



IC3 2018: “Composite functionalization and deformation Monitoring”

Energy Transfer in flexible structures

Company main focusses



Embeddable conductive structures for your composite functionalization

- Out of autoclave process
- De-icing
- Cooling
- Data transfer
- Shielding
- Monitoring / captors
- Embedded antennas
- Collector structures
- Catalyze and High temp.

Created in 2004

HQ near Lille, France



ISO 9001

v.2015 certified

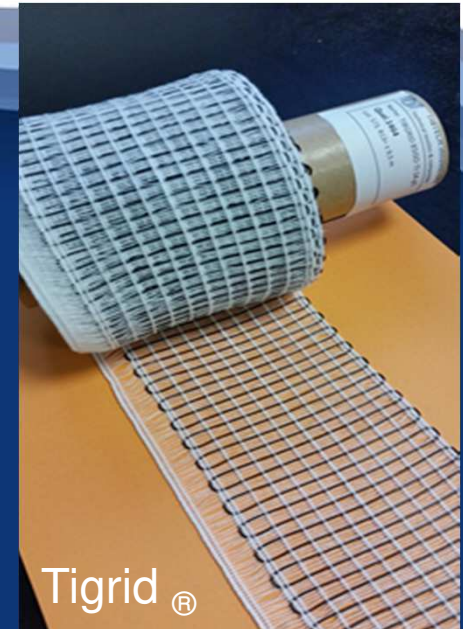




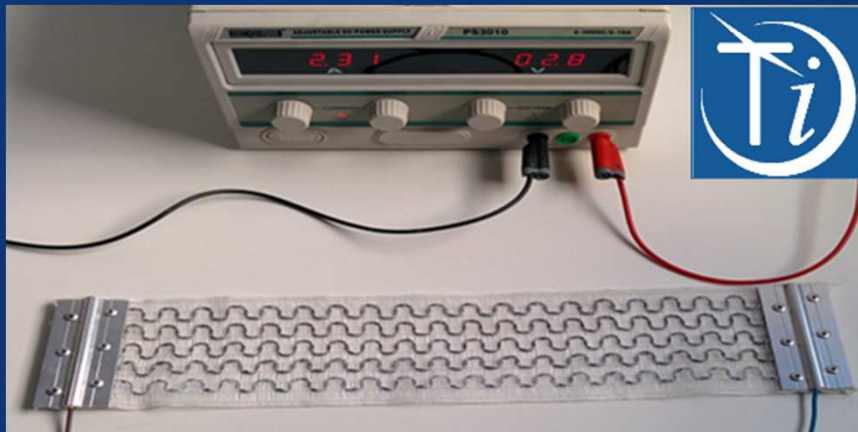
Composite functionalization and deformation Monitoring

- TIBTECH® is specialized in the production of flexible energy transfer wires and fabrics to allow the functionalization of complex shapes multilayers, thermoplastics or composites structures.
- By energy we mean:
 - ✓ electrical ,
 - ✓ optical
 - ✓ fluids

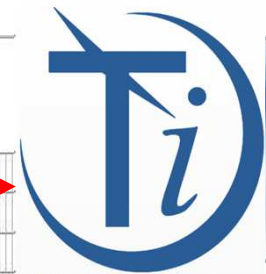
Ti	Conductive and Heating wires	Reference Identification	multi components	remark	Part / no.	color	length	diameter	min. temp.	max. temp.	flexibility	coating	insulation
Non ferrous / stainless steel wires	Ti	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1	Ti-1



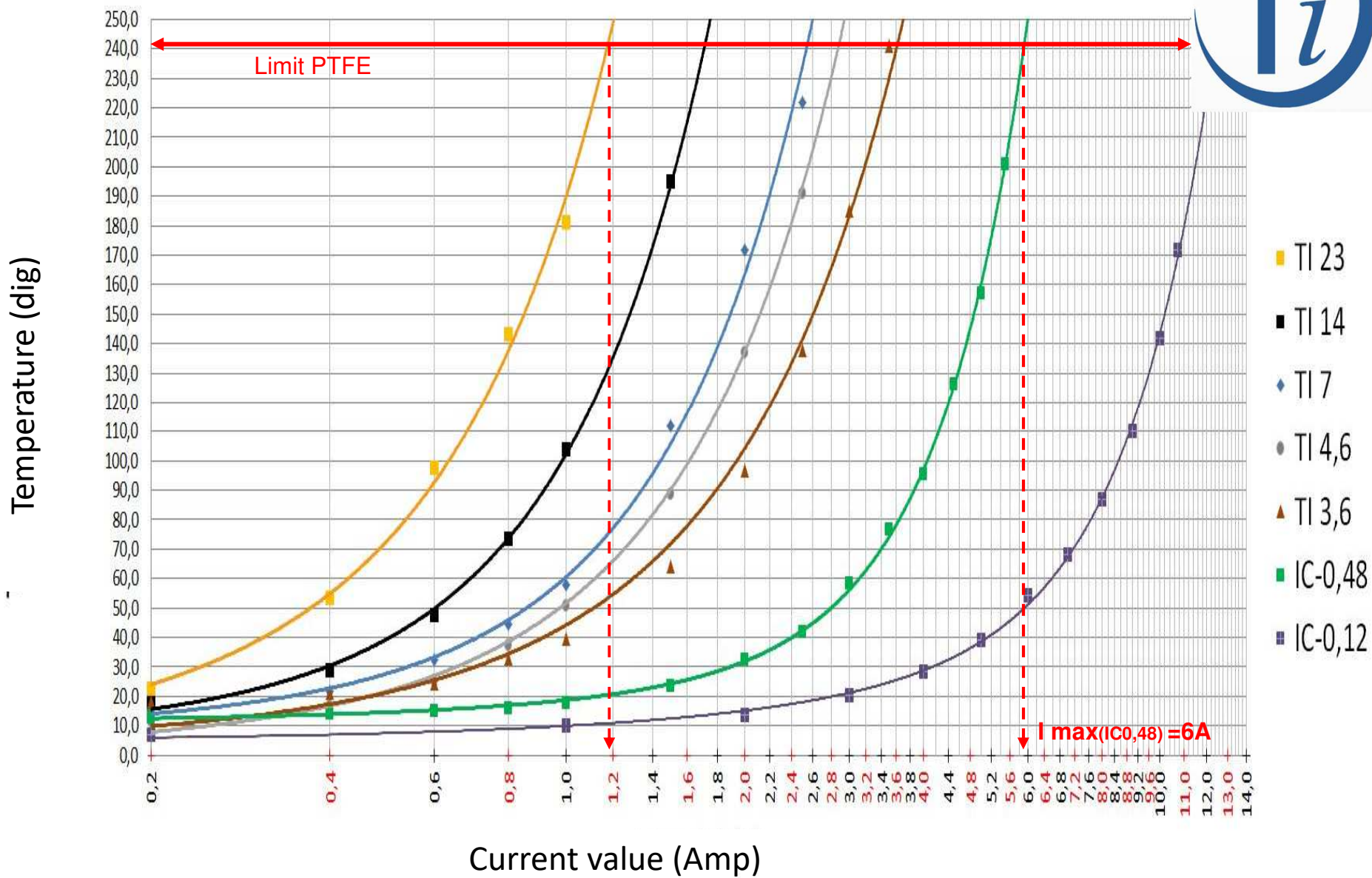
Tigrid®



- Through our experience of production of heating circuits to be inserted within complex shape Composite, we have very rapidly understood that major energy savings could be obtained with out of autoclave curing process as well as better weight gains and efficiency for Deicing structures in structural parts.



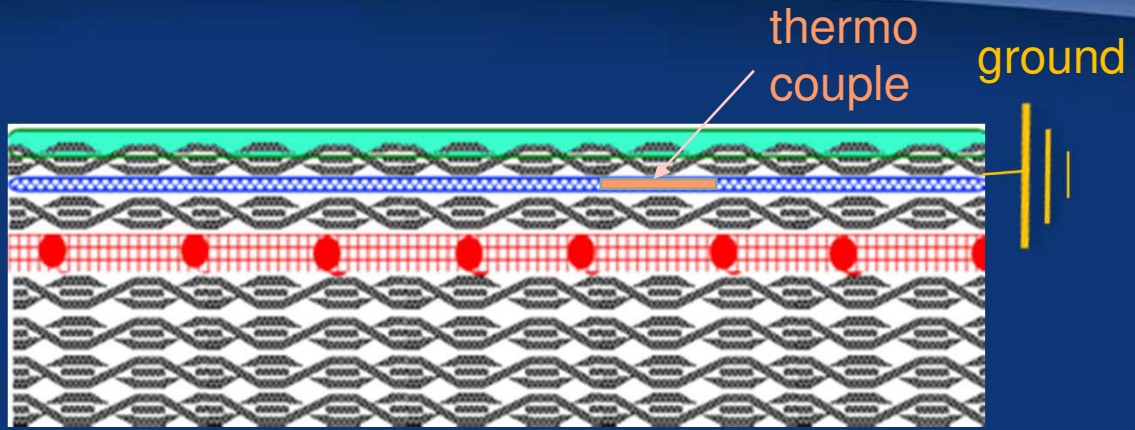
Wires temperature as a function of current value



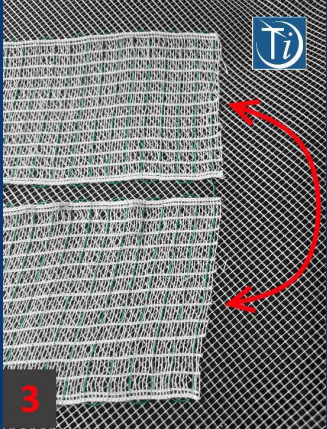
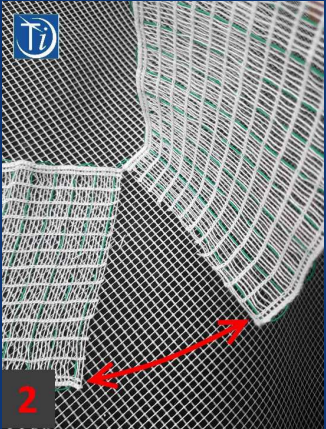
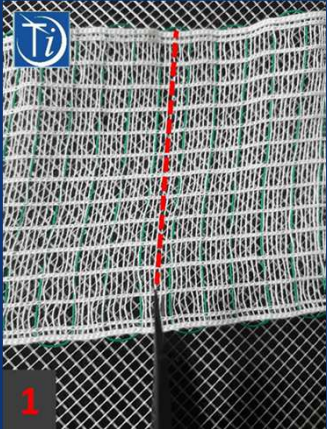
Heating functionalization: TIBGRID®



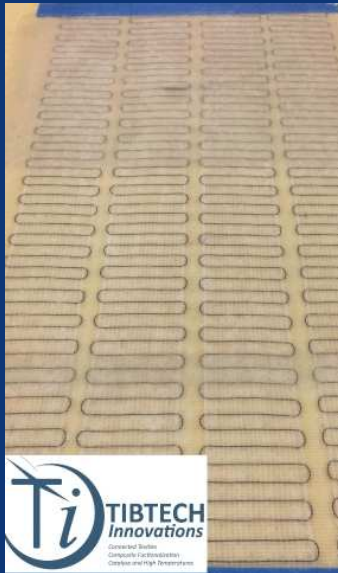
Finish / gel coat
 Thermal smoothing
 Heating Tibgrid
 Composite layer
 Insulating material



Important ,even in rigid composites:
 Vibration and thermal fatigue withstanding behavior are required !

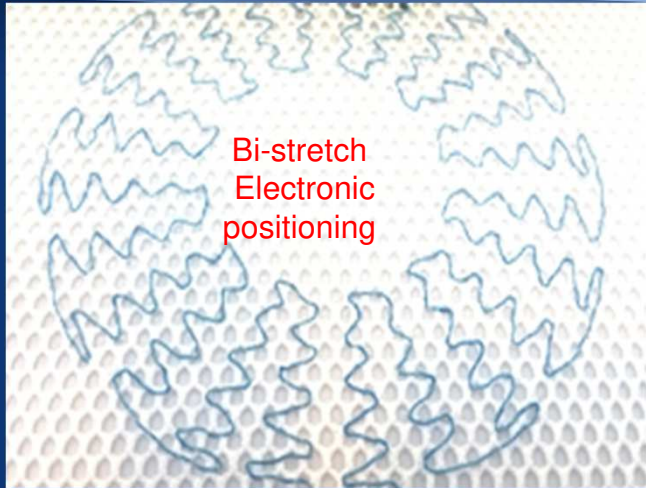
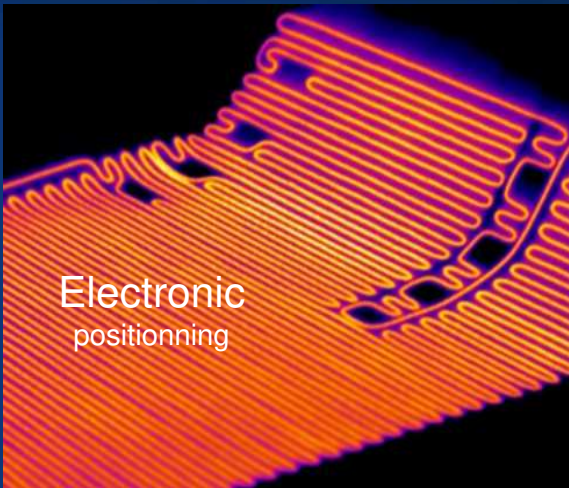
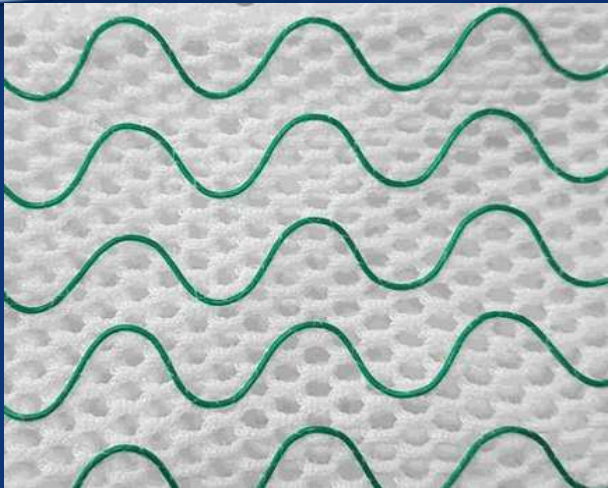


Easy pre-layout of complex shapes on our "Placetech" ultra light adhesive grids



TIBGRID® Stretch or Bistretch

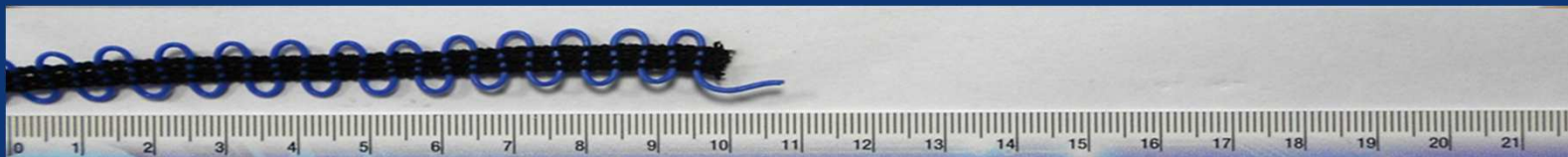
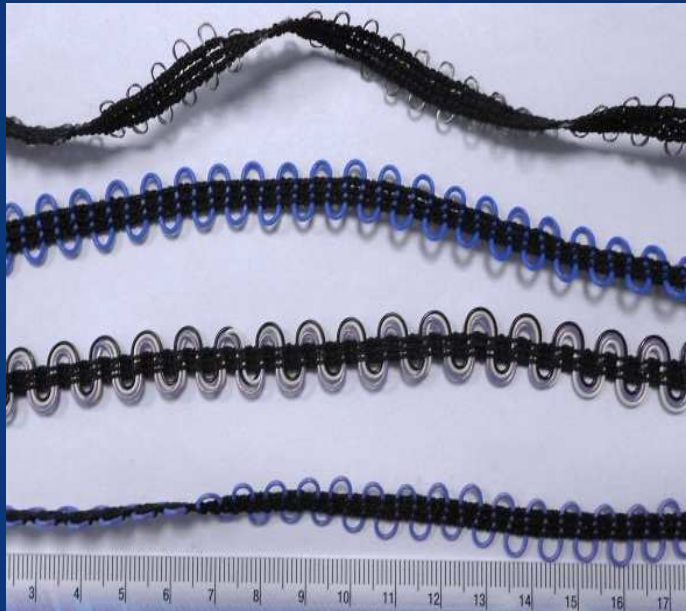
for light weight complex shapes or silicone vacuum bags



Thermostretch – Condustretch



Narrow elastic heating / energy supply / data transfer ribbons
Embeddable Stretchable data transfer bus !



Connection deport within thermoformable composites



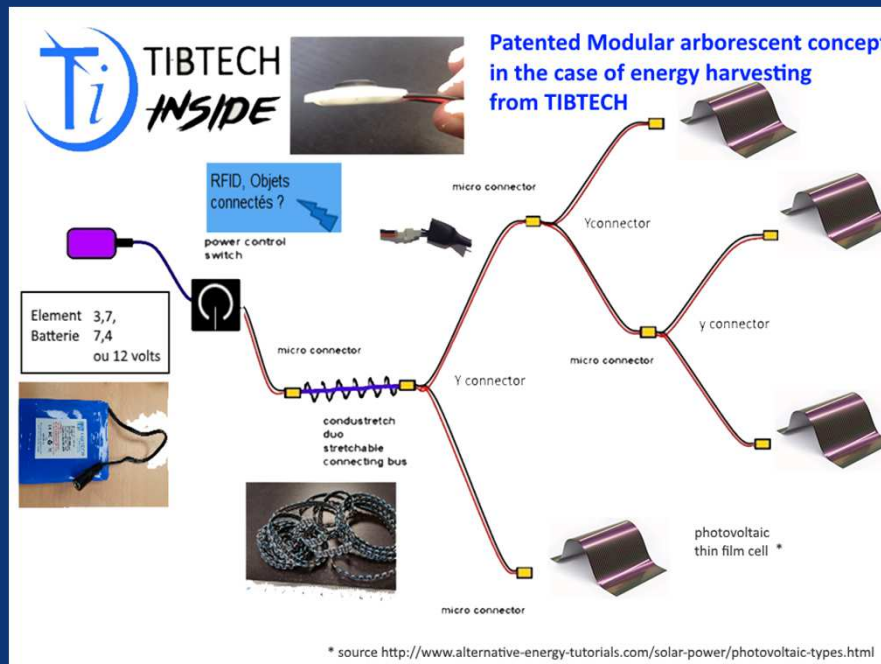
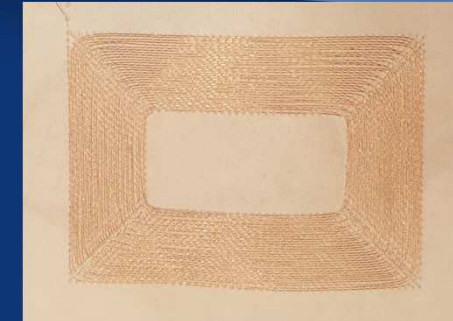
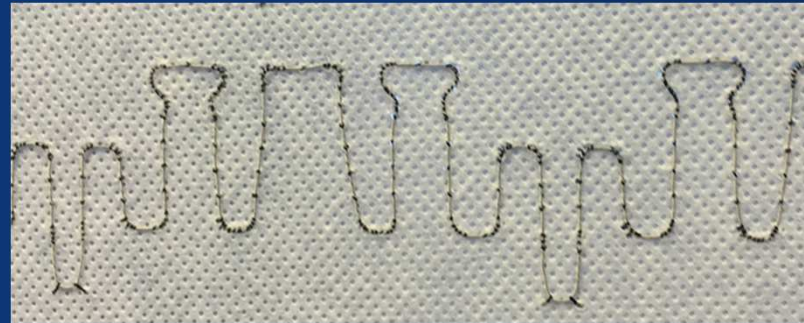
The embedded connection bus remains functional despite the process
(heat and deformation)

Functionalization: Embedded Antennas or Shielding fabric



Antennas: TIBTECH has got a wide experience of RFID or other antennas:

- Induction
- Energy harvesting
- RFID/ transponders
- Other



Deformation monitoring



- Our deformation monitoring surface captors can also be embedded within composite parts.
- Most of time they are conceived to analyze the behavior or relatively large surfaces and their advantage versus conventional punctual measure captors.
- They will show their specific interest to measure material vibration signal and to detect, after integration of the signal , the material signature under a specific input vibration or rotation frequency.

Lets us take an example on a wind turbine:

One can insert a TIBGRID heating grid in the lead edge of Wind blade, for Deicing purposes by example.

This TIBGRID structure can also be use as a deformation surface captor. Under a specific rotation speed, the deformation signal can be recorded and integrated to obtain the periodic resonance pattern , what can be called the “signature”

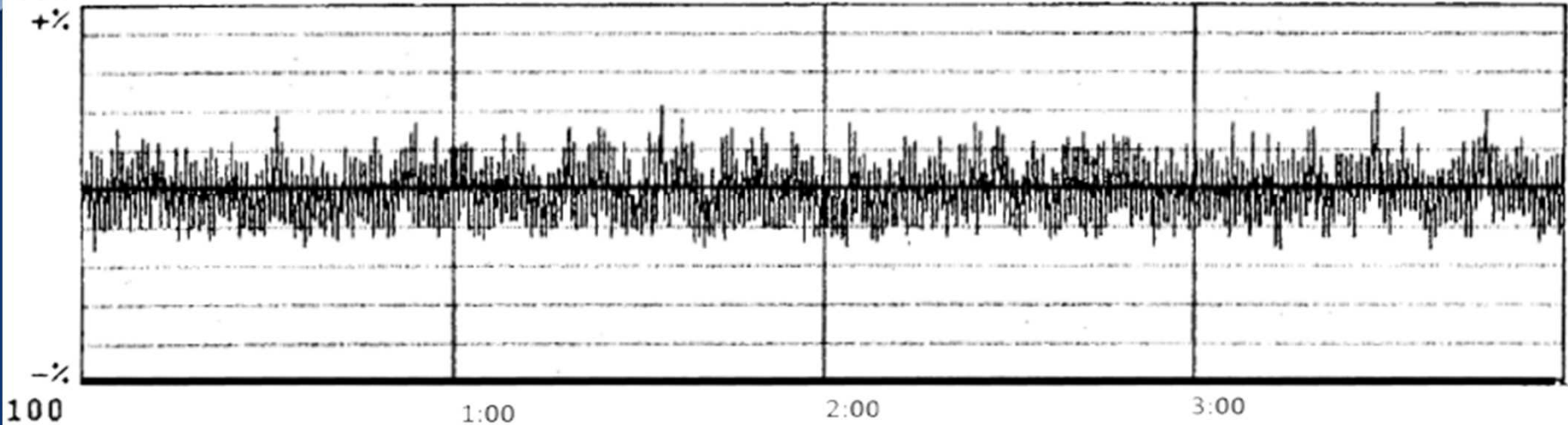
One can understand the great interest of such a measure for maintenance!



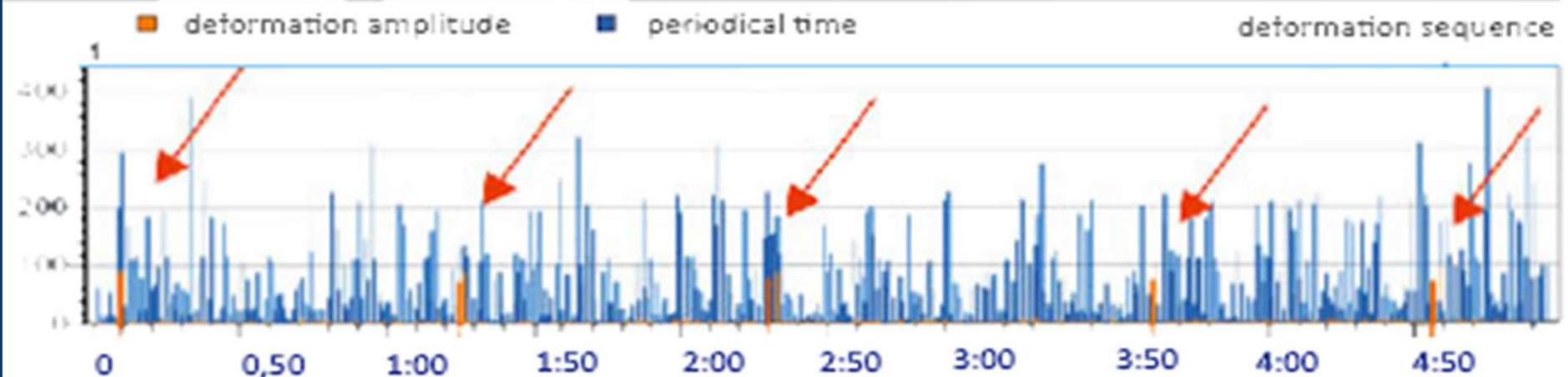
Examples of vibrations deformation diagram



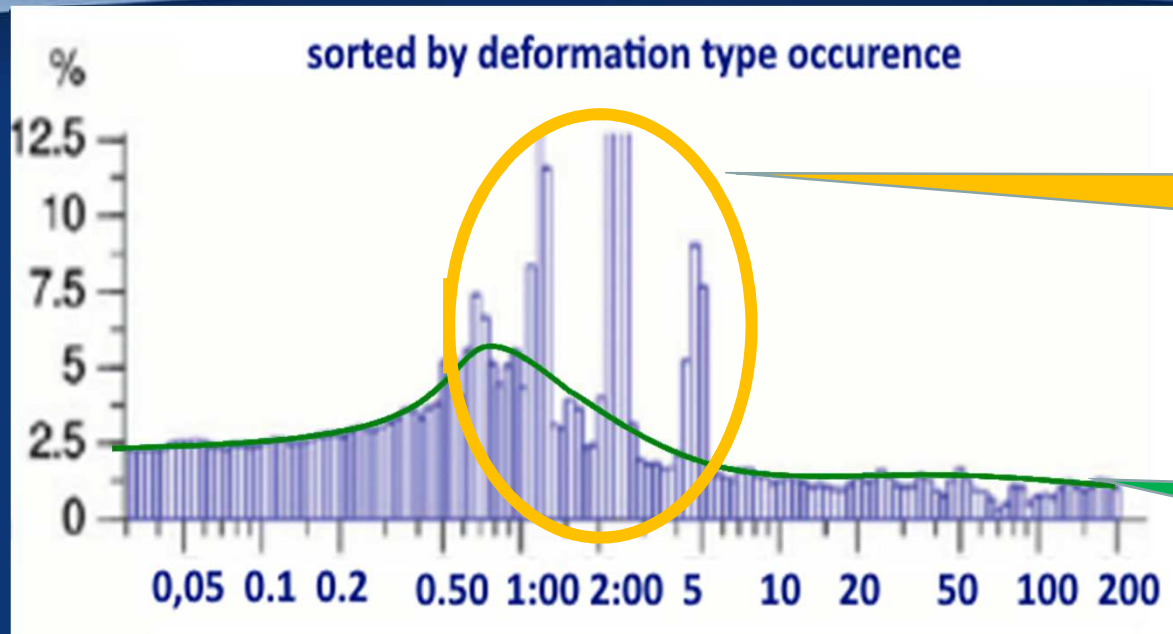
100 Vibration monitoring diagram (in % of the maximum signal measured)



Sequence diagram with repeat pattern



Example of signal integration



Signature

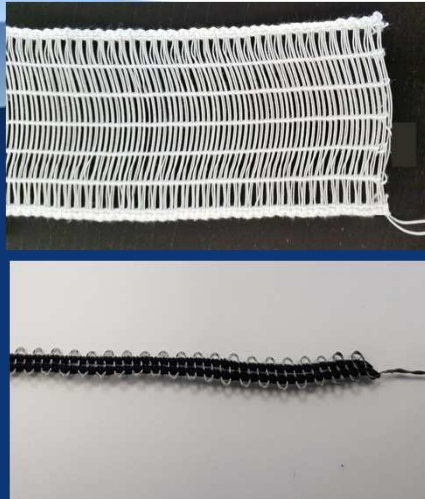
Specific resonances

Base pattern
(function rotation frequency)

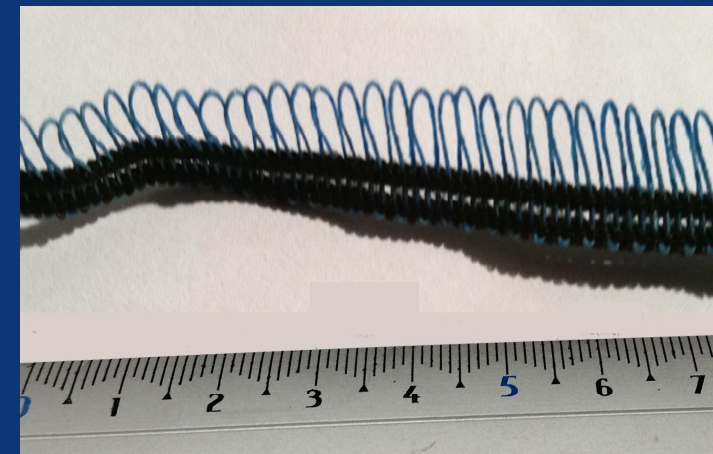
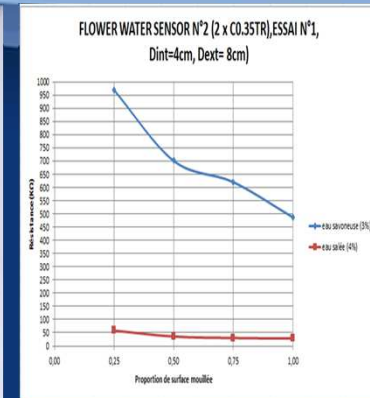
Two main interest :

- Conception :
 - ✓ Reduce the specific resonances by composite adjustment
 - ✓ rotor speed adjustment to avoid excessive resonances of the composite part
- Preventive maintenance:
 - ✓ Excessive deformation of the base pattern or of specific resonances,
 - ✓ occurrence of new peaks

Example of deformation monitoring & surface captors

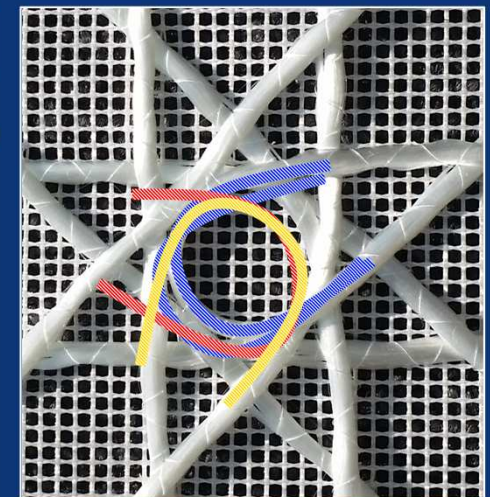
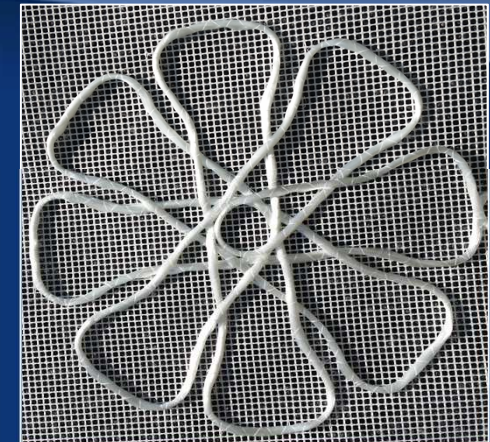
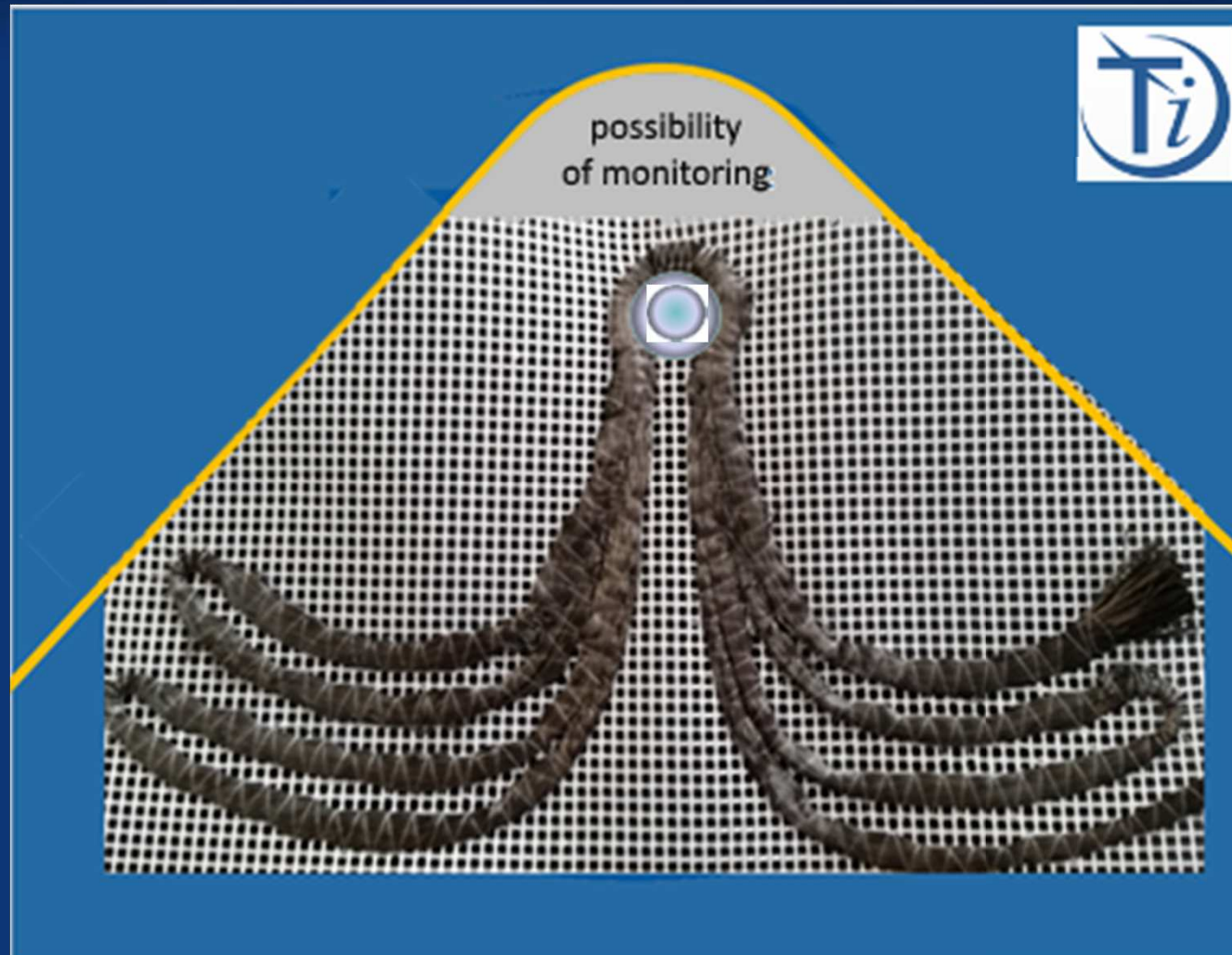


- Deformation monitoring
- Servo robots / games
- Vibration monitoring
- Maintenance & Signature evolution
- Optical circuit positioning
- Liquid Leaks detection
- pressure or chocs recording



Remark: TIBTECH is supplying the captor: (not the signal treatment or integration system) we remain open for any collaboration in this regard

Composite or Honeycomb Drill holes reinforcements by anchor transfer



What about future development for Tibtech ?



Wireless addressable Embedded captors for composite signature monitoring.

Tibtech is willing to associate its knowledge of embedded functional structures or data transfer to its electronic RFID antennas and chip positioning to develop embedded monitoring system addressable within long distance +- 30 meters.
(addressable induction antennas without battery)

Functionalization of composite is one major issue. But, as we have to address several functionalities together to reduce weight and costs several technologies must be associated by the different players that needs to work together.

Thank you for your attention!