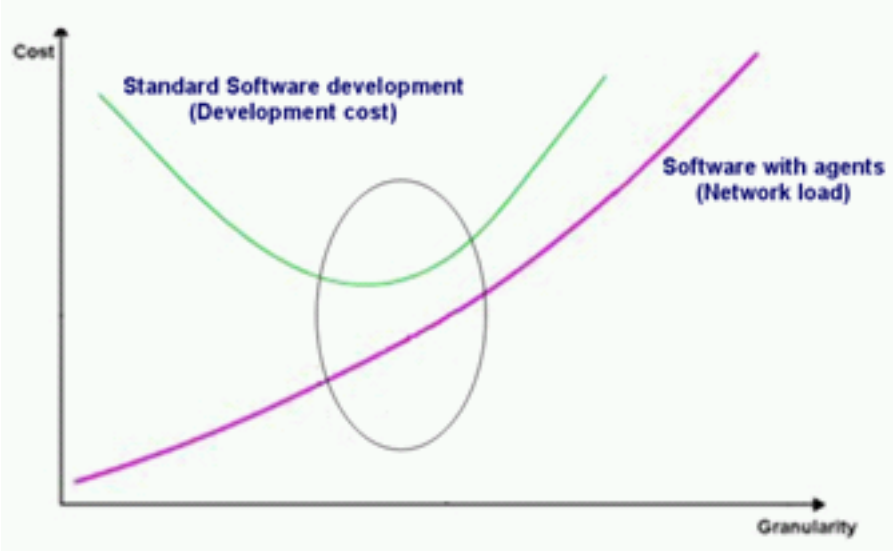
To develop agents we use the platform JADE that provides basic middleware-layer functionalities which are independent of the specific application and which simplify the realization of distributed applications that exploit the software agent abstraction. A significant merit of JADE is that it implements this abstraction over a well-known object-oriented language, Java, providing a simple and friendly API. The LEAP (Lightweight Extensible Agent Platform) add-on, when combined with JADE, replaces some parts of the JADE kernel forming a modified runtime environment that we will identify as JADE-LEAP and that can be deployed on a wide range of small devices.

Obviously we can agentify everything but, increasing the granularity, for example realizing a complex system with more agentified modules (major number of elementary skills), the system performance could be bad for a high network bandwidth required and for major difficulties to synchronize all the agents (figure 1).



Each agent will have adaptive behaviour, so it can modify its job considering both environment conditions and the information exchanged with others agents. We put our attention on testing and diagnostic procedures. Testing focuses on fault detection. Diagnosis consists of determining the nature of a detected fault, locating and fixing it. We have decided to use “quantitative models based” algorithm based on Kalman filter and neural network. The main advantages of this method are that we can reduce the number of sensors, minimize the disturbance effects, and estimate the same Masmec is developing a demonstrator (figure 2) to show the entire ideas concept from an industrial point of view. The demonstrator has a transportation line that transports pallets with memory tag which contain all the data related to the piece on it. The test case is given by CRF.

The concepts presented on the final demonstrator are:

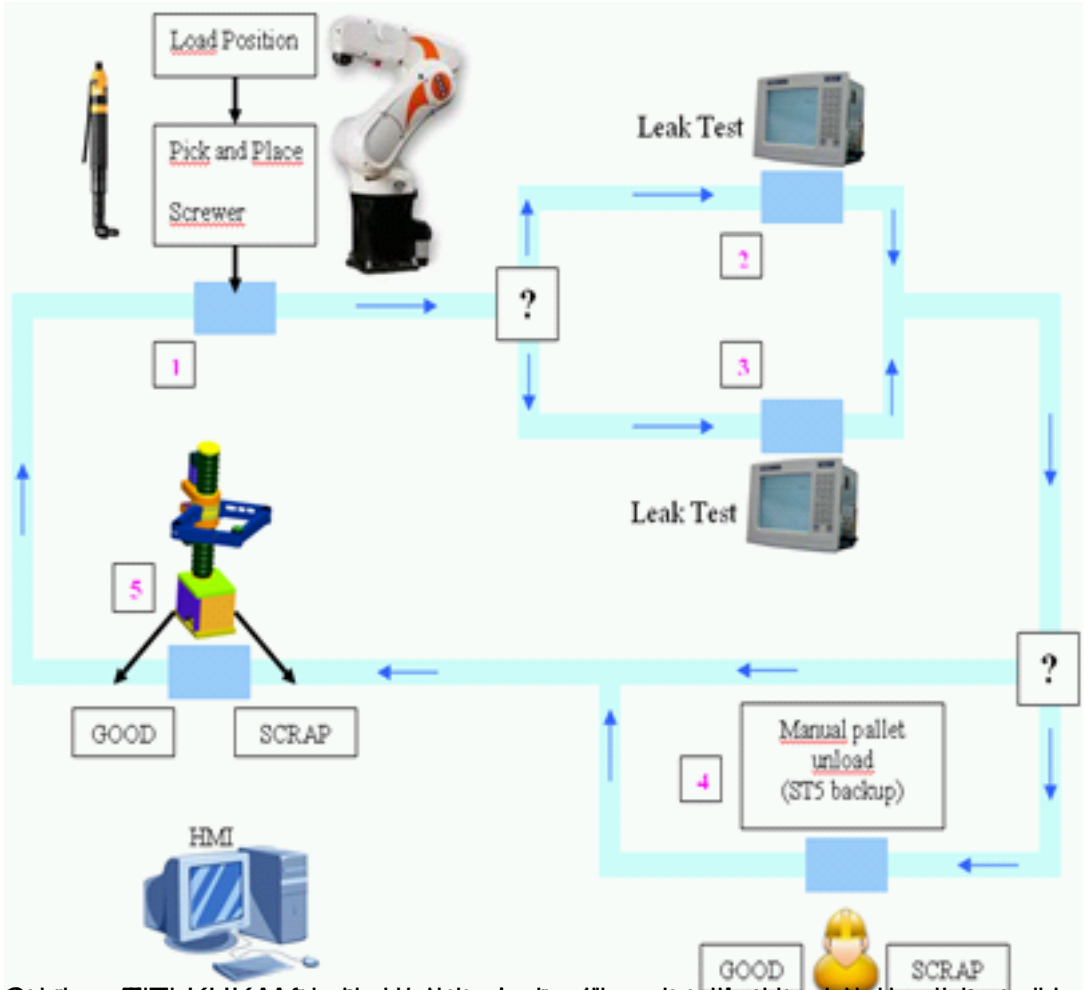
- No need of written code for process design but only a simple workflow realization using a graphical tool

- Agentification of legacy modules (robot, screwed) and custom modules (SCARA, leak units) realizing a robust mechatronic agent architecture

- Adaptability and self-configuring concepts present during line production

- Use of simple and intuitive graphical interface (i.e. AUTOMATION ML editor) to configure an assembly line with DCS (Distributed Control System)

- Possibility to interface to other CAD/CAM tools using innovative XML standards (Automation ML) that uses COLLADA for 3D graphics and allows to interface with other XML standards


Load Position
Pick and Place
Screwer
Leak Test
2
?
1
3
Leak Test
5
?
GOOD
SCRAP
Manual pallet
unload
(ST5 backup)
4
HMI
GOOD
SCRAP