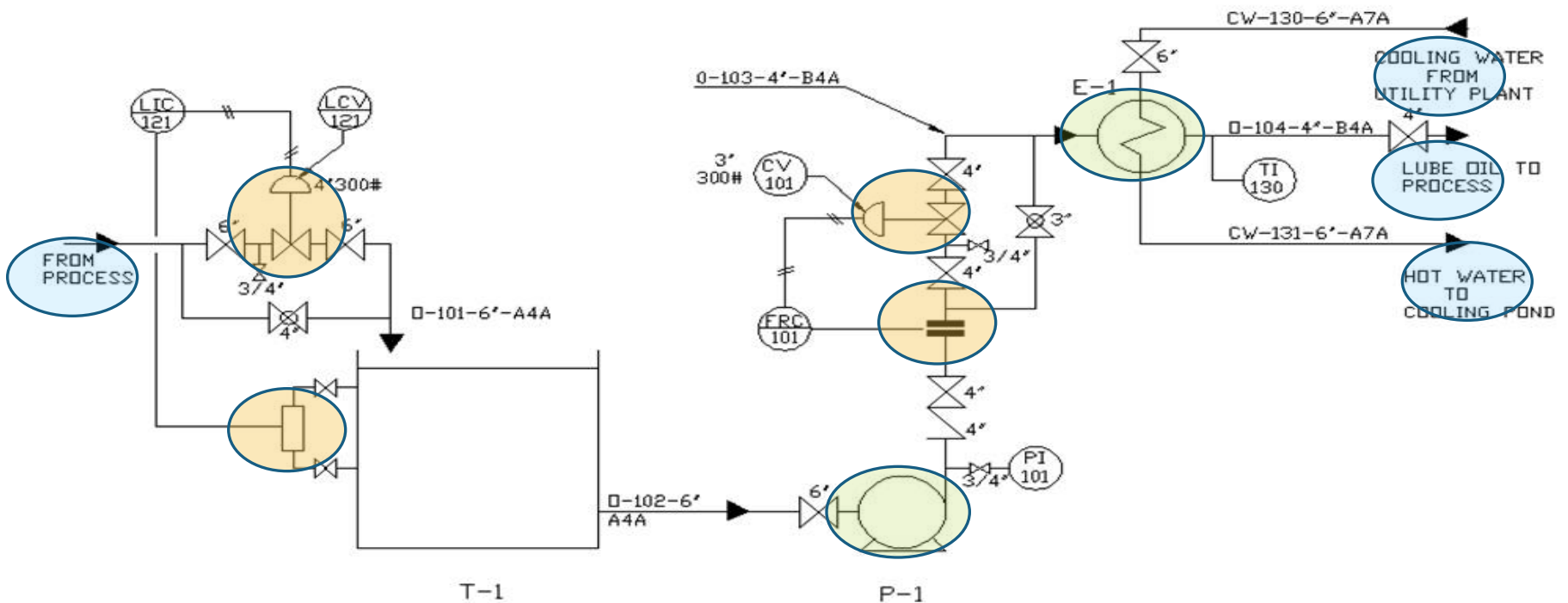
1. UK: England, Scotland, Ireland
2. Norway: Stavanger, Sovik & Oslo
3. Germany: Celle & Pforzheim
4. France: Paris & Bezier
5. Holland: Velzen & Amsterdam
6. Italy: Rome & Ravenna
7. Denmark: Esbjerg
8. USA: New Jersey
9. Australia: Bathurst
10. Singapore:
11. Bangladesh: Chittagong
12. Saudi Arabia: Al Khobar & Abqaiq



# Teamwork

## Design a Process System

### How many Different Engineers/Designers needed?





# Where will it take you???



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# Questions?

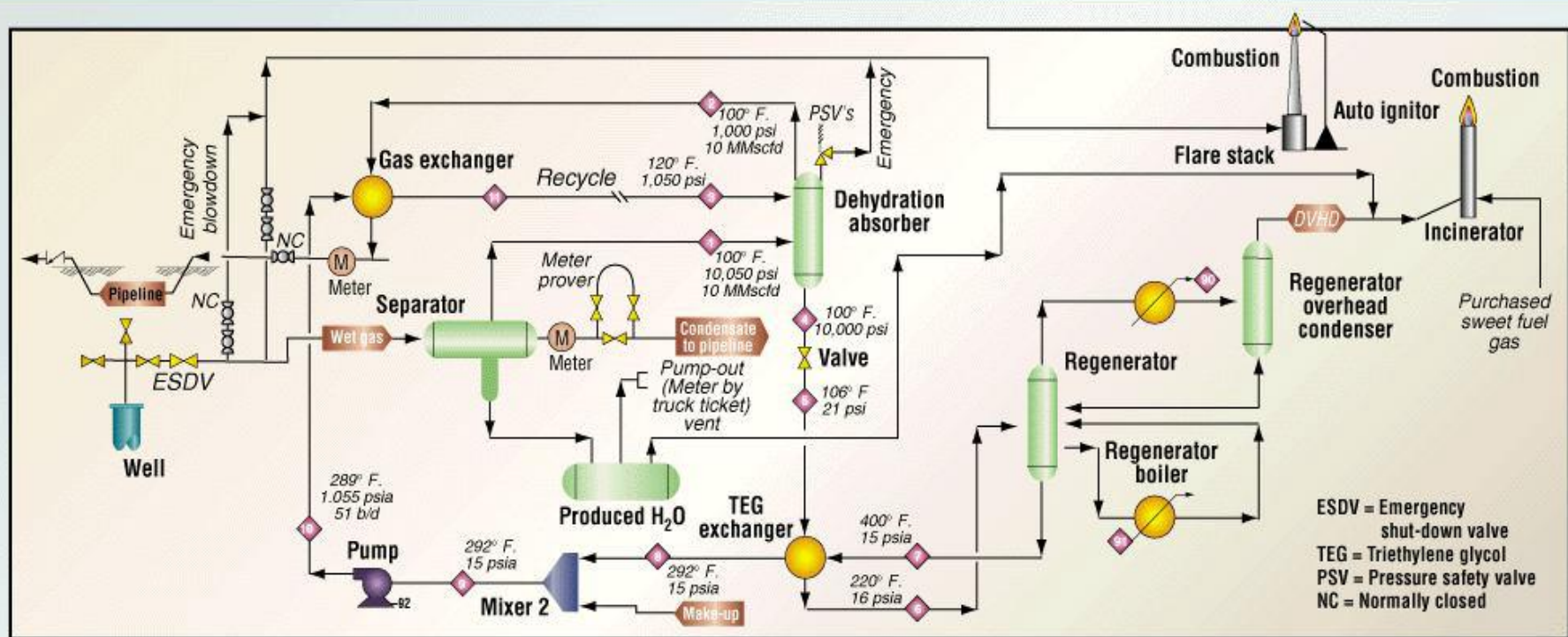
# Questions?



3D modelling by MaritimeColours

# What is an Engineer?

## SOUR GAS WELL PROCESS FLOW



# Skandi Achiever



## Key Features

<p><b>Principal Dimensions</b></p> <p>Length Overall 106 m          Length between pp 94.7 m          Breadth moulded 21 m          Depth to Main Deck 8.5 m          Design Draught 5.8 m          Max. Draught 6.6 m          Deadweight at 6.6m 4000 t</p> <p><b>Classification</b></p> <p>DNV 1A1,E0,DYNPOS-AUTR(IMO II),DK(+), HELIDK,ICE-C,CLEAN DESIGN, NAUT-AW (LoC), Comf V(3), DSV-SAT ERN 99.99.99</p> <p>Flag Bahamas</p> <p><b>Cranes</b></p> <p>140t at 10m AHC Knuckleboom subsea crane          10t at 32m Whipline</p> <p>5t at 10m Auxiliary seabed crane          3t at 15m Provision crane</p> <p><b>Deck Capacity</b></p> <p>Area Approx 735 m<sup>2</sup>, 5 - 10t/m<sup>2</sup>          Deckload 1300t 1m above deck</p>	<p><b>Accommodation</b></p> <p>100 persons in 56 Cabins</p> <p><b>Capacities</b></p> <p>Fuel Oil 1200 m<sup>3</sup>          Lub Oil 48.3 m<sup>3</sup>          Fresh water 1088 m<sup>3</sup>          Ballast Water 3620 m<sup>3</sup>          Water makers 1x25t/day,1x 35t/day</p> <p><b>Service Air</b></p> <p>1x 8 bar Compressor 1000 m<sup>3</sup>/h</p> <p><b>DP 2 System</b></p> <p>Kongsberg KPOS</p> <p><b>Reference Systems</b></p> <p>2x HPR          2x Tautwires          2x MRU          1x Fanbeam          2x DGPS          2x Seapath</p>	<p><b>Power Plant</b></p> <p>4x Wartsila 9L20          2x MAN 9L28/32/H</p> <p>Total generated power 12.5 MW</p> <p><b>Forward Propulsion</b></p> <p>2x Tunnel Thrusters 1.5 MW ea.          1x Drop down gyro thruster 1.5 MW</p> <p><b>Aft Propulsion</b></p> <p>2x Fixed Pitch Contaz 15 thrusters, 2.2 MW ea.</p> <p><b>Vessel Speed</b></p> <p>Trials speed 15 kts at 4.5m draught</p> <p><b>Helideck</b></p> <p>Dimensioned and strengthened for S-92 .</p> <p><b>Lifesaving Appliances</b></p> <p>2x 100 persons lifeboats          1x FRC          1x 18 divers SPHL + 4 Crew</p>	<p><b>Diving system</b></p> <p>Depth rating 300 MSW          No. in Sat. 18          No. of bells 1          Bell Vol. 6 m<sup>3</sup>          System Volume 196 m<sup>3</sup>          Gas storage at 200 bar 18400 m<sup>3</sup>          Reclaim sytem fitted to bell          Gas recovery for chambers          Moonpool aeration system</p>
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