AIGA 2005 Meeting

Packaged Gases: Changes in the Past 25 Years

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Packaged Gases: Changes in the past 25 years

- Why 25 years ?
- A number of reasons…….
  - Period of great change
    - Technically
    - Operationally
    - Legislatively
    - Customer Focus
    - Industry consolidation
    - Role of the trade Associations

Some History up to 1980……

- **Gas Cylinders had not changed very much since the first patent in 1886**
- **Slow and steady changes in steel quality**
- **More sophisticated design formulae**
- **Aluminium Cylinders arrived in commercial quantities in the 1960s.**
- **Composite cylinders in specialist applications**

Patent Picture to be added

Cylinder Efficiency

- **How do you measure the efficiency of a cylinder?**
- **No agreed measurement**
- **Not just pressure or weight but a ratio**
  - **Some use M^3/kg**
  - **Others Kg/M^3**
- **Preferred method for AP is Kg/M^3**

Cylinder Efficiency to 1980s

Graph to be added

Cylinder Efficiency to 2000

Graph to be added

So what happened (1)

- A number of changes
  - Improved steels
  - New Aluminium Alloys
  - Design Formulae Changes
- However, a cylinder is still heavy

So what happened (2)

- Composite Cylinders arrived in commercial quantities
- Three main types
  - Hoop Wrapped
  - Fully Wrapped
  - NO line

Composite pictures to be added

Improved Efficiency
Why Important?

- Improved efficiency means less cylinders and less vehicles
- Reduced deliveries
- Reduced number of fill cycles

Decreased Weight & Increased Pressure

- Both lighter and light weight cylinders were now available.
- Gas Companies were buying cylinders for 300 Bar and building facilities for 300 Bar
- Great…….but hold on !!!!!!!!

Drawing to be added

What is the problem??

- **300 Bar is not really much use to a user or for that matter neither is 200 Bar**
- **To help the customer need to supply the pressure that the customer needs.**
- **Led to the development of Cylinder Valves with Integrated Pressure Regulators (VIPRs)**

Valves with Integrated Pressure Regulators

Pictures of VIPRS

And if you put them together……..

Picture of heligas cylinders and medical composite cylinders and VIPRS

Operational Changes

- **Palletisation**
  - **Filling**
  - **Transport**
- **Distribution Methods**
  - **Small Bulk**
- **Supply Chain**

Add in Cryoservice picture

Legislation

In 1980 Cylinder Legislation in Europe was a mess.

Each Country had its own approval authority for new cylinders and retested cylinders

A cylinder could be “illegal” if you took it across the road

Lets look at the map……..

Europe/Asia

Map to be added

What was happening?

- **Not very much in 1980.....**
  - **ISO standards were being written but only adopted as National Standards in a few countries**
- **But then in early 1980s.....**
  - **“Pressure” from a number of areas.....**
    - **European Union**
    - **Gas Companies**
    - **Cylinder and Valve Makers**

The Result

- **By 2005 the dissappearance of National Cylinder Standards in Europe**
- **Replaced by one set of common standards across the European Union**
- **Now being replaced by International Standards.....ISO**
- **Legislation to permit the free movement and use of gas cylinders across Europe.**

The Bigger Picture

- **We need to have a global approach to cylinder use**
- **ISO is one step**
- **UN Mark is another, recently permitted approval that enables free transport, but not use.**
- **Singapore leads.....**

Picture of a UN Marked cylinder

Harmonisation

- **Benefits**
  - **Safety**
  - **We are all using the same set of rules**
  - **Rework is reduced**
  - **Better use of assetts**
- **Disadvantages**
  - **Very Few**
    - **Some loss of flexibility at a National Level**

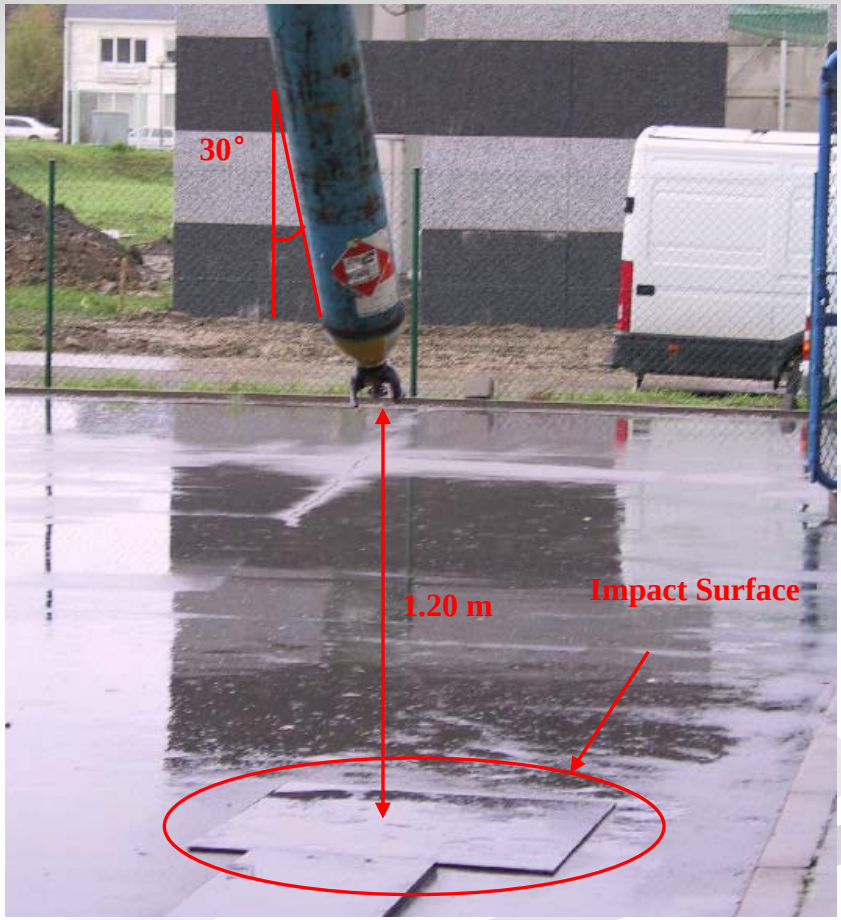
Harmonisation Examples

- **Bundle test**
  - **Harmonised Standard**
  - **Bundle has to withstand 1.2 metre drop and not leak**
  - **Heavier design**
  - **Does not leak or suffer so much operational damage**
  - **Overall benefit**
    - **Level playing field**

ISO/DIS 11755

Harmonisation Examples

- **Drop Test of Valve Protection**
  - **To an agreed set of parameters**
  - **Ensure consistancy across all designs**
  - **Safety is ensured**



ISO 11117

Harmonisation Examples

- **Adiabatic Testing of Cylinder Valves**
  - **–Ensure valves meet a minium service criteria**
  - **–Consistancy**
  - **–Safety**

Hopefully clip from AL

ISO 10297

With thanks to Air Liquide CTE

Legislative Changes on Supply

- **Medical Gases**
  - **Twenty Five years ago little different to an industrial gas**
  - **Today highy regulated across the US and European Union**
  - **Separate filling areas**
  - **Demands on analysis and traceability**

Picture of fill area

Legislative Changes on Supply

- **Food Gases**
  - **As with Medical Gases little regulation twenty five years ago**
  - **Whilst not at the level of medical gases expect to see this change**
  - **Looks as if it will end up close to medical gases**

Food gases picture

Trade Associations

Trade association logos

Role of Trade Associations

- **Very Important**
  - **Continue to undertake the role of a “learned society”**
  - **In Europe, over the past twenty five years a focal point for the Authorities to talk to**
- **Many Examples in Europe**
  - **Asbestos in acetylene cylinders**
  - **Lead in brass cylinder valves**

Challenges for Asia

- **Asia position is similar to Europe twenty five years ago**
- **Opportunities to move in a similar direction to Europe**
  - **No need to be as slow or make the same mistakes**
  - **Need to be rigourous in the application of rules**

Challenges for Asia

- **Cylinder Ownership**
  - **Need to have clear policies and processes on cylinder ownership**
  - **Ensure a set of rules are followed by AIGA members**
  - **Lobby National Governments to ensure legislation is introduced and enforced to protect cylinder owners**

The Next Twenty Five Years

- Some Packaged Gases Predictions
  - There will be truely global cylinders, no National Boundaries
  - Charging Pressures will have increased across the globe to be upto 500 Bar
  - Composite cylinders will be very common
  - Cylinders will be produced in a different manner

Twenty Five Years of Change

Picture of old Oxygen cylinders