FISHING FOR EXPERIENCE

AIRBUS

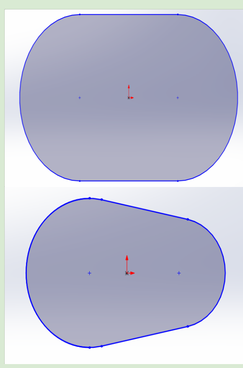
Project Group - 1

Investigation of rear SMR Aircraft fuselage with an integrated LH2 tank and the distribution system

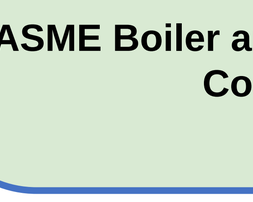
Aim: The purpose of the project is to develop a rear fuselage structure that has the capability to fit an integrated liquid hydrogen storage tank.

- **EU Vision of Net Zero Emissions by 2050**
- **First Hydrogen powered flight by 2027**
- **First Commercial Hydrogen powered flight by 2035**

Dimensions of Tank



Volume: 50 m^3
Radius: 1.75 m
Length: 6.36 m

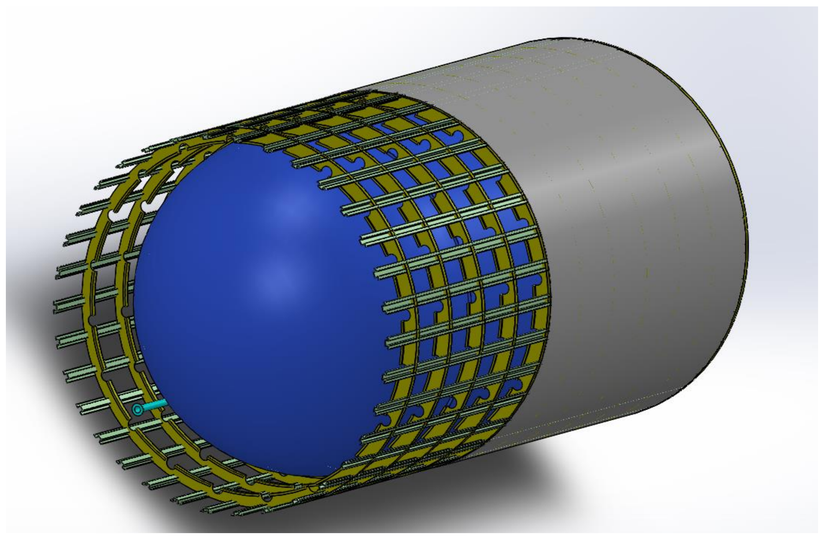


Volume: 35 m^3
Major Radius: 1.75 m
Minor Radius: 1.28 m
Length: 5.50 m

ASME Boiler and Pressure Vessel Code 2010

Integration of Tank into Fuselage

- Flange connection with profiles on frame
- Convert the entire fuselage volume into a tank



Cabin Space Reduction

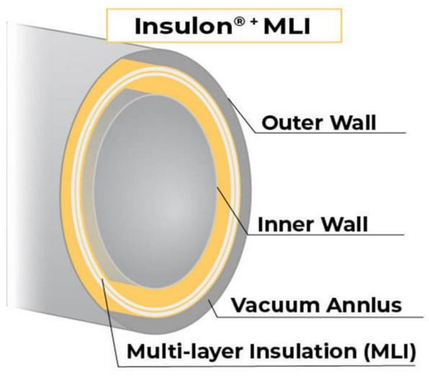
Aircraft Length: 37.57 m
Cabin Length: 27.51 m
Tank Length: 11.86 m

43% decrease in cabin space

Choice of Material

Aluminium alloys preferred
- Light weight
- Good low temperature properties
- Resistant to hydrogen embrittlement

Cryogenic based Insulation



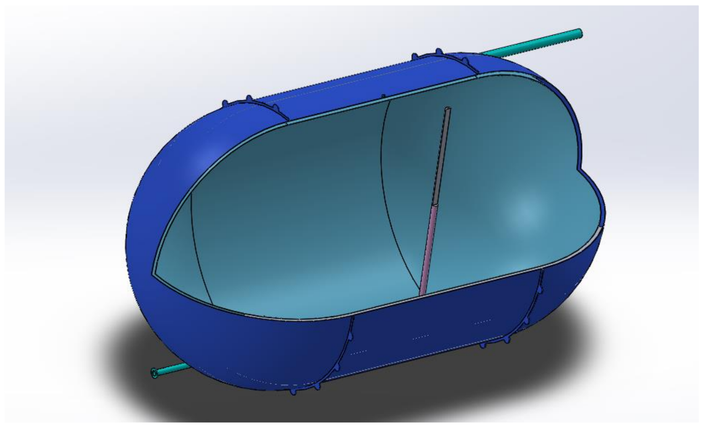
Ensure maintainability

- Separable tail end design
- Removable inner tank while the outertank is fixed to the fuselage

Tank Accessories

- Cryogenic pump
- Level probe
- Boil off valve
- Inlet and outlet pipes

Results for distribution and vent-off system		
Energy required	128400 MJ/hr	1045.6 kg/hr of LH2
ΔP in pipeline	13.664 MPa	Assumed L=13.6m ; D=10cm
Considering same ΔP	LH2 pipe D=2.4cm	Applied Hagen–Poiseuille equation
H2 boil off rate	2% in 24hr	0.0833% in 1hr
70.83L of H2 vapors/hr	5kg of H2 vapors/hr	13,3 MPa of H2 to be vented out



TUHH
Hamburg University of Technology

Company Executives
Florian Leichsner Steffen Dietrich

Team Members
Jabur Sayyed Pranav Bhangale
Sachin Soney Elias Klee
Yogasatya Adikhansa Shreyas Hiremath

VON HAMBURG AUS DIE WELT VERÄNDERN

Technik für die Menschen