



# TEST-FUCHS Hydrogen R&D Strategy

Mission H2-3-4

*safety in test > safety in flight*



TEST-FUCHS contribution to speed up the transformation towards sustainability in the aviation sector. We see the important role of (liquid) hydrogen to reach this goals.

**Our contribution: The Mission H2-3-4:  
H2 = Hydrogen - 3 = 3 Million Euro - 4 = 4 Years**

Since the beginning of 2022 TEST-FUCHS invests 3 Million Euro towards H<sub>2</sub> development for Ground and Air operations over the next 4 years

*safety in test > safety in flight*



We use technology to build a solid base to understand the complexity of the upcoming change for the whole industry. Our talents develop based on our experience and your expertise solution to move the transition forward.

**Stop talking – let's move (fly)!**

People Centric – Solution oriented – Experience -  
Innovative – Fast – Pragmatic – Flexible –  
Continuous Learning



**Our experience over decades helps to solve your challenges fast and risk reduced**

### TEST-FUCHS Background & Know-How



Systems and Components



Cryogenic applications



Testing



GSE



Data IOT

### H<sub>2</sub> R&D Focus



#### LH<sub>2</sub> Systems & Valves



On – Air

LH<sub>2</sub> Management and Valves



In – Motion

LH<sub>2</sub> Valves

#### H<sub>2</sub> Testing Solutions



To – Testing

Test equipment for (L)H<sub>2</sub> materials, components and systems



For – GSE

H<sub>2</sub> GSEs & H<sub>2</sub> powered GSEs

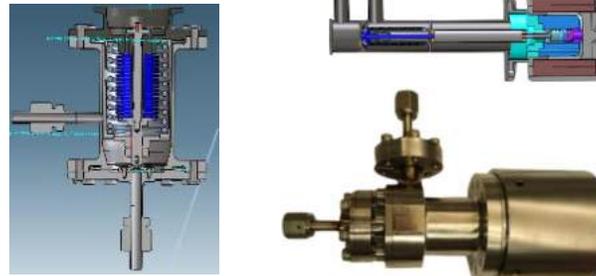
# HYDROGEN R&D

# ON-AIR



## LH<sub>2</sub> Management Systems and Valve development

Sealing concepts, actuator concepts...  
H<sub>2</sub> & LH<sub>2</sub> Valve and cryogenic tank control systems... → Shut-Off Valve, Pressure Relief Valve, Check Valve, Safety Relief Valve



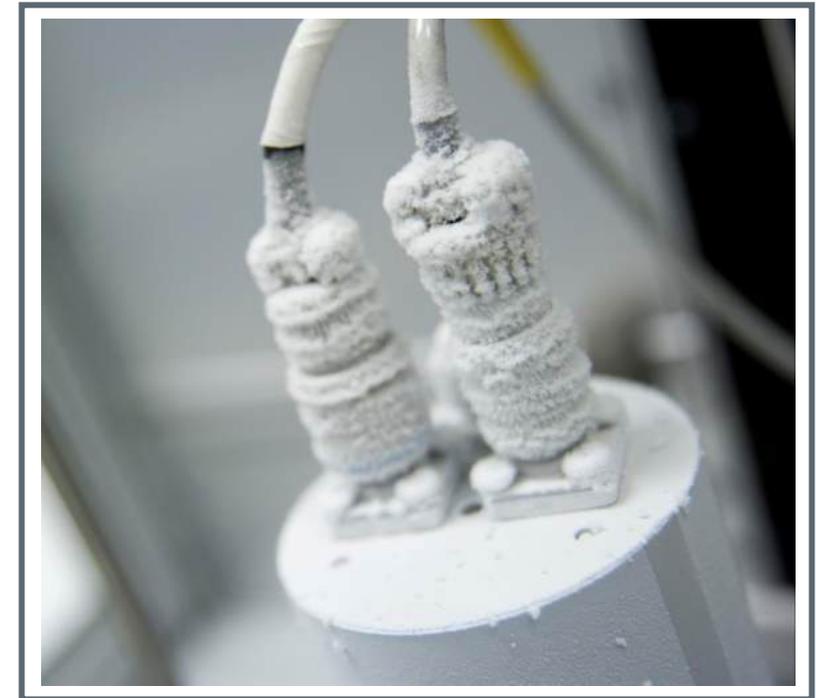
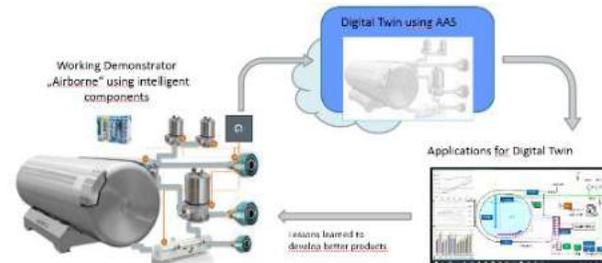
## LH<sub>2</sub> Inner tank components

LH<sub>2</sub> fuel level sensor  
LH<sub>2</sub> electrical heater development



## LHYTAMAN

Consortial Research project for producing a laboratory LH<sub>2</sub> tank system and digital twin. Development of a SMART Cryo-Sensor "CryoSens"



# HYDROGEN R&D

# ON-AIR



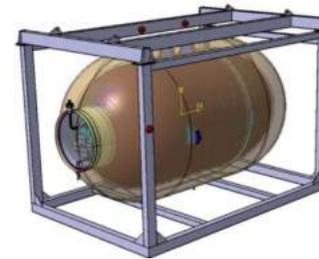
## fLHYing tank

Consortial European Research project  
Development and production of LH<sub>2</sub> tank system inclusive ground and flight test campaign.  
Leader: Pipistrel



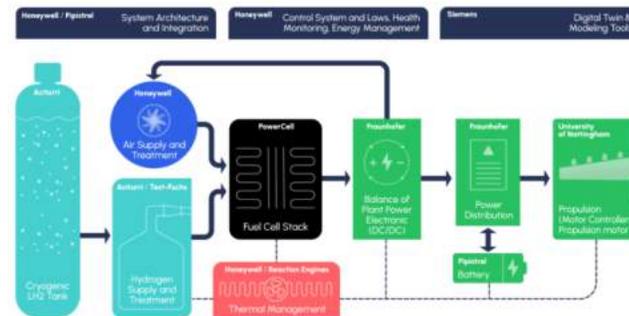
## H<sub>2</sub>ELIOS

Consortial European Research project  
Development of an LH<sub>2</sub> tank with high gravimetric index inclusive demonstration on ground  
Leader: Aciturri



## NEWBORN

Consortial European Research project  
Development of a complete fuel-cell based 1MW powertrain system from LH<sub>2</sub> tank to propeller. Production and testing of a ground demonstrator.  
Leader: Honeywell



# HYDROGEN R&D

# IN-MOTION



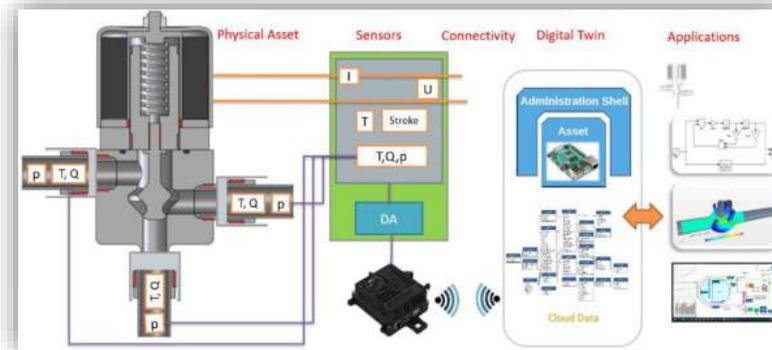
## Flow Control Valve

Development, Production and Testing of a Flow Control Valve for Inner Tank Heat Exchanger control.  
Automotive.  
Already used in experimental application.



## SMART VALVE

Insert small sensors into a valve to get fully control of parameters. Use IOT for data communication and cloud storage.



# VALUE PROPOSITION

## H2 SINGLE COMPONENT AND SUBSYSTEM DEVELOPMENT



## H2 RECIRCULATION LOOP



## LH2 COMPONENTS, COLD BOX AND SAFETY SYSTEMS



## LH2 TANK (AUSTRIA CONSORTIUM)



© by Magna



(L)H2 Test Equipment and Test services in cooperation with HyCentA

airborne

ground

# HYDROGEN R&D

# TO-TEST



## Test Equipment and Test Stand Development

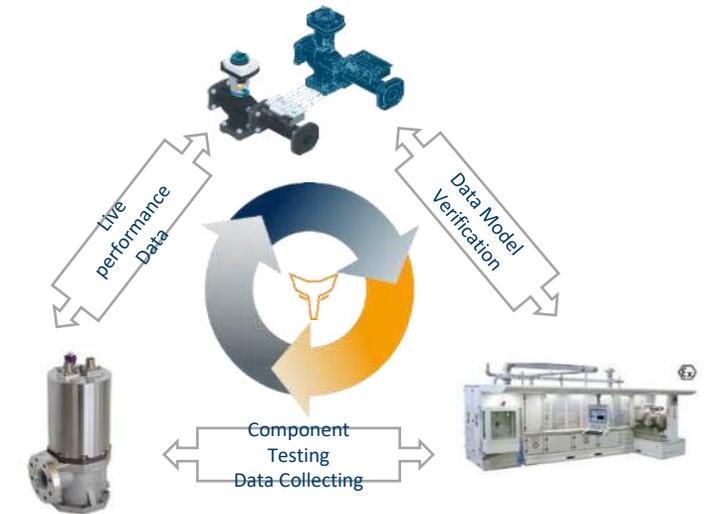
To test, validate and qualify:

- Materials
- Components
- Systems

For internal use and for customers



## TEST-FUCHS Magic Triangle



## LHL - Liquid Hydrogen Lab

Partnering on an independent LH<sub>2</sub> test center for common use.

Tests with (L)H<sub>2</sub>, (L)N<sub>2</sub>, He  
Executed by HycentA



# HYDROGEN R&D

# FOR-GSE



## H<sub>2</sub> GSE

Emission-free GSE instead of Diesel-engine.  
First contact for demonstration project.

GSE for H<sub>2</sub> A/C not necessary so far.



## H<sub>2</sub> GENSEC

Our first commercial H<sub>2</sub> product  
on the market.

Mobile emission-free generator  
with integrated tanks.

Developed with partners.

Possible to refuel on a H<sub>2</sub> fuel  
station. IOT fully integrated.

[www.h2-gensec.com](http://www.h2-gensec.com)



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