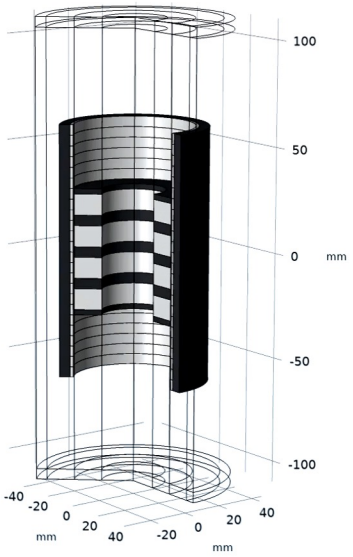
REGIM

REGENERATIVE SOLUTIONS

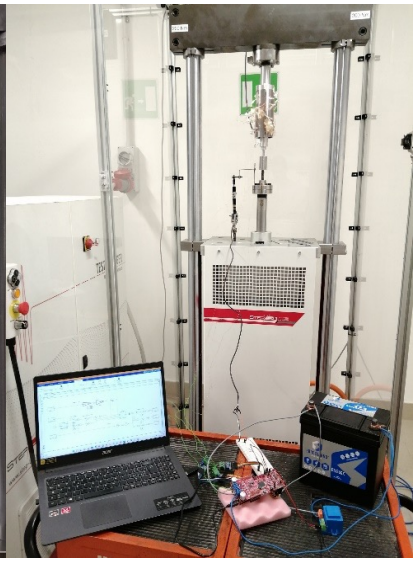


REGIM aims to design and develop a regenerative shock absorber capable of harvesting vibrational energy from agricultural machines, converting it into readily available electrical energy. Currently, only a small portion of fuel consumption of is directly used to drive the vehicles, while the majority of the energy is dissipated in the form of heat, noise, and vibrations. Vehicle suspensions determine one of the main channels of energy loss and thus have a substantial influence on fuel efficiency. Recovering part of the dissipated energy can greatly impact the overall energy efficiency of agricultural machines.

With 21% of the total CO2 emission worldwide related to agricuture, the agricultural field appears ready and commited to integrate substantial innovation and to promote sustainability transformation in the environment. REGIM aims to provide cutting-edge technology to ride the innovation wave towards a more pervasive electrification of the agricultural field and a more efficient use of resources. The project acts towards the global effort of the Sustainable Development Goals by fostering the Goals of Zero Hunger (2), Affordable and Clean Energy (7) and Responsible Consumption and Production (12).

The team carried out the definition of the optimization of th regenerative damper with regards to several physical phenomena involved in the energy harvesting process (multiphysics) and the design of the electrical circuit to interface the device with a battery (power electronics). Computer simulations were performed to determine the geometrical features, the dimensions and the materials of the components that maximize therecovery of energy, as well as the design and the parameters of the control circuit. The results were used to define the technical parameters for the production of a prototype of the regenerative damper.

The prototype was evaluated on an experimental setup, developed at Politecnico di Torino. The testing utilized a newly available test rig, capable of reproducing realistic vibrations. The setup was carachterized by data of vibration extracted from direct on-site testing on operational aricultural machines.



The experimental testing validated the design approach adopted by REGIM, in order to maximize the recevory potencial the team conjugated in the develop damper the physical models of the device with the electronic components of the energy harvesting system. This apporach constitutes a novelty for the optimization of regenerative dampers.