



**ESS**  
european sensor systems

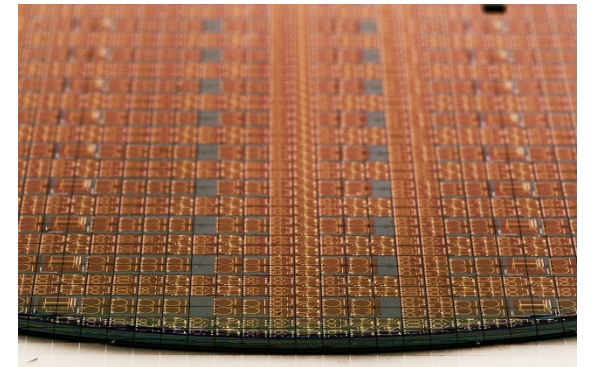
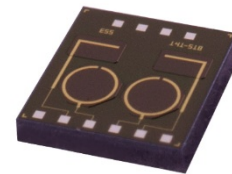
# MEMS

Imagine Microsensors custom build  
to fit your product needs...

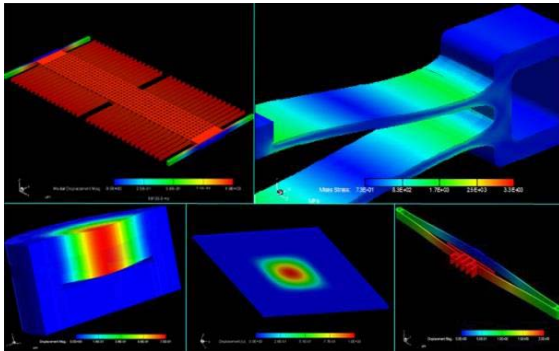
**“MEMS sensors & Network of Sensors”**

- **Company Profile**
- **Design Capabilities/ Infrastructure / Products / Applications**
- **Overview of ESS Space Activities**
  - **Accelerometer Component to TRL5**
  - **Space Qualified Pressure Transmitters**
- **IoT Connected Sensors**
- **Defense Applications**
- **Suggested Solution / Required Resources**

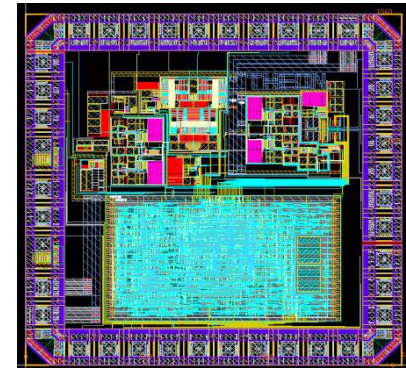
- Privately owned company started operations in 2013- located in Athens
- A global developer and manufacturer of high quality sensors based on **MEMS** Technologies
- A **high technology company** with advanced design and development capabilities, **flexibility** and **custom made approach**
- Our vision is to deliver **high quality and reliability products** customized to meet the demanding requirements and conditions of our clients
- **Sensor Type Portfolio**
  - MEMS Silicon Capacitive **Pressure** Sensors
  - MEMS Silicon Capacitive **Acceleration** Sensors
  - MEMS **Flow** Sensors



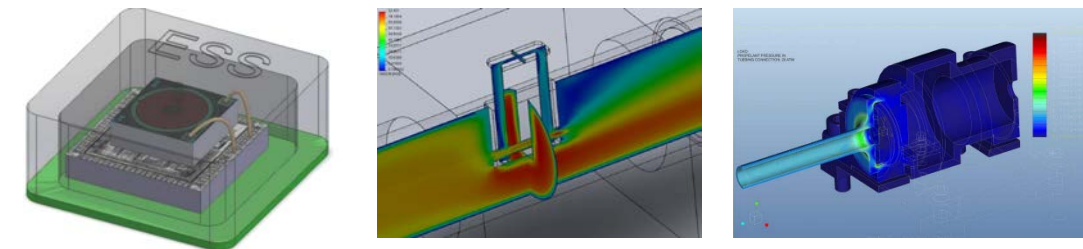
## Design of Silicon Capacitive MEMS Sensors



## Design of CMOS ASICs for MEMS Signal Conditioning / Readout



## Design and Simulation of Sensor Packages



## Design of Mechanical Parts



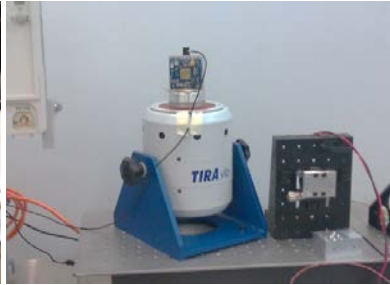
# INFRASTRUCTURE

ESS possesses all the necessary testing infrastructure to fully characterize its MEMS sensors or packaged sensors

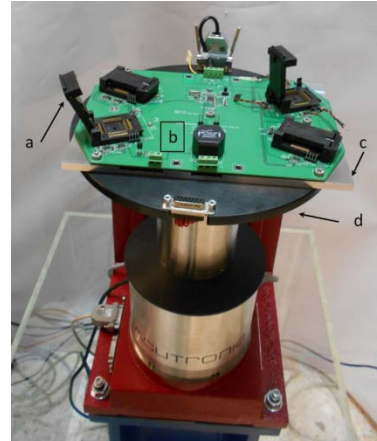
**Die Bonder**



**Vibration Shaker**



**Rate Table**



**Climatic Chambers**



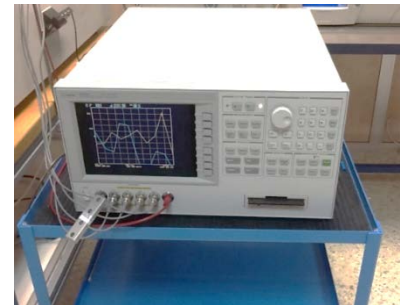
**Wire Bonder**



**Pressure Controller LP**



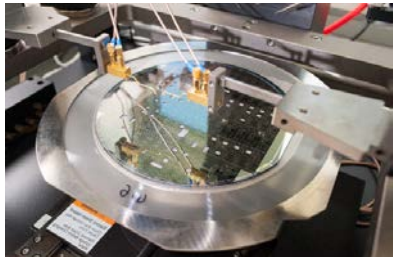
**Impedance Analyzer**



**Signal Analyzer**



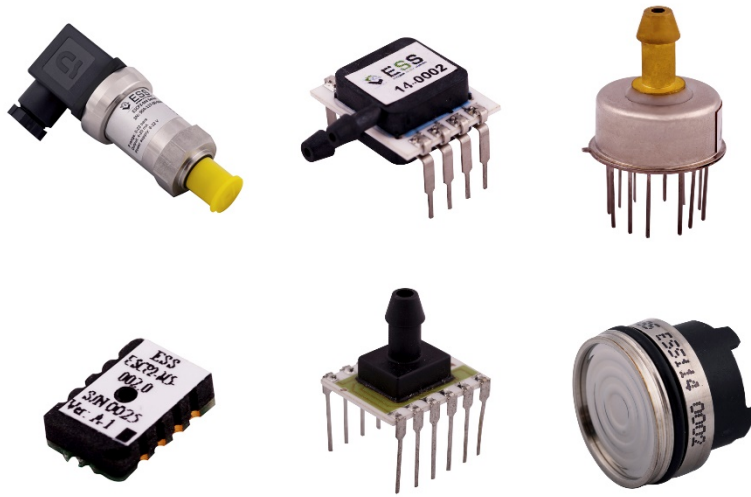
**Probe Station**



**Pressure Controller HP**



## Pressure Sensors



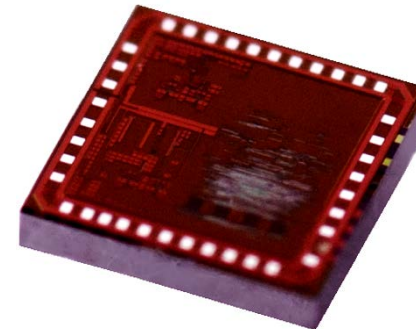
## Flow Sensors



## Acceleration Sensors

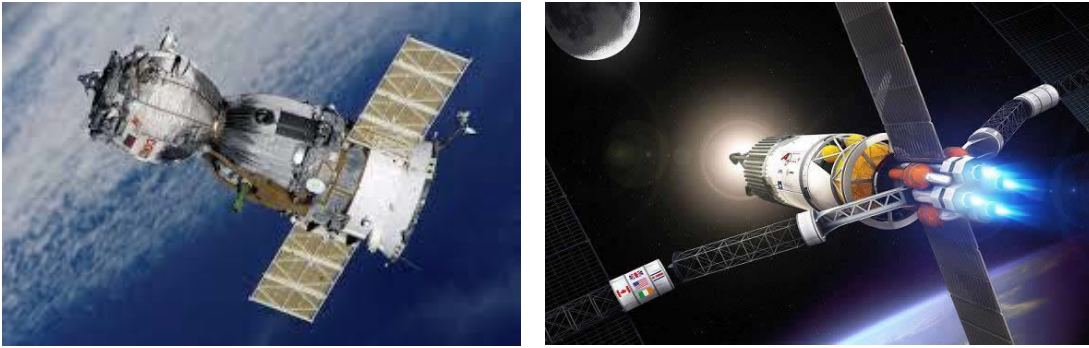


## CMOS Signal Conditioning ASICs



## Space Applications

Chemical & Electrical Propulsion / Navigation



## Industrial Applications

Oil Exploration / Gas Networks / HVAC



## Medical Applications

Blood Pressure / Dialysis / Ventilators / Respirators



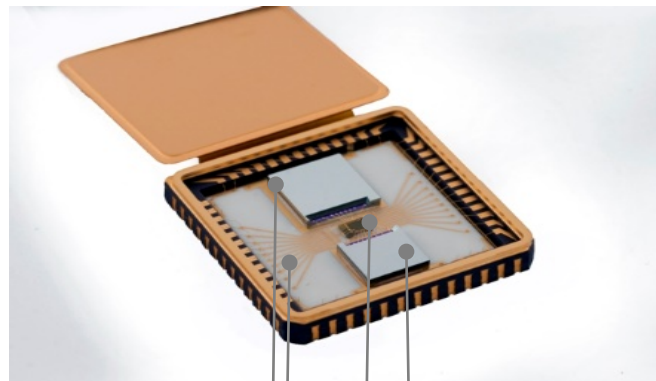
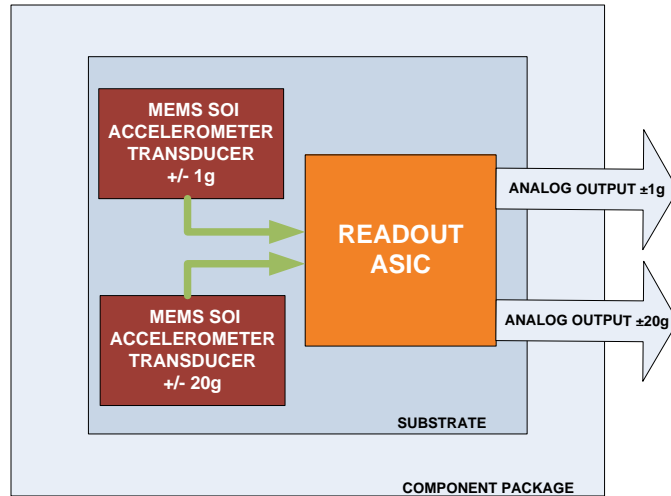
## Consumer Goods

Home Appliances / Aircon / Leisure / Navigation



# SPACE ACTIVITIES

This is an ESA activity targeting to a single axes two channel accelerometer component to TRL5



±1g MEMS

ASIC

±20g MEMS

Tracked substrate

## MEMS Detectors

- Acceleration detection through capacitance change
- Two distinct models ( $\pm 1g$  &  $\pm 20g$ ) in the component

## ASIC

- Capacitance to Voltage conversion
- Rad hard ASIC with 2-channel analog output

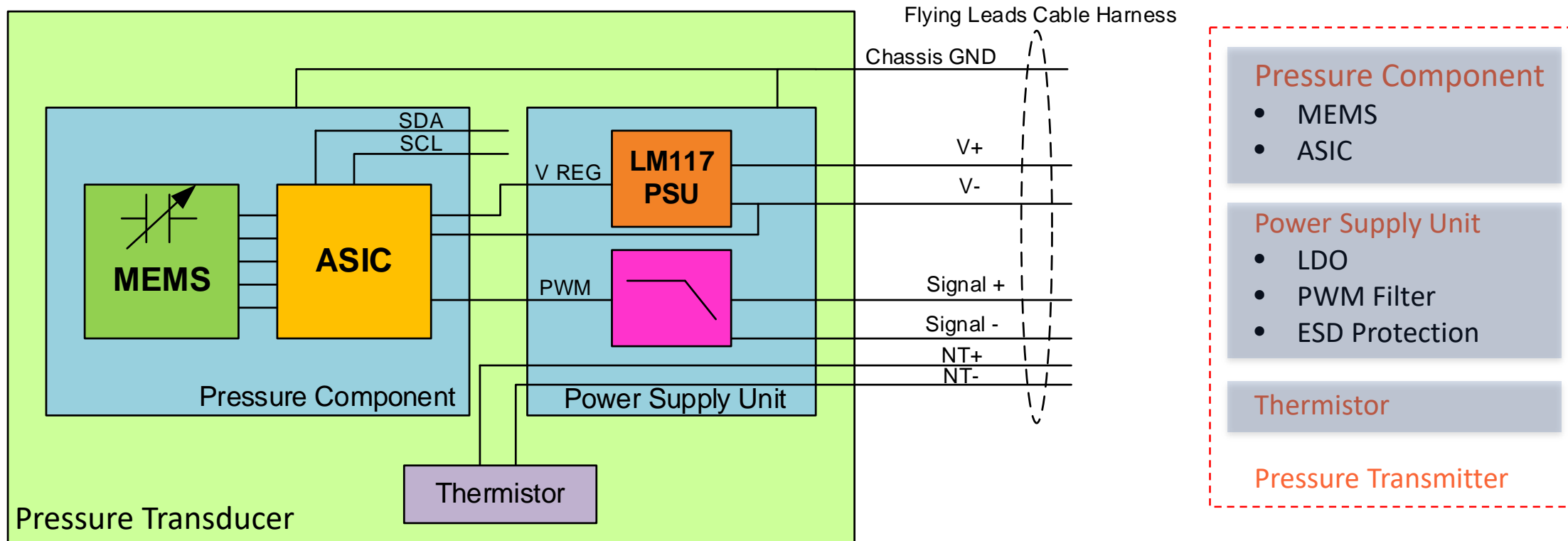
Design, fabrication and measurement in "*Accelerometer component to TRL5*"

## Packaging

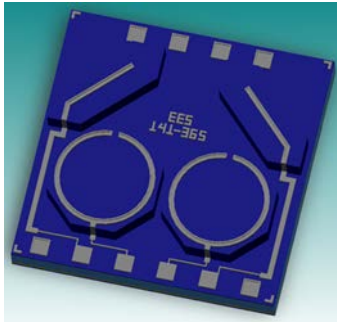
- Design and development of packaging scheme based in commercially available housing

Fabrication commenced in "*Accelerometer component to TRL5*"

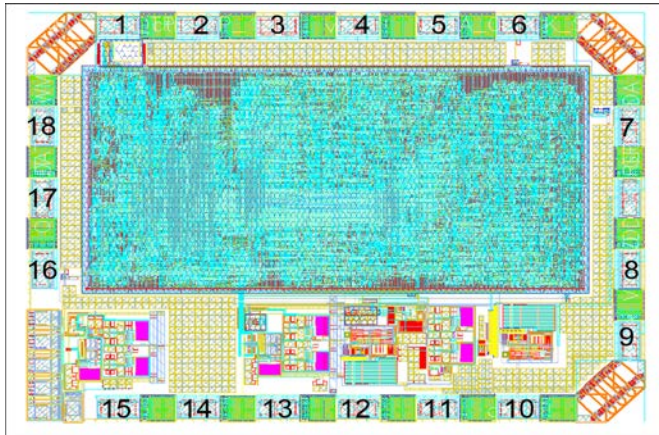
- The objective is to develop a family of ITAR free Pressure Transducers for measuring the remaining propellant medium in the propulsion subsystem
- Pressure Ranges: **7bara, 22bara [Low Pressure], 150bara, 310bara [High Pressure]**
- All Titanium Design



*MEMS pressure sensor die*



*CMOS ASIC*



*Pressure component*



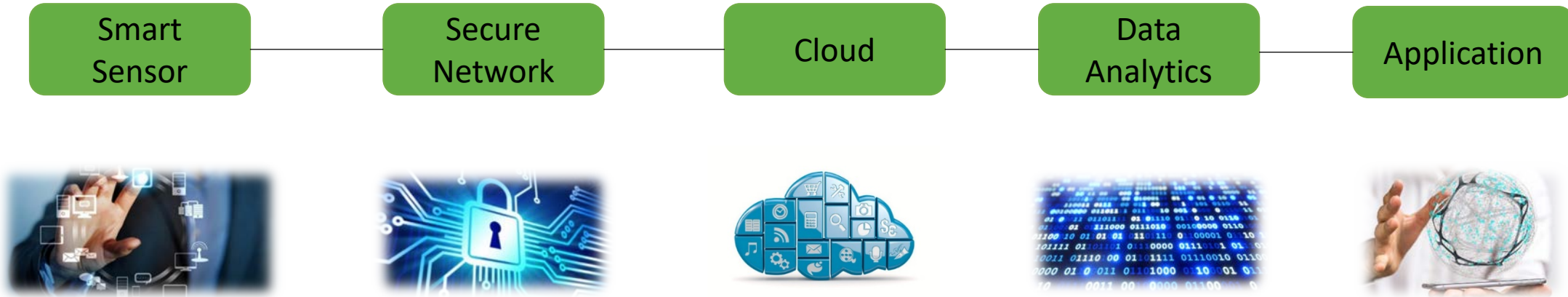
*Fabricated Model of PT*



- EM testing will be concluded by March 2018
- Maturity level TRL7

# IoT Connected Sensors

The IoT Sensors Market was valued at 3.34B USD in 2015 and is expected to reach 38.41B USD in 2022



ESS has the knowledge & experience to deliver a complete OEM solution according to its customer' needs...



- **Acceleration Sensors**

- **Tilt**

- **Helmet Mount Systems**
- **Missile Launch Angular Measurement**
- **Fire Control Platform Stabilization**
- **Laser Range Finding, North Finding**
- **Platform Stabilization**

- **Vibration**

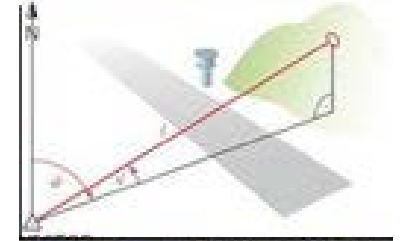
- **Pre-Flight and Wind Tunnel Testing**
- **Transportation Monitoring of Military Equipment**
- **Anti-vibration Measurement in Helicopters**
- **Preventive Maintenance, Structure Health Monitoring**

- **Seismic**

- **Unmanned Remote Surveillance Sensors**
- **Unattended Ground Sensors, Buried Sensors**
- **Perimeter / Border Security**

- **Pressure Sensors**

- **Cabin Air Pressure**
- **Engine Oil**
- **Heating and Cooling**
- **Fuel Level**
- **Reversed Thrust**
- **Engine Bleed Air**
- **De-Icing**
- **Air Filters**
- **Air Speed**
- **Altitude**
- **Breaks Antilock**
- **Propulsion**



## Suggested Solution

- 3-axis Accelerometer for Tilt, Vibration & Seismic Applications

## Tactical Advantages

- Lower Weight
- Precise Measurement
- Lower Power Consumption
- Connected Sensors

## Required Resources

- 30 months
- 1M EUR



# Thank You!

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