



PhD in INGEGNERIA DEI MATERIALI / MATERIALS ENGINEERING - 39th cycle

PNRR 117 Research Field: SMART QUALITY CONTROL: INNOVATIVE SOLUTIONS FOR ADVANCES SEALING EVALUATIONS

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

SMART QUALITY CONTROL. The food packaging industry is constantly researching the best way to balance quality and performance while prioritizing safety. Within this context, packaging materials and systems engineering lack quantitative methods for the nondestructive characterization tools for finished packaging. This research project aims to acquire a deeper fundamental understanding of several physical phenomena which determine the degree of success of packaging processing in terms of sealing quality. Identifying the key factors that affect component performance is crucial for developing strong testing methods that can generate reliable analytical and provisional models. This will aid in designing and enhancing new and existing solutions. To establish a manageable research topic that can be completed within a Ph.D. program's timeframe, the candidate:

1. Will explore the fundamental of quality control in sealing
2. Implement the innovative solution for an automatic control

Methods and techniques that will be developed and used to carry out the research

The research will be focused on three main areas:

1. State-of-the-art review of the characterization protocols in sealing evaluation.
2. Assessment of destructive testing and correlation with



	the performance in aseptic food and beverage product. 3. Study of nondestructive testing and correlation with destructive testing.
Educational objectives	The Ph.D. candidate will become familiar with state-of-the-art nondestructive testing protocols and analysis for multilayer packaging, using existing models and developing new ones to correlate the processing performance and product behavior.
Job opportunities	The Ph.D. candidate will develop an in-depth knowledge of nondestructive testing methods for packaging Materials, together with a variety of advanced analysis techniques used in materials science and technology. Academia, research centers, and private R&D companies are the primary job opportunity for the candidate.
Composition of the research group	1 Full Professors 3 Associated Professors 3 Assistant Professors 7 PhD Students
Name of the research directors	Prof. Luigi De Nardo

Contacts
Luigi.denardo@polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Tetra Pak Packaging Solutions S.p.A. Via Antonio Delfini no. 1, Modena https://www.tetrapak.com/
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	to be defined



By number of months abroad	6
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Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Confidentiality (Agreement with company): since this is a thematic scholarship, the management of Confidential Information, Results and their publication is subordinate to the restrictions agreed upon with the funding company. Upon acceptance of the scholarship, the beneficiary must sign a specific commitment.

Individual budget for research (5.700 euro): 1st year: 1.900 euro; 2nd year: 1.900 euro; 3rd year: 1.900 euro

Teaching assistantship (availability of funding in recognition of supporting teaching activities by the PhD student): there are various forms of financial for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities within the limits allowed by the regulation.