Lean robotized AssemBly and cOntrol of composite aeRostructures

LABOR in a nutshell

UNIVERSITÀ DEGLI STUDI
DI SALERNO

LOCCIONI

Università
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Scuola Politecnica e
delle Scienze di Base
Dipartimento di Ingegneria

www.labor-project.eu

Objectives

- Objective 1
  - Development of a self-adaptive system able to perform an automated drilling and fastener insertion, based on robotized systems for composite structures
- Objective 2
  - Development of smart inspection tools
- Objective 3
  - Development of distributed intelligence architecture and Human-Machine-Interface
- Objective 4
  - Ergonomic design and work space monitoring algorithms
- Objective 5
  - Integration and prototyping of the LABOR system
- Objective 6
  - Demonstration in real environment

Assembly sub-operations

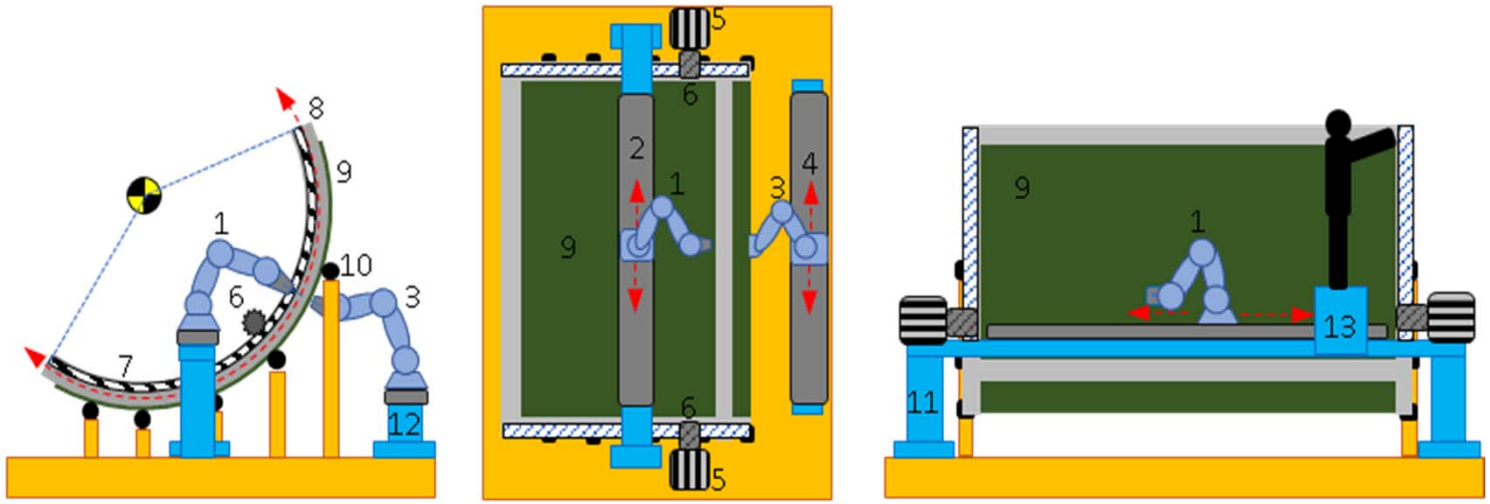
- Currently, these operations are mostly performed manually, especially for regional aircraft

Goal

- Lean and self-adaptive robotic technologies
  - small/medium size robots to provide higher capability of adaptation and easy integration in existing shop floors
  - adaptive processing tools to perform the different process tasks
  - advanced vision systems to reference the robots and check the quality of the work performed
  - Safe human-robot coexistence
  - distributed intelligence to build a more flexible solution

Approach

- Adoption of small-scale robots
  - to save costs and gain flexibility
  - smart fixtures and external axes to increase their workspace
  - standard process tools (electrical drilling tools or automated fastening tools) adapted to be integrated into a robot end effector compatible with quick tool-changers



Main components

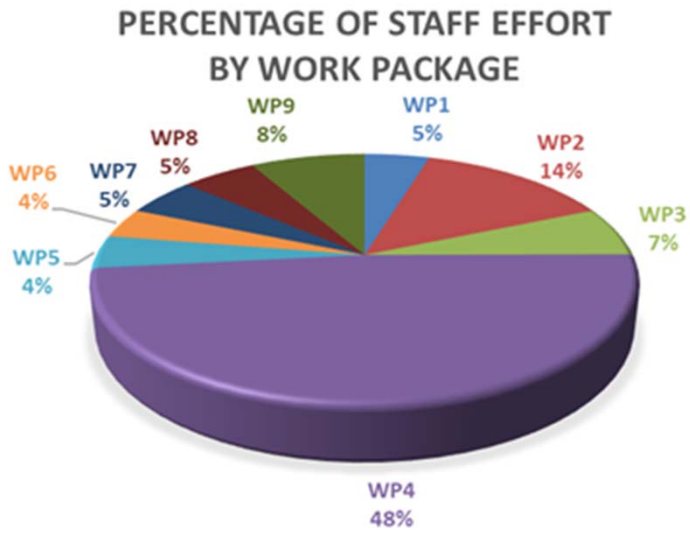
- Assembly jig to hold the panel
- Two 6-axis robots mounted on sliding tracks
- Adaptive processing tools
  - Drilling tool
  - Sealing tool
  - Fastening tool
- Non-contact vision inspection tools
  - Tool for quality inspection of the fastener head
  - Tool for quality inspection of hole, countersink and fastener flushness
- Control software and HMI

Impact

- Productivity would benefit of increased freedom in the design of parts to which the automatic solution and assembly processes might easily adapt
- Advanced manufacturing means and methods
  - high production rates
  - reduced recurring costs
- Factory of the Future approach
  - intelligent automation
  - ergonomic work environment
  - optimal HMI

The figures

- Start date
  - 1 March 2018
- Duration
  - 36 months
- Resources
  - Total cost 2.509.375 €
  - EU contribution 1.995.062 €
  - Staff effort 281 Person Months
- Work packages
  - WP1: Requirements
  - WP2: Design
  - WP3: Test plan
  - WP4: Development
  - WP5: Pre-acceptance test
  - WP6: Acceptance test
  - WP7: Final demonstrator
  - WP8: Project management
  - WP9: Dissemination & Exploitation



The consortium

- Coordinator: AEA srl – Loccioni Group, Italy
  - Principal Investigator: Dr. Cristina Cristalli

- Beneficiary: University of Salerno, Italy
  - Principal Investigator: prof. Alessandro Marino

- Beneficiary: University of Campania Luigi Vanvitelli, Italy
  - Principal Investigator: prof. Ciro Natale

Thank you

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