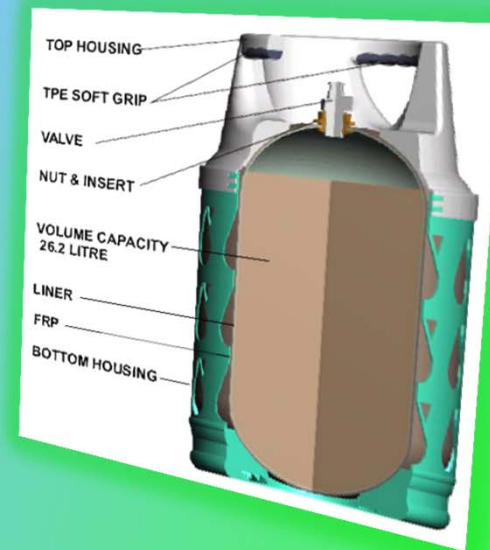
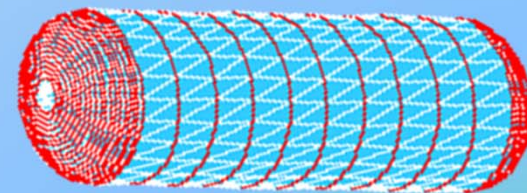
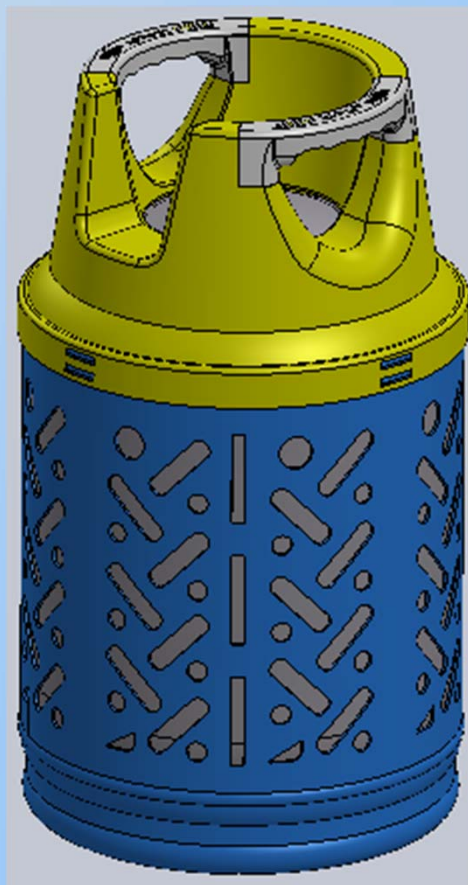
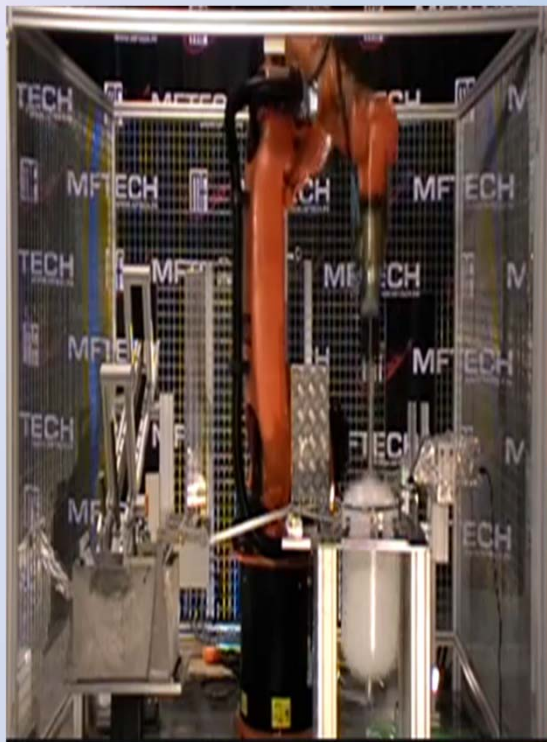


LPG Composite Cylinder



LPG COMPOSITE CYLINDER



LPG Composite Cylinder

There are three major cylinder characteristics that impact design and component selection.

- > Weight
- > Durability
- > Cost



Cylinder Components



HDPE Liner
Blow molding



LPG pressure valve
Local purchase part



Fiber reinforcement
Filament Winding

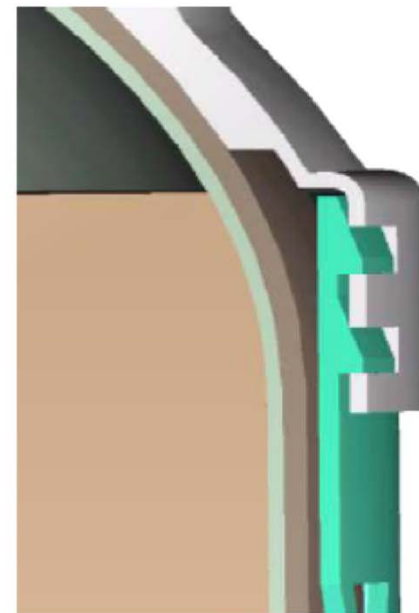
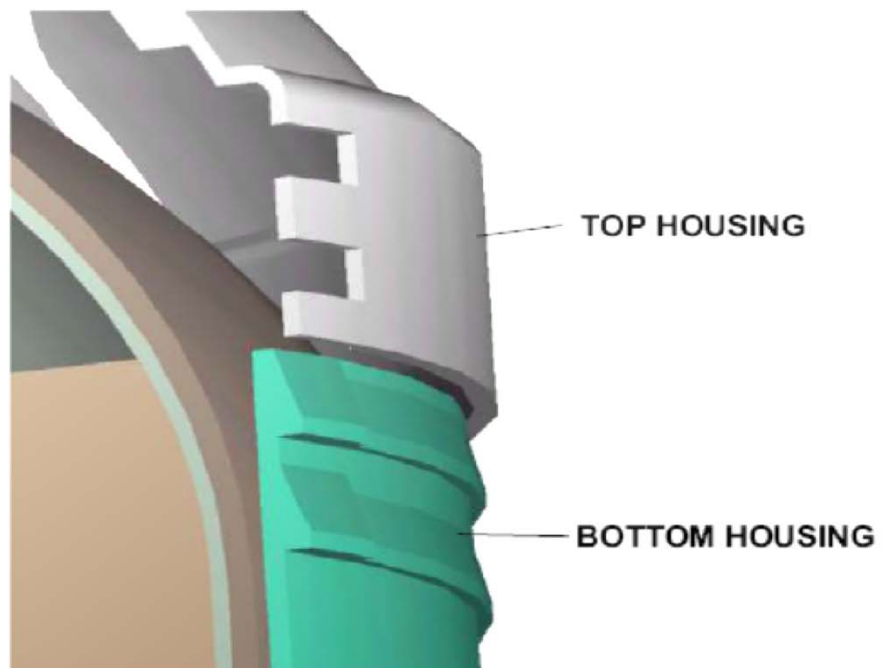


Housing
Injection molding

Imported Components:

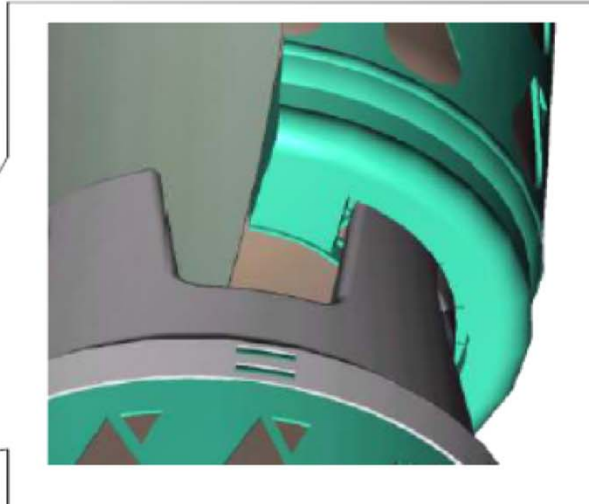
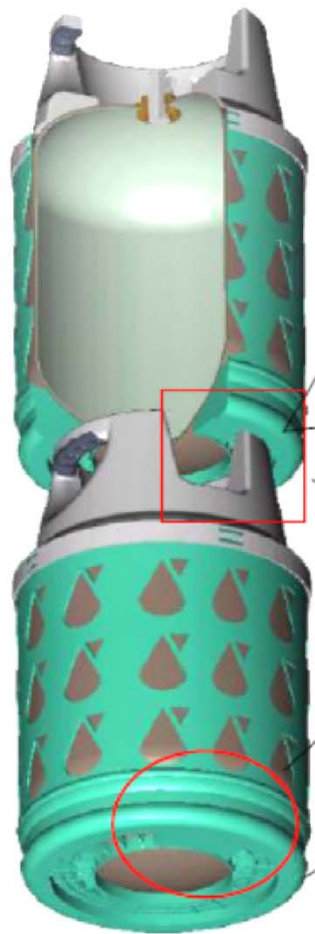
Epoxy Resin
Glass Fiber

assembly



PRESS LOCK WITH DOUBLE THREAD LOCK

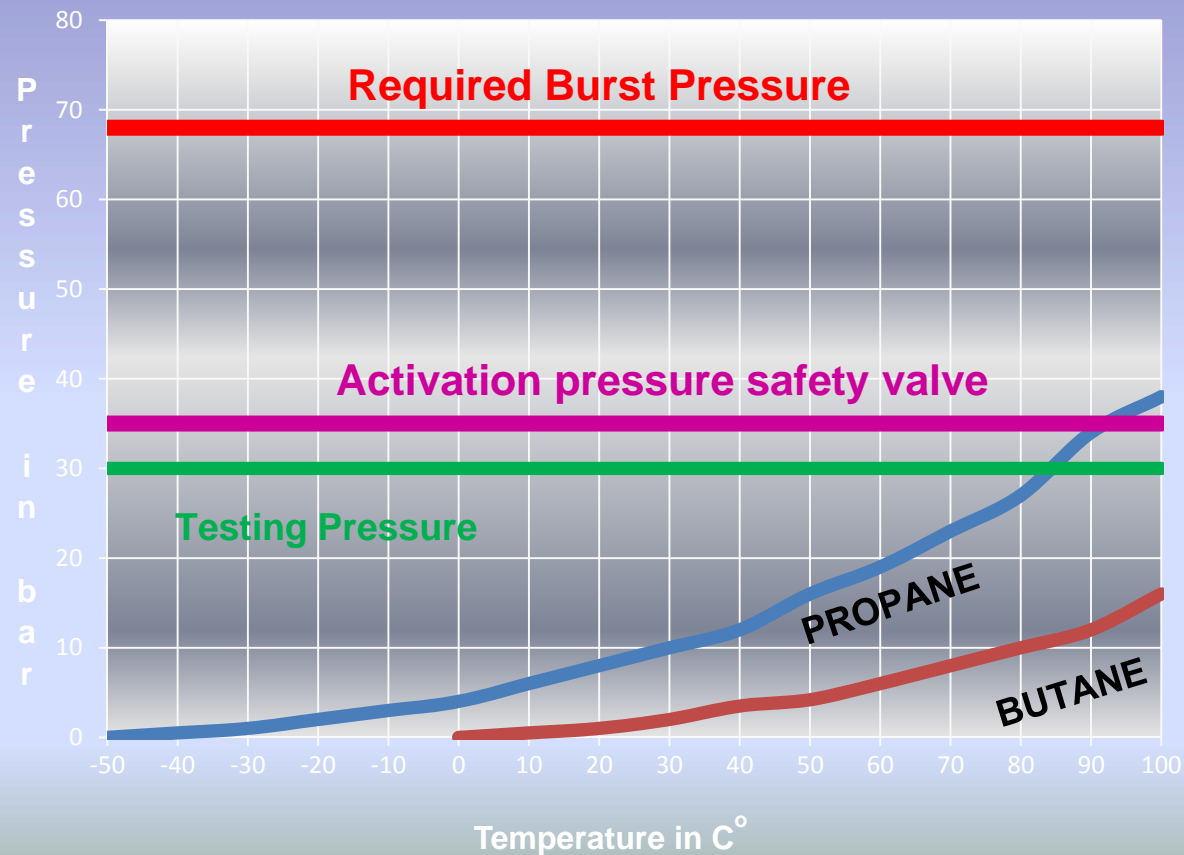
stacking & transportation



STEP FOR STACKING GUIDE AND TRANSPORTATION

ROLLING RING FOR TRANSPORTATION PURPOSE

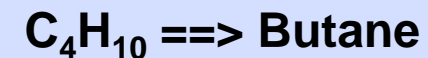
Gas pressure is dependent from Temperature



Burst pressure of Composite Cylinder is at 160 bars!

The burst pressure is 2.4 times higher than of steel cylinders.

- PROPANE
- BUTANE
- Safety Valve
- Test Pressure
- Burst pressure Steel Cylinder





Technical Comparison between Composite Cylinder Manufacturer

	Competitor Technology	Competitor Technology	APTech Technology
Liner	HDPE blow molding	PET stretch blow molding	HDPE blow molding
Cylinder Housing	HDPE	HDPE	PP
Top / Bottom housing	Welded together	Welded together	One way clip → simple replacement
RFID	optional	optional	Included, traceable
Resin	2 component system → pot life 20 – 30 min	2 component system → pot life 20 – 30 min	1 component → <u>unlimited pot life</u>



Technical Comparison between Composite Cylinder Manufacturer

	Competitor Technology	Competitor Technology	APTech Technology
Cylinder curing time	~ 120 minutes	~ 120 minutes	4 minutes
Cylinder curing system	oven	oven	UV free LED Light
Curing energy costs	Very high	Very high	<u>Very very low</u>
Cylinder rejects due to curing energy lost (20 min)	~ 350 Cylinder ~ USD 20 000	~ 350 Cylinder ~ USD 20 000	0 Cylinder USD 0, (BATTERY)
Styrene smell in factory	High	High	Very little
Cylinder Housing replacement	Difficult, risk of cutting into cyl.	Difficult, risk of cutting into cyl.	Very easy, clip
Test Cylinder recycling concept	No	No	Yes

Steel LPG Cylinder



- No design change for almost 100 years
- No technical improvement
- Corrosive
- High maintenance
- Unstable Cylinder stacking
- Minimum safety features
- No alternative for LPG user

Remark:

*During a fire, the pressure relief device (PRD) releases the gas pressure with a flame of up to 10 m. If the pressure increases further due to overheating, the PRD does not have sufficient time to release the pressure; the cylinder can explode or reach **B.L.E.V.E.** effect.*

*(**Boiling Liquid Expanding Vapour Explosion**)*

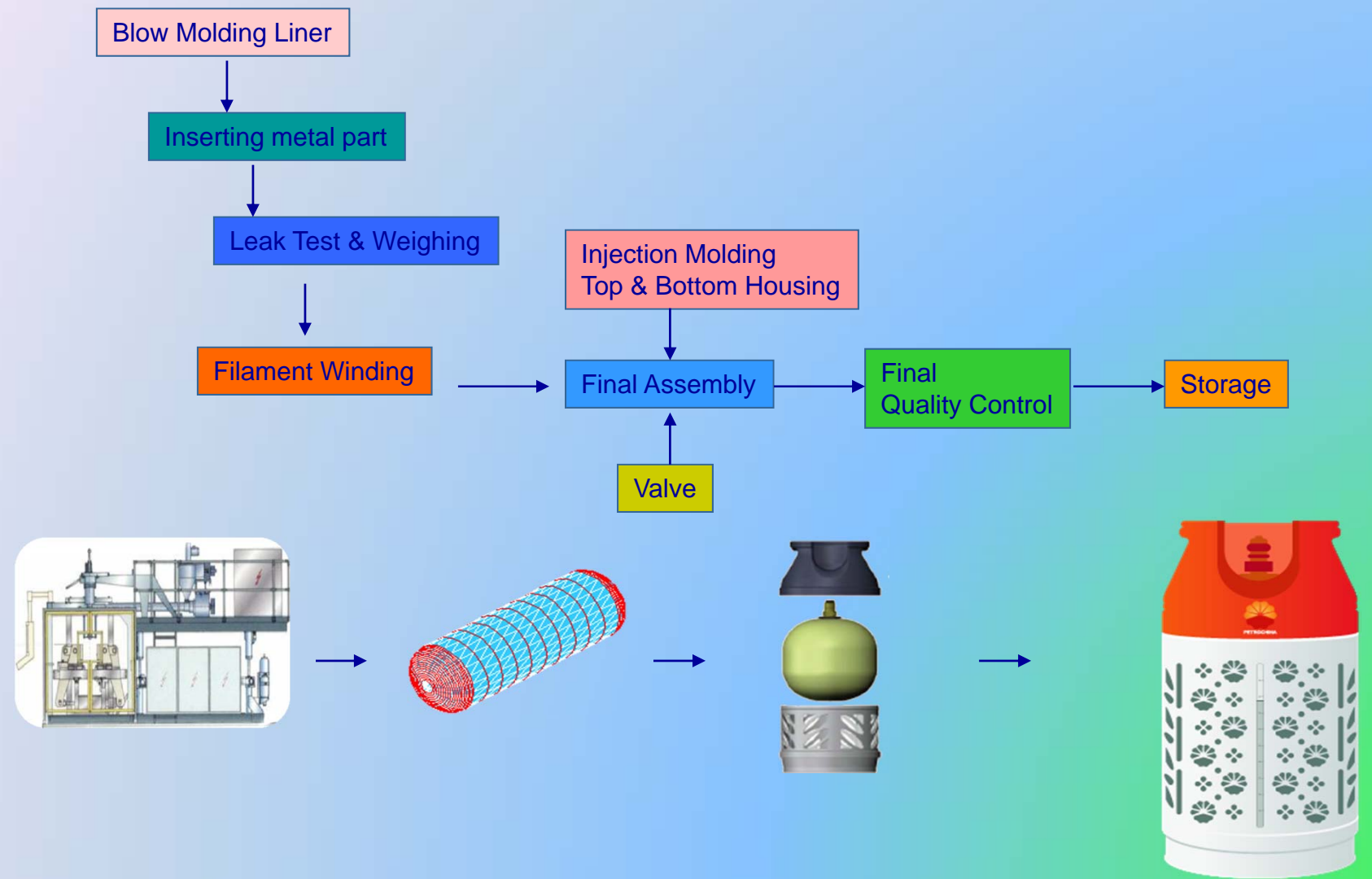
APTech's Composite LPG Cylinder



- **Explosion proof under fire exposure**
- Visual control of filling level (full/empty control)
- No danger through overfilling (more than 85 %)
- Empty weight is 50 % less than steel cylinder
- No Corrosion
- Cylinder housing can be recycled
- Modern design for today's needs (user, transport, handling)
- High Safety Performance and certification (SIRIM, TUV, ISO)
- Electronic chip for identification and cycle control
- Easily branded



Manufacturing Process

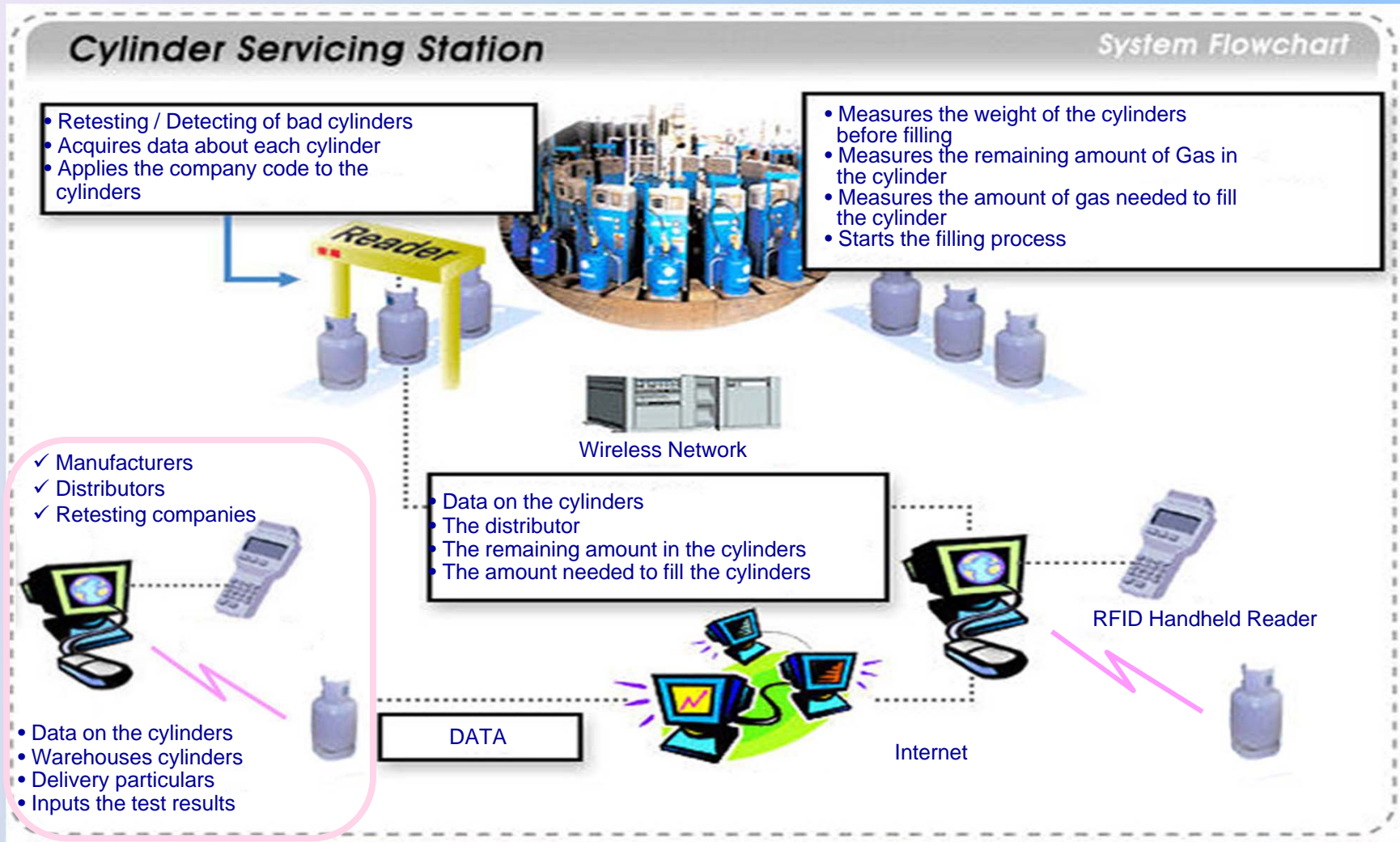




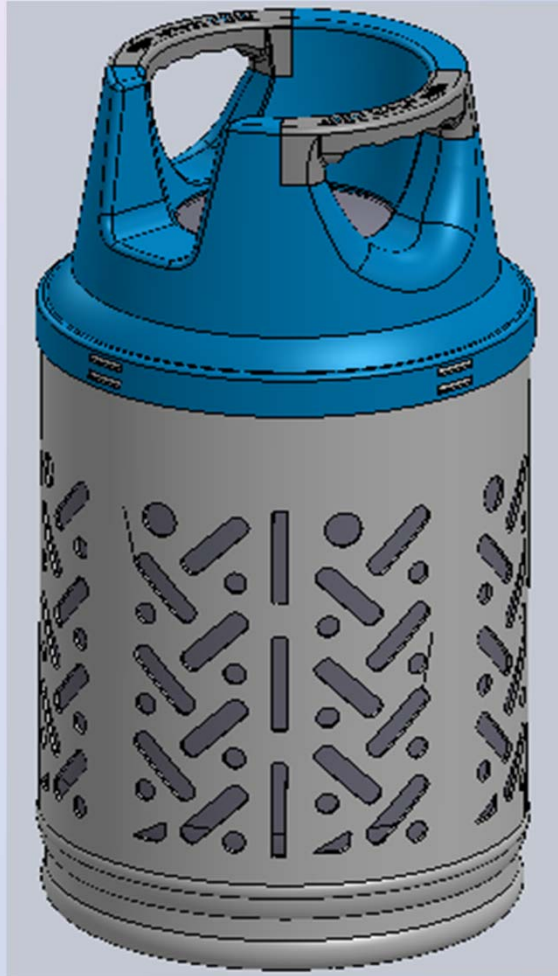
Additional Technical Features

- Each Cylinder is equipped with RFID (manufacturing data, Lot number).
- Cylinder is almost maintenance free and needs only tech. inspection according international intervals (pressure re-test after 10 years)

RFID Flow Chart



LPG Composite Cylinder Properties



- ✓ **Composite Cylinder will not explode**
- ✓ According Customer Specification
- ✓ Customer Logo + embossed text
- ✓ Level Indicator, RFID
- ✓ **Cylinder is el. conductive, optional**
- ✓ L-Ring for handling
- ✓ Soft Grip at handle, optional
- ✓ Locking Ring (Top / Bottom)
- ✓ Stackable
- ✓ No rust from inside (moisture from gas)
- ✓ Safety Valve in correct position
- ✓ Housing recyclable
- ✓ Own Patents and Trade Marks
- ✓ Affordable pricing



Benefit for Gas Companies

- **Highest worldwide recognized SAFETY STANDARDS, Cylinder will not explode!**
- **Consumer friendly product with “State of the Art design”**
- **Reduced transport cost for gas distribution per truck (20 t → 14 t [less by 30 %])**
- **No re-painting of cylinder is required**
- **No dents or rust on cylinder housing**
- **Housing is easy to clean**
- **Housing can be recycled**

KNOW HOW AND TECHNOLOGY

- One patent is in final approval process
- One patent is filed and in registration process
- Resin supplier developed tailor made resin
- Energy saving curing system
- Raw material and component supplier are secured
- Equipment supplier are secured
- TUV is standby for testing and monitoring production



**Thank you very much for your time
and interest in this presentation!**

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