**Introduction**

The Group of Robotics, Automation and Biomechanics (GRAB) of the University of Bologna is committed to devote its expertise and resources to achieve the results of the project "Robotized and reconfigurable production cells", in collaboration with the industrial partner IMA SpA (www ima.it). IMA SpA is world leader in the manufacture of automatic machines for the packaging of pharmaceuticals, cosmetics, food, tea and coffee. IMA SpA, whose philosophy is strongly based on research and innovation, acknowledged the importance to exploit autonomous and cognitive robotics technologies in its market sectors.

**The project**

GRAB will support the design and development of a demonstrator that will be part of robotized production cells for machine automation. The demonstrator is supposed to automatize a number of repetitive and/or burdensome tasks that human operators ordinarily perform to support the automatic machine operation. The specific project addressed here has the goal to realize a flexible and autonomous robotic system able to:

- wash large-dimensions bins with cylindrical (or even more complex) shape;
- perform technological operations on plane surfaces.

In order to maximize the impact of the robotic system on the effectiveness and efficiency of the production cell, IMA and GRAB recognize that the aforementioned goals will be achieved by the deployment of a flexible robotic system based on a commercial robotic platform formed by an autonomous mobile vehicle equipped with a lightweight compliant robotic arm, as well as specifically conceived programming and simulation frameworks.

**Plan of activities**

In order to achieve the goals of the project, the following operations are to be addressed:

*Automatic washing of large-dimension bins:*
- acquisition of a 3D model of the surface to wash
- identification of the work location and autonomous positioning
- definition of the washing strategy
- collection and set up of the washing tool
- definition of the washing strategy
- collection and set up of the drying tool
- verification of surface state and humidity

*Technological operations on plane surfaces:*
- identification of the work location and autonomous positioning
- precise referencing with respect to the operation plate
- screwing and unscrewing of bolts
- drilling of holes with assigned center-to-center distances and center-to-edge distances
- boring of holes with assigned center-to-center distances and center-to-edge distances
- use of a sawing tool to realize holes with non-circular shape and/or large dimensions