



THAMES CRYOGENICS LTD.
Total Cryogenic Solutions

Dewar Filling Solutions

from

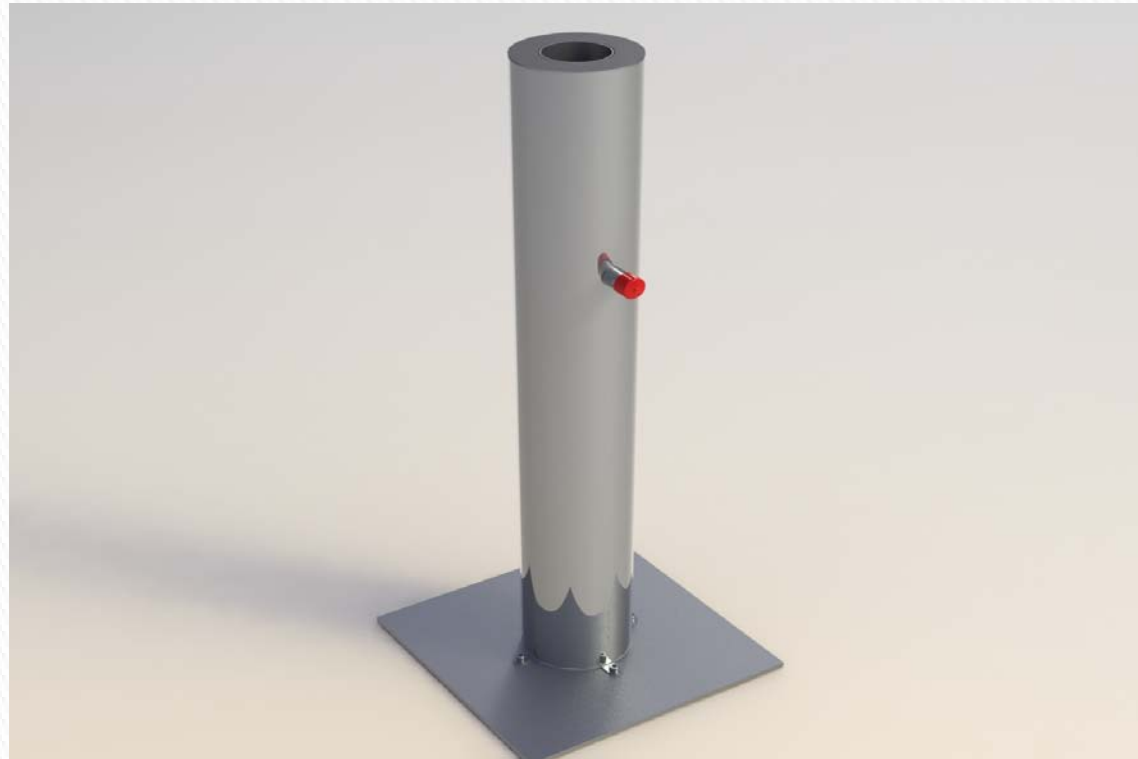
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Cryogenic Cluster Day 22/09/2010

Dewar Filling Solutions

Dewar vessel

- ▶ *-noun.* A container with an evacuated space between two walls, capable of maintaining its contents at a near-constant temperature over relatively long periods of time.



Dewar

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Suitable for all
manual filling
applications

- ▶ Handle
- ▶ Rigid filling tube
- ▶ Sinter
- ▶ Sinter shroud
- ▶ Variable length and diameter.



Simple decant hose

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Safety improvement
for manual
decanting

- ▶ Fail-safe
- ▶ Uncomplicated
- ▶ No services required.



Mechanical dead-man's handle

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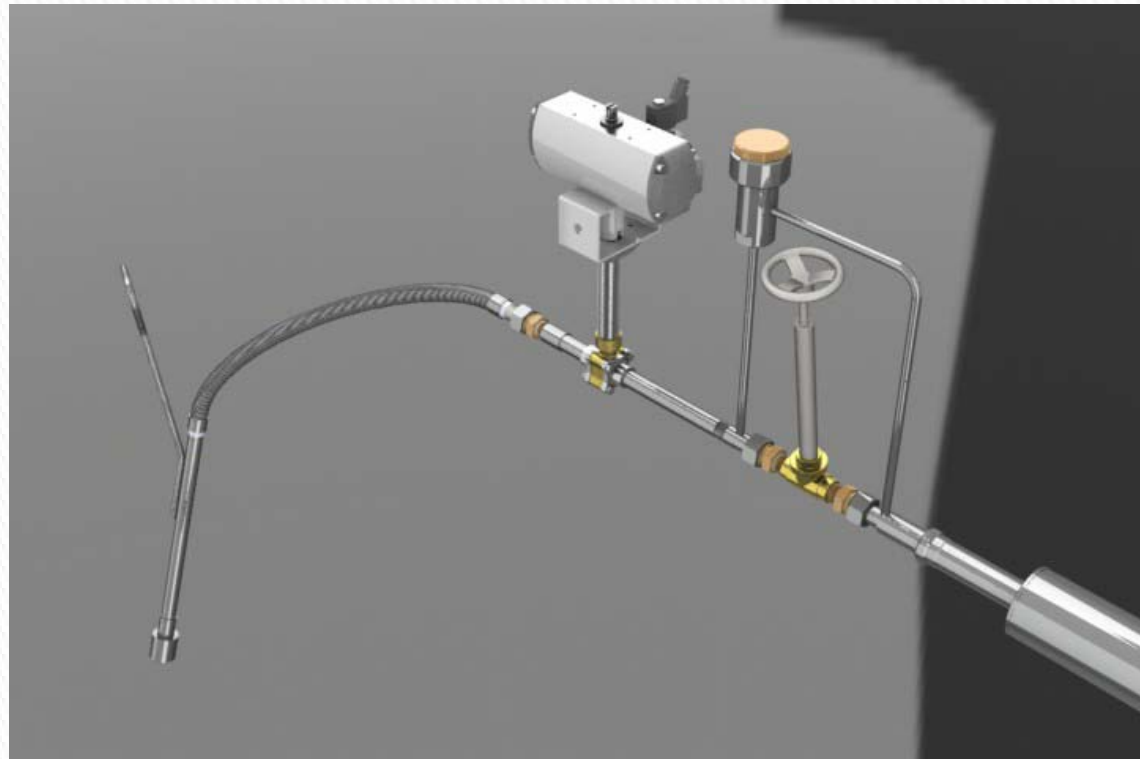


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Improvements over mechanical DMH

- ▶ Easier to use
- ▶ Space
- ▶ Push button can be remote from decant point

But does require electrical supply and possibly pneumatics.

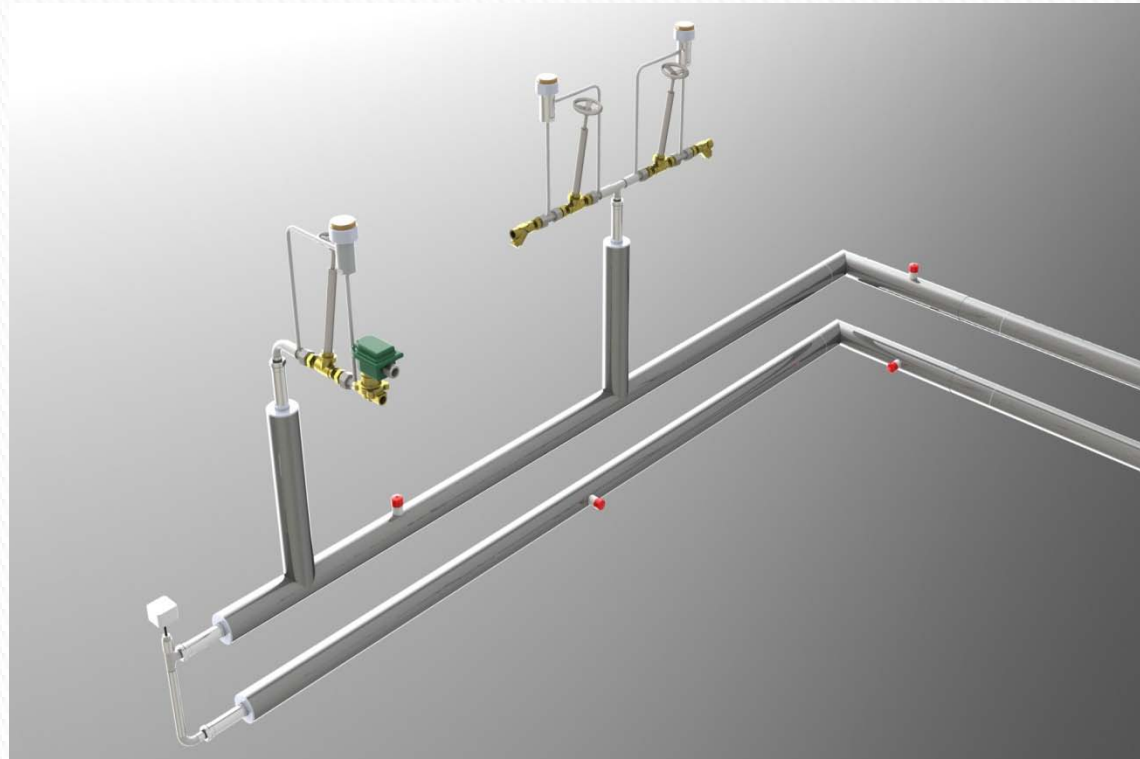


Push-to-fill

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For end of line decant points,
combination with a
gas vent system
pre-cools line and
prevents large gas
discharge

- ▶ Interface prevents operation until gas vent has operated.

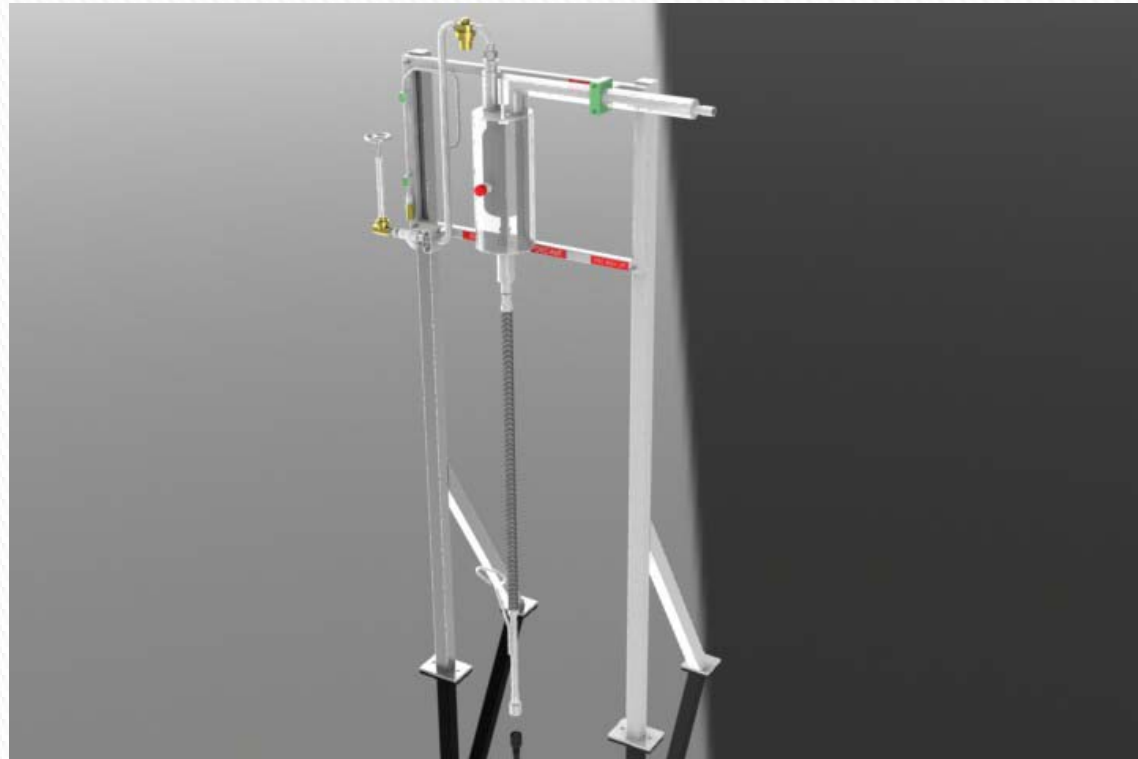


Push-to-fill combined with gas vent

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For sites with a high pressure tank

- ▶ Deals with inlet pressures up-to 20 bar
- ▶ Provides free-venting liquid for open dewar filling
- ▶ Variant available with level sensor for auto filling.



Pressure-reducing open dewar filling station

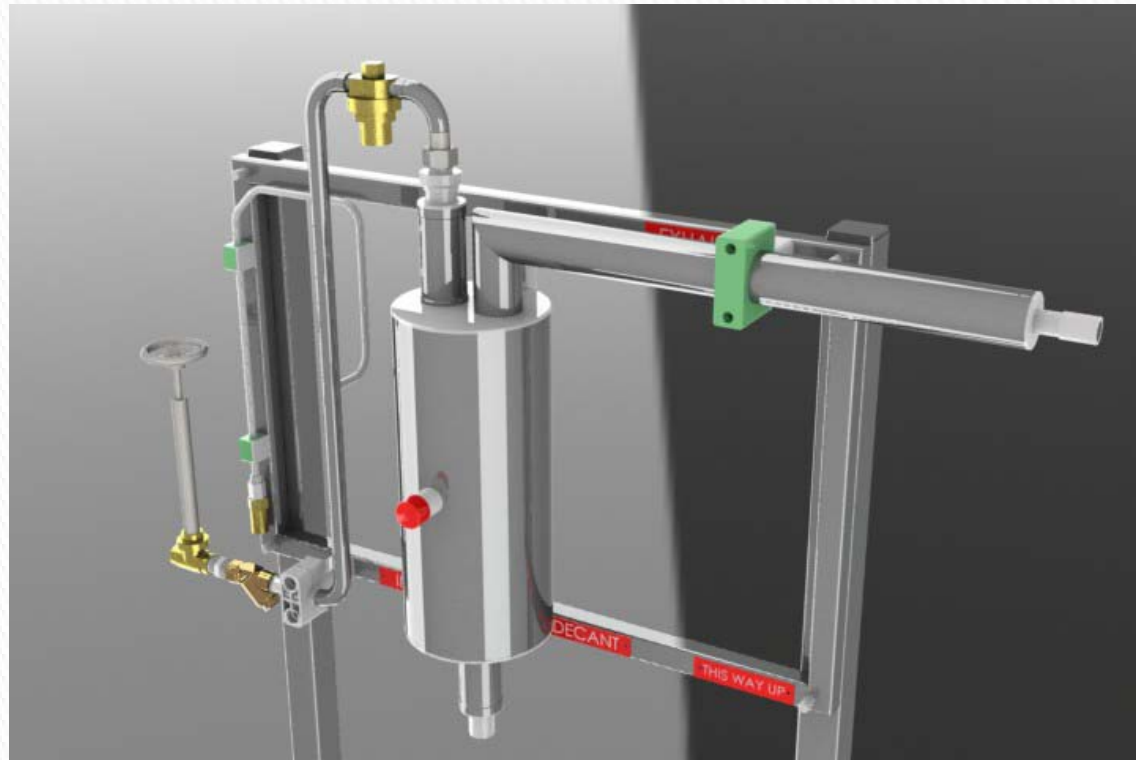
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Features

- ▶ Manual valve
- ▶ Filter
- ▶ Pressure reducing valve
- ▶ Phase separator
- ▶ Vacuum insulated exhaust
- ▶ Manual decant flexible
- ▶ Wall or floor mounted on frame.



Pressure-reducing open dewar filling station

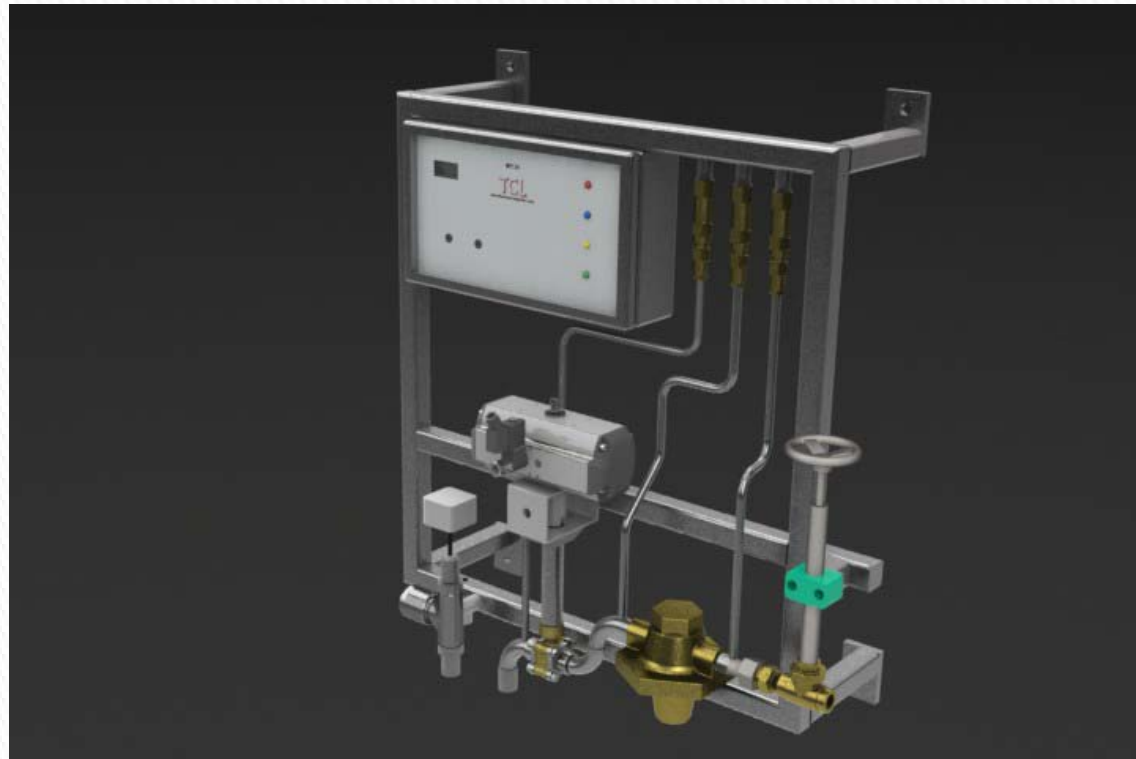
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For the filling of
pressurised dewars
(liquid cylinders)
from a bulk tank

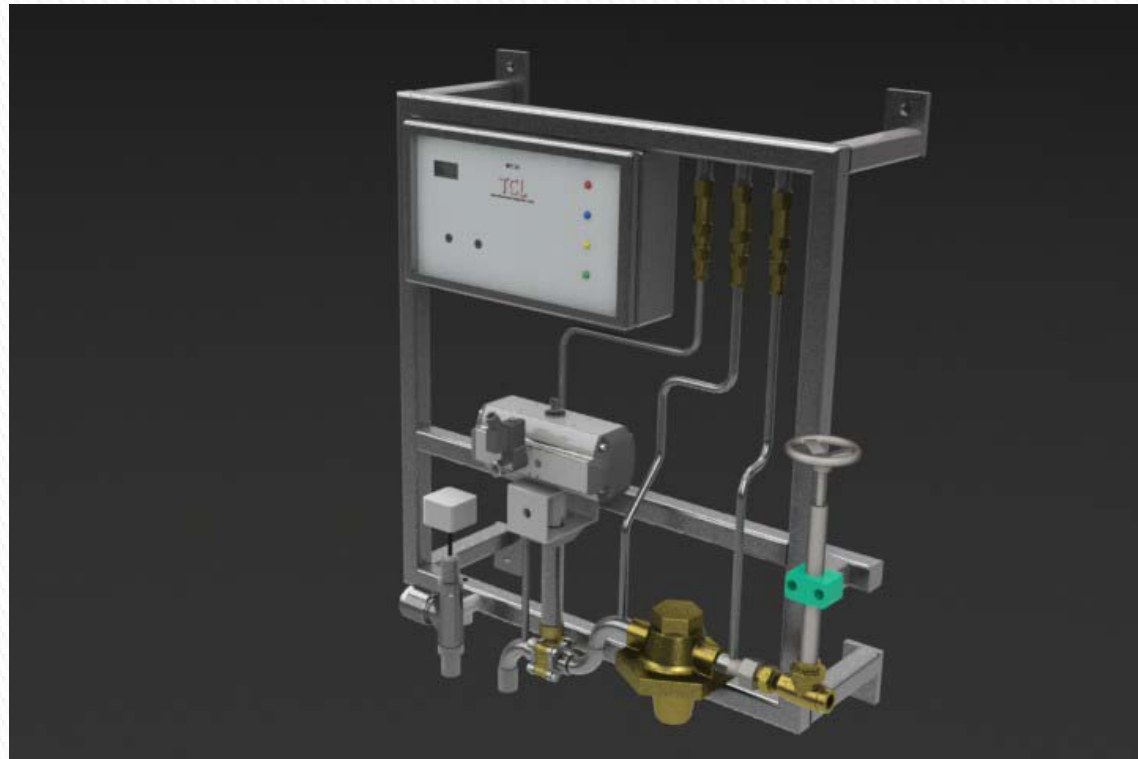
- ▶ Automated fill
- ▶ Deals with any size dewar
- ▶ Can be sited inside buildings if required
- ▶ Reduces pressure from source if required



Pressurised dewar filling station

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- ▶ Temperature controlled
- ▶ Optional proximity sensors
- ▶ Relief valves combined for ease of piping away
- ▶ Wall or floor mounted on frame
- ▶ Optional swipe card system for access and logging.

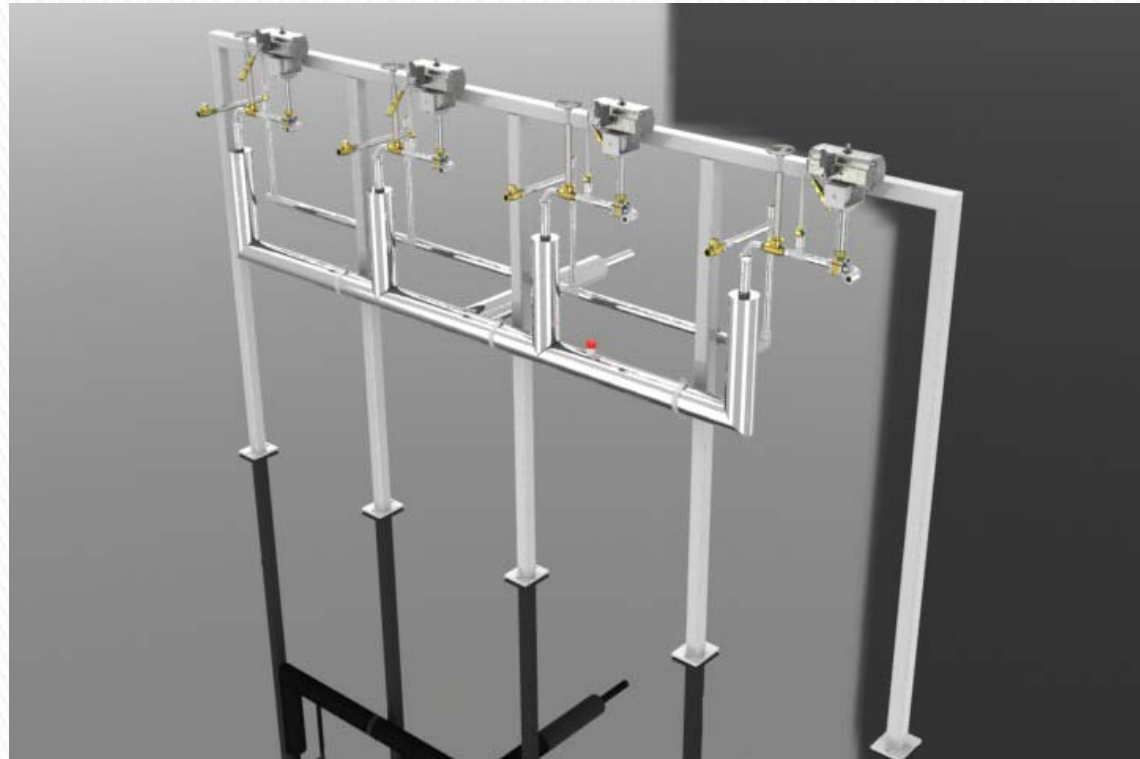


Pressurised dewar filling station

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Where multiple dewar fill stations are required

- ▶ Combined control panel
- ▶ Combined feed and vent streams.



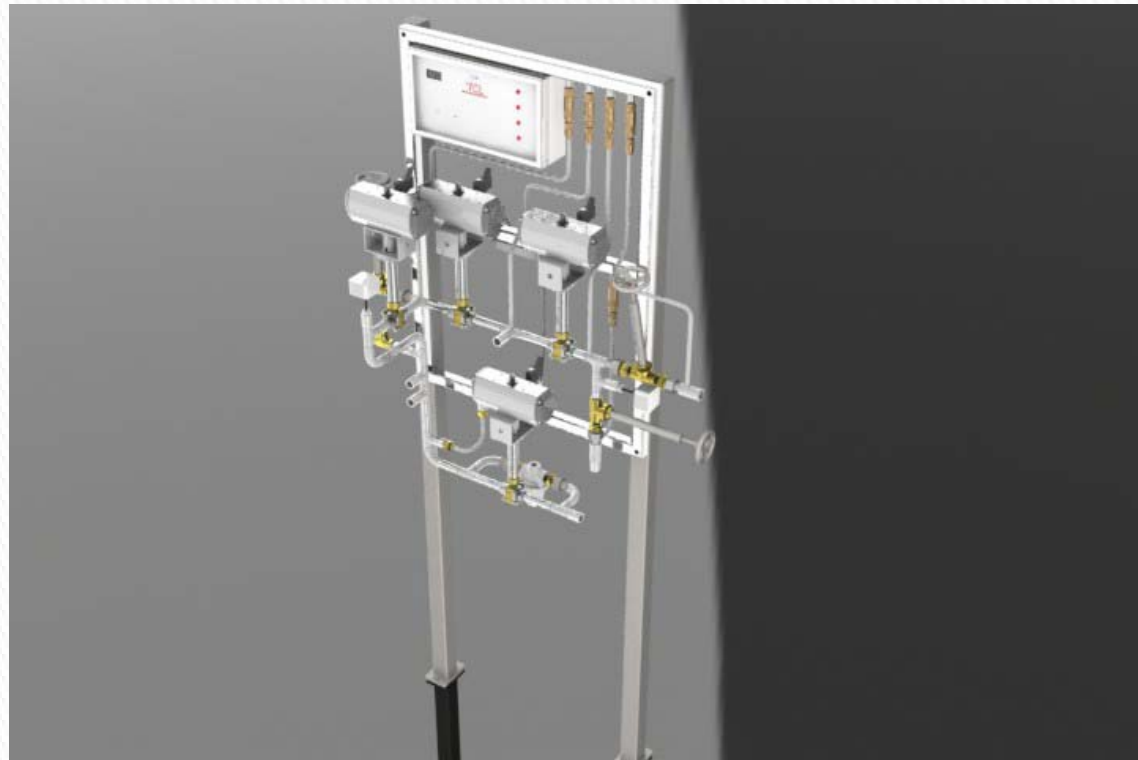
Multi-pressurised dewar filling station

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- Current ways of getting LN₂ to areas that are remote from the supply point
- ▶ Manual handling of dewars from delivery point to use point
 - ▶ Vacuum jacketed pipework from bulk tank to use point.



ISIS – Internally Sited Intermediate Storage

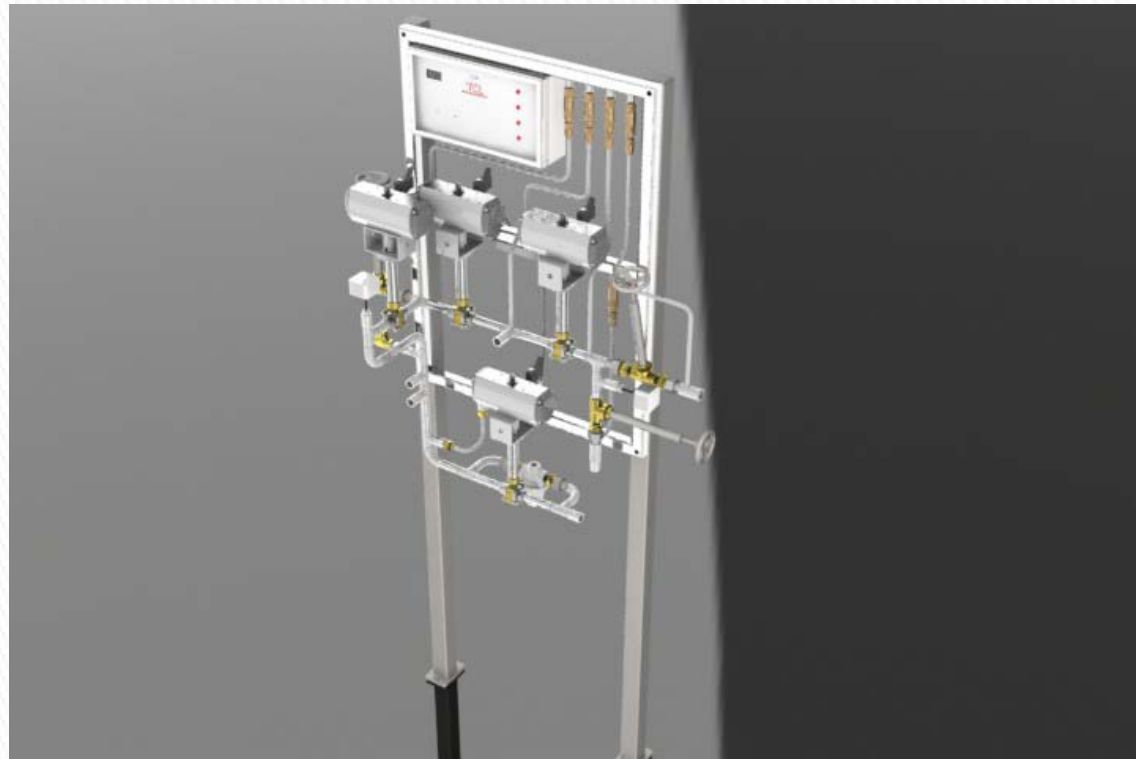
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Drawbacks with manual handling of dewars

- ▶ Physical weight of a full dewar (up to 1 / 3 tonne) means any risk assessment will advise against moving them
- ▶ Weight of liquid is supported on thin neck tube in dewar which is prone to damage if dewar is not moved carefully, particularly across uneven ground
- ▶ Use point may be on a different level meaning that the dewar needs to be placed within a lift!!!



ISIS – Internally Sited Intermediate Storage

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Drawbacks with piping systems

- ▶ Systems which are run 'dry' can have long waiting times to get liquid at use points. Multiple decants of small volumes during a day result in the pipe being cooled frequently and high losses
- ▶ Systems which are run 'wet' have static losses which can be quite high. Keeping a pipeline full of liquid means throwing away liquid.



ISIS – Internally Sited Intermediate Storage

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Thames Cryogenics have developed the ISIS system to overcome these problems

Essentially we have created a hybrid system that gives all the convenience of liquid on demand without the penalty of high liquid consumption and importantly ticks all the boxes with respect to safety

In a nutshell the dewar remains in the room or location where liquid is required and is filled once a day, automatically via a vacuum superinsulated pipeline.



ISIS – Internally Sited Intermediate Storage

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Components of an ISIS

- ▶ Pressurised dewar – Can be existing, user owned or leased or supplied as part of a new package
- ▶ QPL3K control panel – A highly sophisticated, programmable control panel that controls filling, decanting and venting and can be wired to depletion systems to shut-down in an emergency. Can be configured to fill on a timed basis or when the dewar has reached a pre-set level. Can also be used with key card access to prevent unauthorised use



ISIS – Internally Sited Intermediate Storage

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Components of an ISIS (contd)

- ▶ Valve arrangement mounted on a frame for ease of installation, utilising high reliability valves and designed to allow all safety valves and vent valves to be piped away to a safe area
- ▶ Vacuum superinsulated pipework to convey liquid to the ISIS from a bulk tank with a minimum of boil off.



ISIS – Internally Sited Intermediate Storage

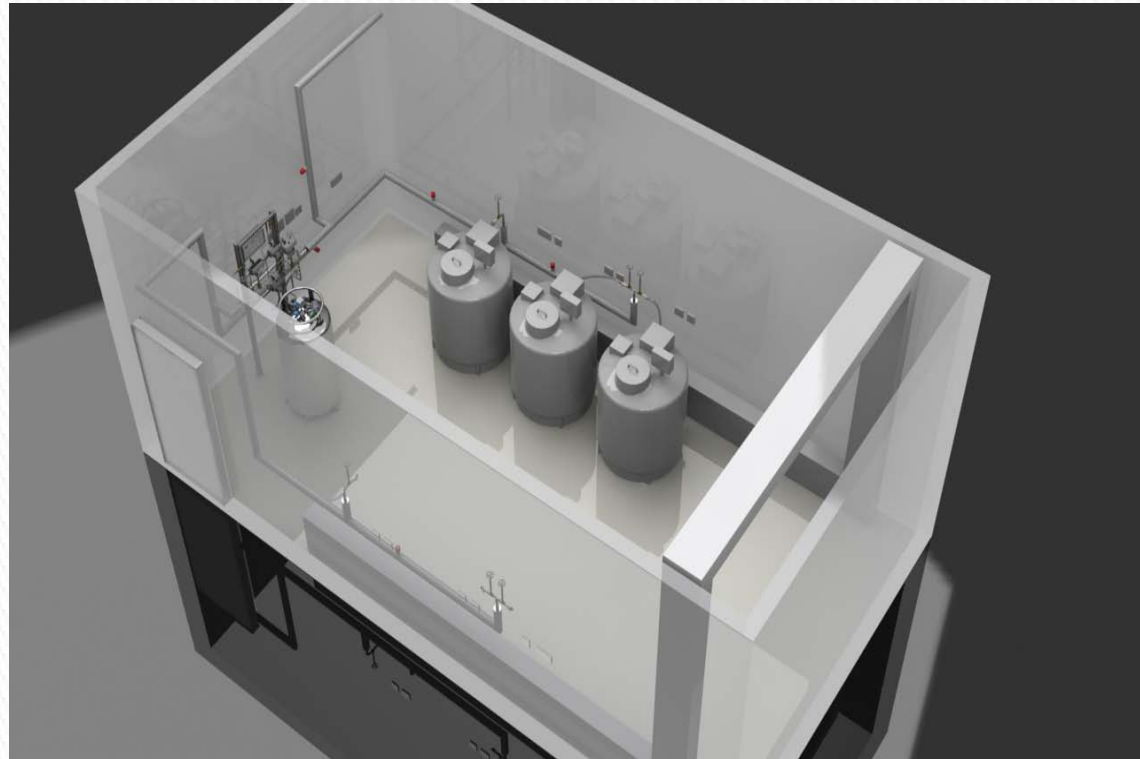
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Result

- ▶ Liquid on demand for either manual decanting or for automatic feed into other equipment
- ▶ Minimal losses in pipework system
- ▶ Removal of hazardous handling of pressurised dewars
- ▶ Enclosed system of flow and return so gas generated during filling is piped safely away
- ▶ Links to detection systems and BMS to ensure full monitoring and safety.



ISIS – Internally Sited Intermediate Storage