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**Spin-off of the University of Naples *Federico II***

# Towards industrialization of a new supercap generation

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University of Naples *Federico II*
&
*CapTop*, Italy

International Workshop on
Supercapacitors and Energy Storage
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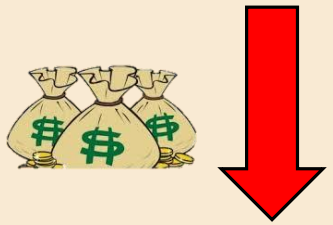
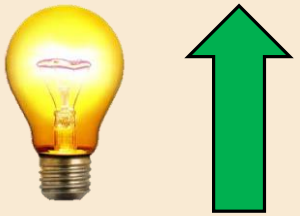
# Our proposal: to enter and to enlarge present SC market

CapTop aim is to enter in the SC field/market following three parallel paths with the final goal of facilitating and/or accelerating the explosion of SCs in the electrical storage market.
These paths are:

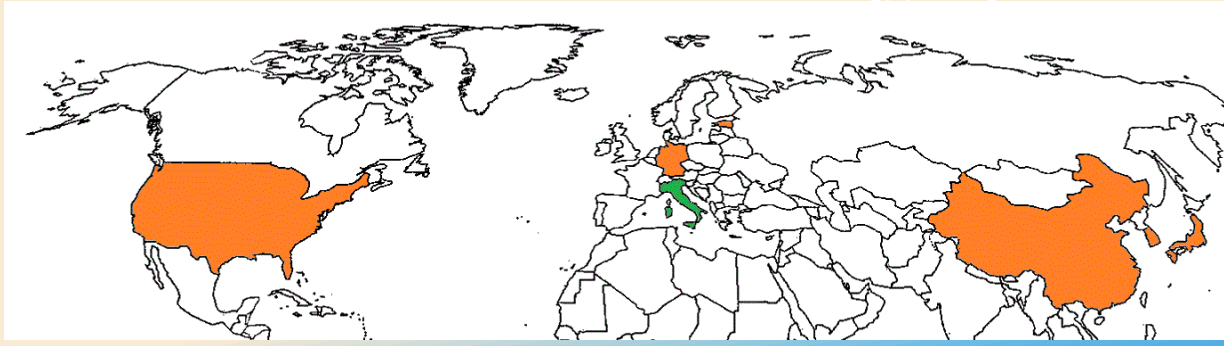




1. Increasing the specific energy by exploiting the scientific research results and technological developments.

2. Reducing the cost by full automation and optimization of the production process

3. Enlarging SC market in Italy and in Europe



# ELECTRODE/BINDER RESEARCH LINE

Development of **binders based on reduced Graphene Oxide (rGO)** that is an electro-active material:

- Doesn't contribute to the ESR;
- It's not a "dead weight".

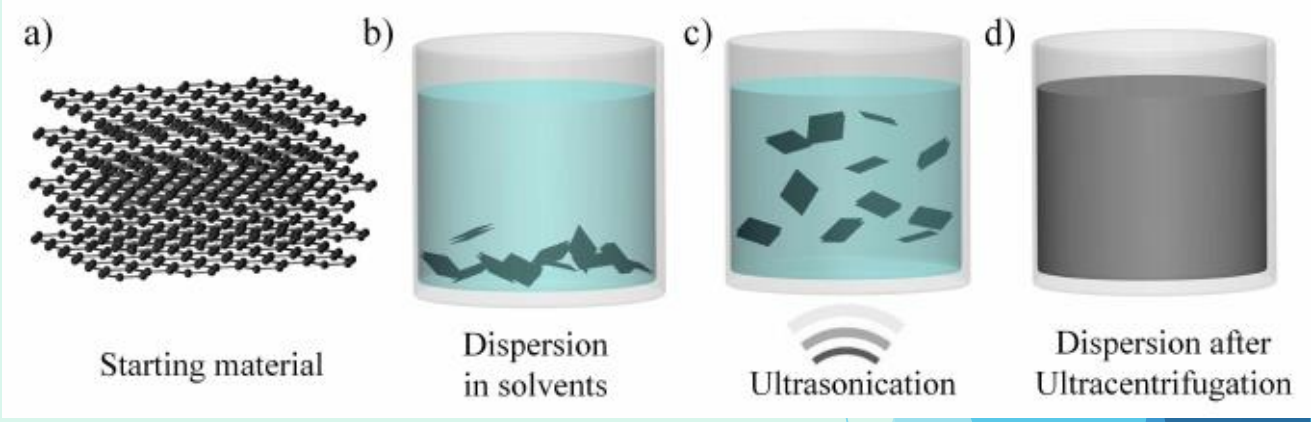
Currently under development at the **University of Bath** by **Dr. A. Damasco**[1] with **Prof. M. Meo**[2]

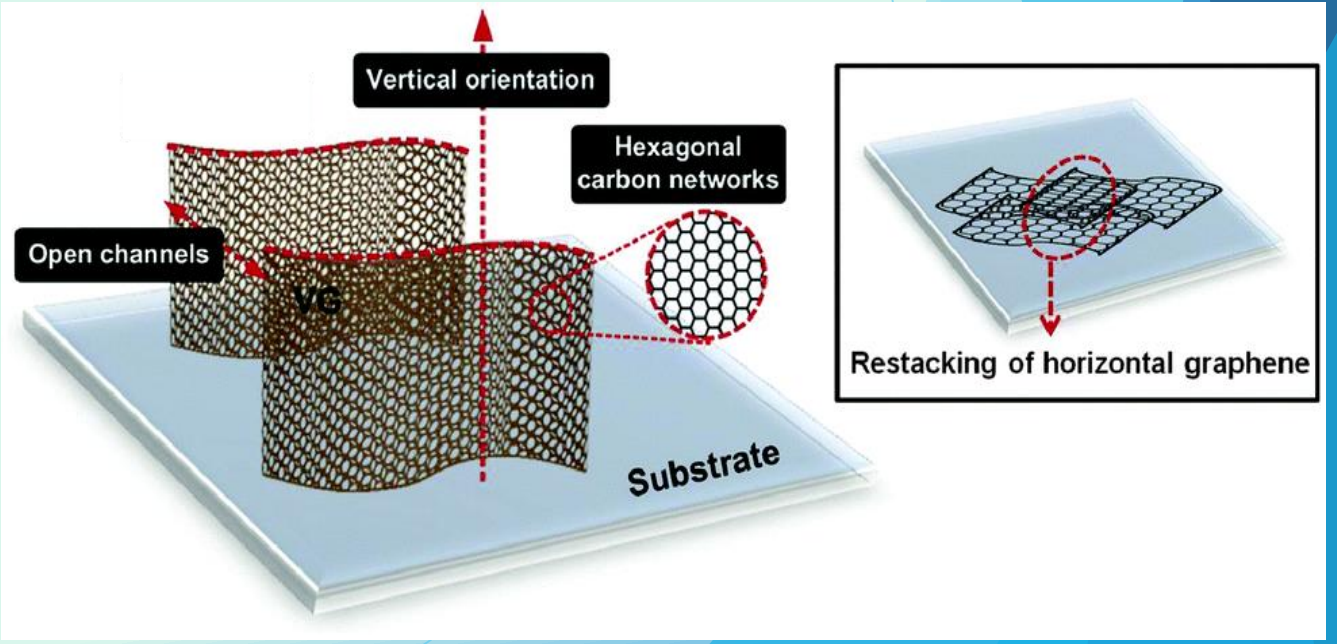
[1] Ph.D. student in Physics, University of Naples "Federico II"
[2] Professor of the Dept. of Mechanical Engineering, University of Bath (UK)

# Electrode/binder research line

Main goal is to use **graphene-like materials** as active material, and focuses specially on:

- **Exfoliation** of graphene in liquid phase;
- **Anchoring** graphene flakes on the collector;
- **Avoid re-stacking** graphene flakes.

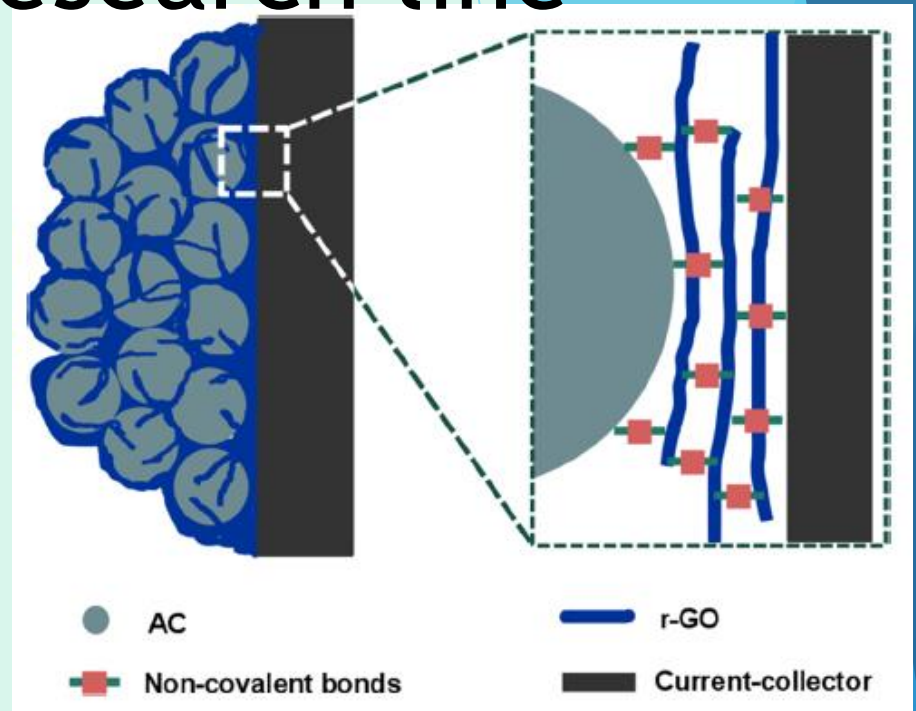


# Electrode/binder research line

Following an idea of a recent paper*, we can use **reduced graphene oxide** (rGO) as a binder (alone or mixed with activated carbon, AC) instead of using a glue. In this way, we can get at the same time reduced ESR and increased specific capacity.

The (rGO) derives from a slurry of GO, AC and propylene carbonate (PC) heated in low pressure and high temperature.




We can try different **variations** of the original idea to test new solutions for our purposes, like a electrode fully made with graphene-like materials or a non-metallic current collector.

*Dona T. L. Galhena et al., Reduced Graphene Oxide as a Monolithic Multifunctional Conductive Binder for Activated Carbon Supercapacitors, *ACS OMEGA* 2018, **3** 9246-9255

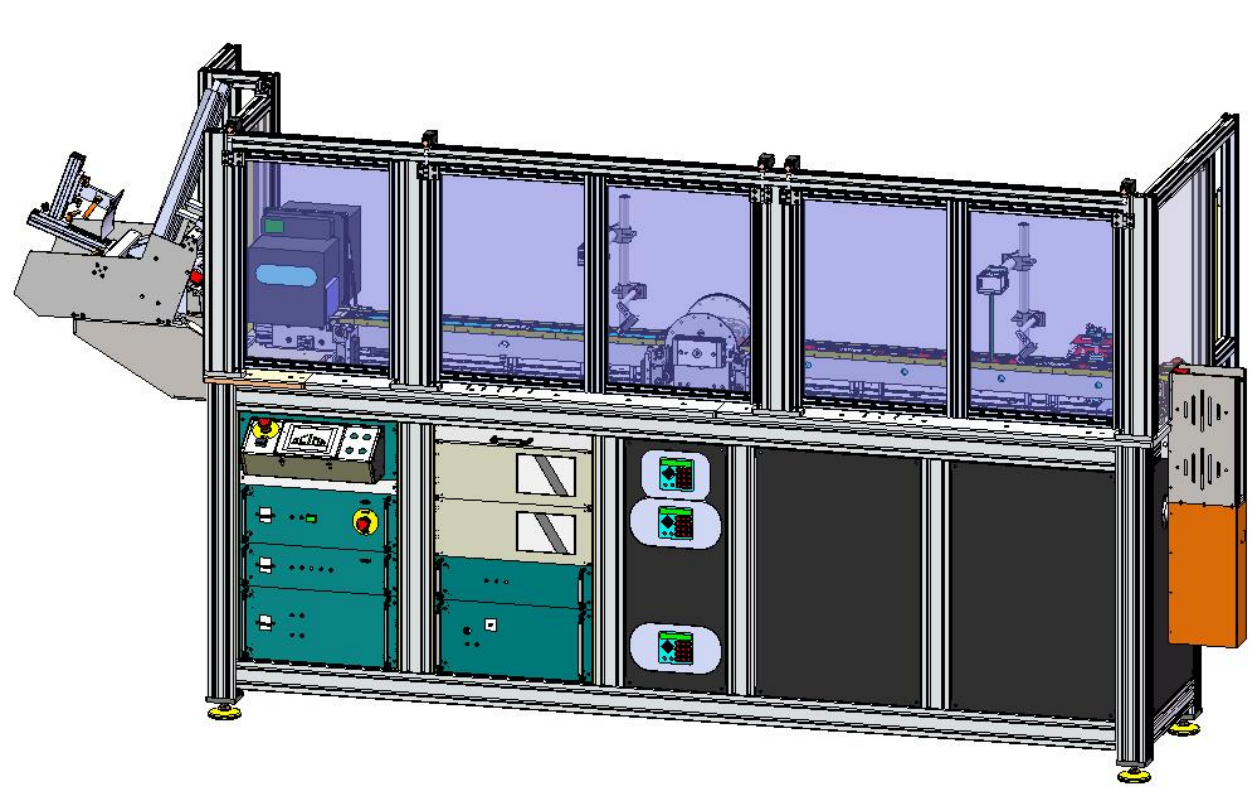
# Reducing costs. Aluminum carbonated foils

**LAMINAZIONE SOTTILE Spa**

# VIDEO CAPTOP LAMINAZIONE SOTTILE


# REDUCING COSTS. AUTOMATION.

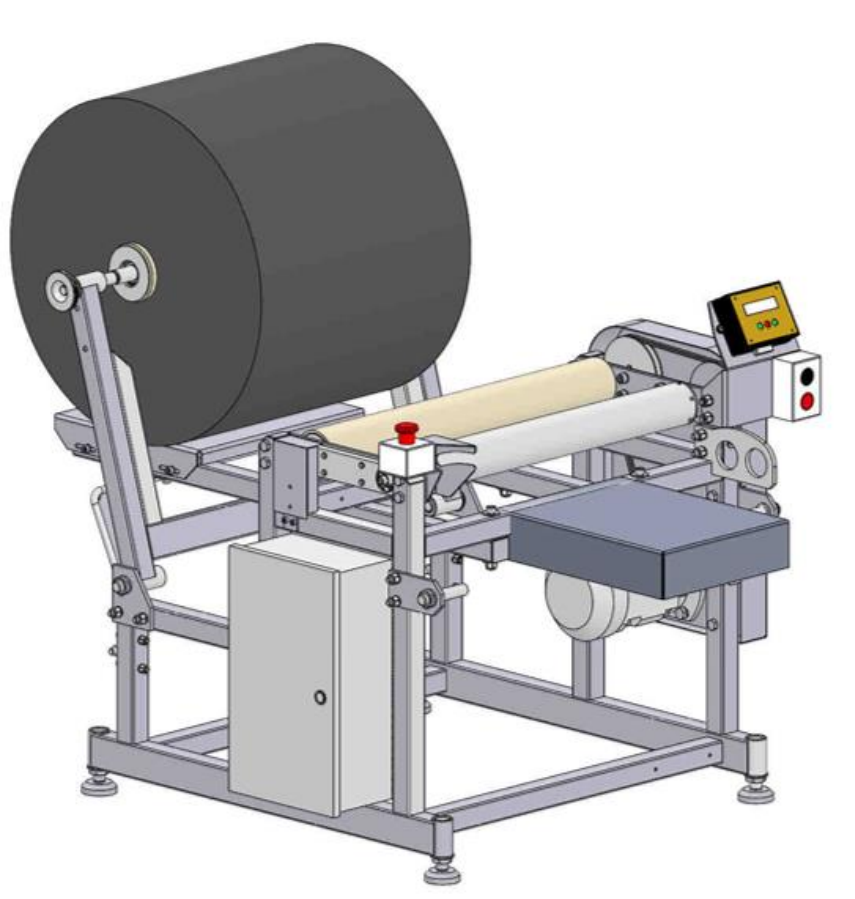
# Design and drawings of a pilot line. Control and assembly unit



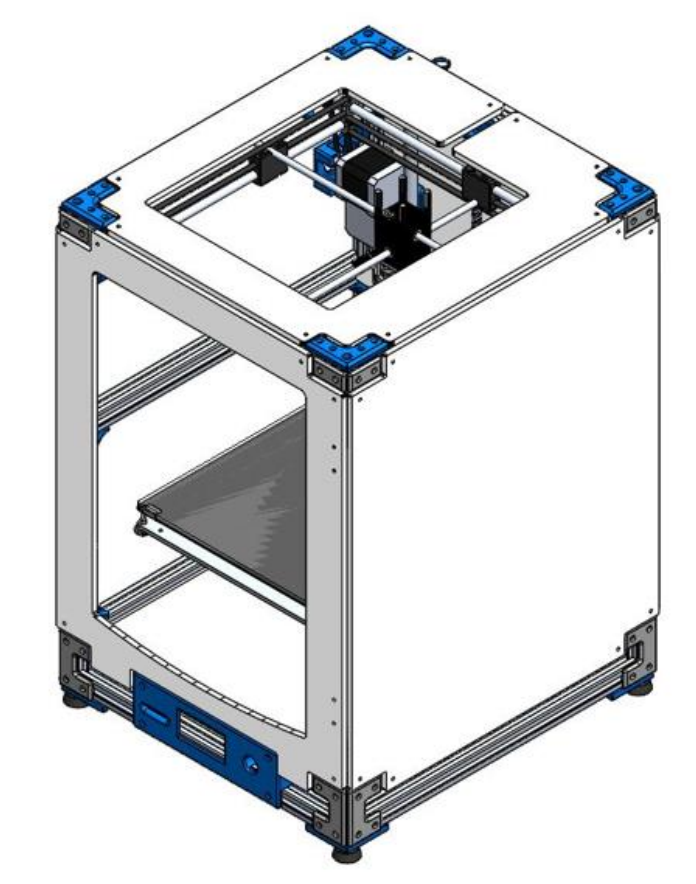
| | |
|---|---|
| **Alimentazione elettrica** | **380V, 50/60 Hz,** |
| **Potenza installata** | 30 KW |
| **Larghezza max rivestimento** | 400mm |
| **Velocità di bobinatura** | Max. 4 m/min |
| **Precisione sullo spessore** | ± 3µm |
| **Temperatura max di lavoro** | 150°C |
| **Reeling/Unreeling Shaft** | 75mm (ID) |
| **Diametro max di carico** | 500mm |
| **Massima lunghezza bobina** | • Dipende dallo spessore del rivestimento. |
| **Aria compressa** | 0.5-0.8 MPa |
| **Dimensioni** | L4500mm x P1200mm x H 2000mm |

# Design and drawings of a pilot line.

## Cutting Machine

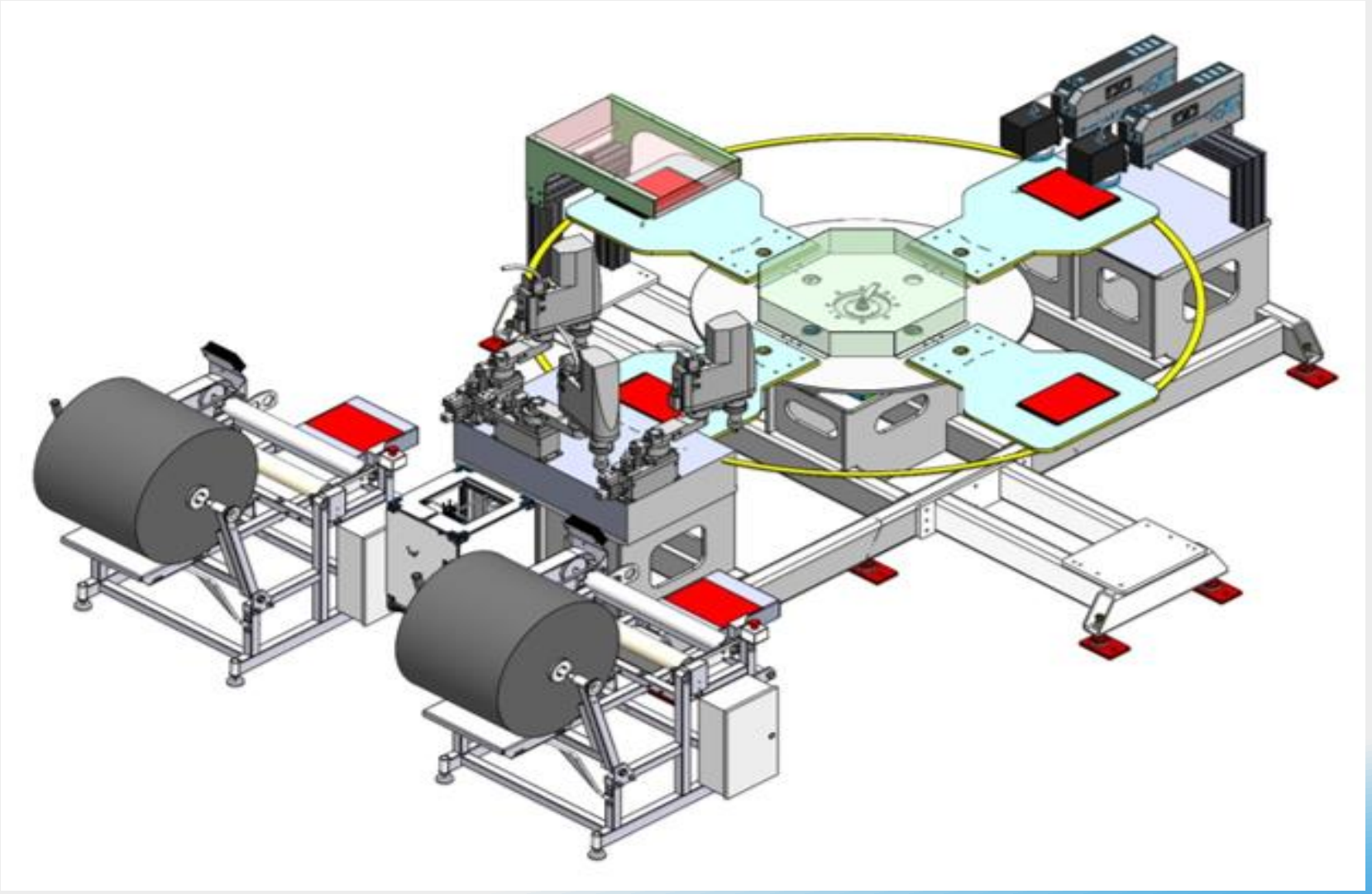


## Sheet Assembly



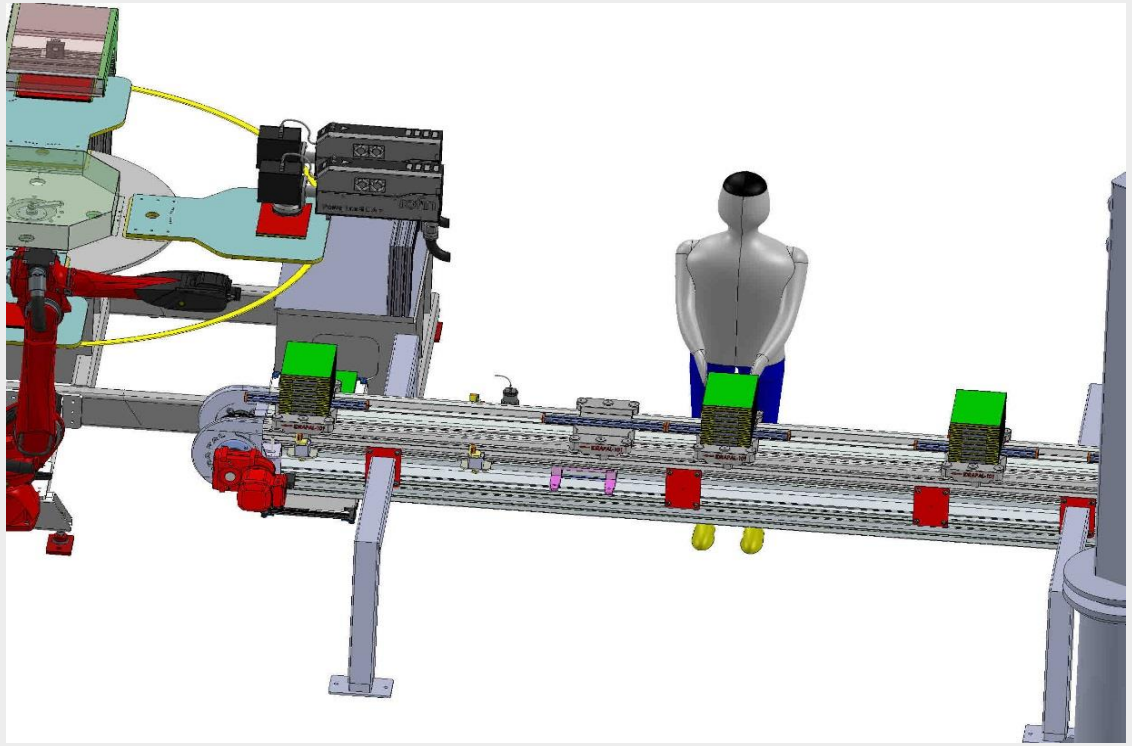
# Design and drawings of a pilot line.

Robot driven Packaging Station (First step: reams)



# Design and drawings of a pilot line.

Man driven Packaging Station (second step: whole package)



… and all the other steps to the delivery of the product

# ENTER THE SC MARKET … AND ENLARGE IT

Thanks to many collaborations with Universities, Research Organizations, Small & Medium Enterprises, and Large Companies, we have been able to acquire the SC production technology at the state-of-the-art. Thus,

**We are ready to enter the market in few months.**

We will focus on few products, but in the high range of performances. We see that the way imagined (or hoped) last year in Salerno is the right way.

# We are confident in a brilliant future for the SC community, academic, industrial, commercial.

THANK YOU

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