



**POLITECNICO**  
MILANO 1863

**ABC<sup>PhD</sup> DOCTORAL PROGRAM**  
IN ARCHITECTURE BUILT ENVIRONMENT  
AND CONSTRUCTION ENGINEERING

## **ABCPhD CALL4SCHOLARSHIP 32b**

Research topic T2: APPLICATION OF THE BIM SYSTEM TO  
CHEMICAL BUILDING PRODUCTS: DIGITALISED SOLUTIONS FOR  
CONSTRUCTION CHEMICALS FOR MAINTENANCE AND NEW  
PROJECTS

**(32b-T2 BIM for CHEM)**

# ABC PhD Program – CALL 4 SCHOLARSHIPS 32b

Thematic Scholarship 32b T2: “BIM for CHEM”



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## Funding and management of the thematic scholarships

- Number of scholarships: 1 (one)
- Monthly net income: €. 1.016,37 (max 36 months)  
[In case of a change of the welfare rates during the three-year period, the amount could be slightly modified]
- **Additional support:** Funding for educational activities<sup>(\*)</sup> : €. 1.370 per student [for the 2<sup>nd</sup> and 3<sup>rd</sup> year]
- Starting of PhD activity: 1/11/2016
- Deadline for application to the call: 9/09/2016
- Research Director: prof. Bruno Daniotti
- **Research Group:** proff. Alberto Pavan, (scientific manager), Bruno Daniotti , Sonia Lupica Spagnolo, Daniela Pasini, Valeria Savoia, Silvio Palomba.
- **Funding and cooperating Institutions:** the scholarship is co-funded by Politecnico di Milano, Department ABC and BASF Construction Chemicals spa.

(\*) (purchase of study books and material, funding for participation in courses, summer schools, workshops, conferences)

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### **Context of the research activity**

The digital revolution of production and services, globally recognised as the fourth industrial revolution, also concerns the construction industry, today experiencing the first prototypes of collaborative platforms for Information Management (optioneering, authoring, process, review and management), making realistically and effectively possible to pursue a relationship that does not consist solely in goods marketing but, above all, in knowledge sharing between all the different players in such a long and diverse supply chain (B2B or B2C).

Rather than the product flow, it is the management of data flows that drive the products and their design, production, marketing, management, maintenance and disposal that becomes essential. Even the world of industrial and chemical production needs to experiment new proactive dialogue systems with construction industry which, in its progressive migration to digitalisation, will be increasingly permeable to product and process innovation efforts coming from other sectors.

The technical and regulatory evolution (compulsory, following national and EU procurement "BIM" legislation, or voluntary, based on "BIM" standard tables developed in national and international contexts) are consolidating this methodological revolution, making the search for new communication/collaboration/coordination systems between highly specialised worlds such as that of chemicals (30% of graduates) and construction (1% of graduates) increasingly necessary (and prospectively fertile) through a new digital "language". The real "objects" of production and the virtual BIM objects merge into a digital platform system for process optimisation, quality of results, end-user satisfaction.

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### **Motivation and objectives of the research**

The objective of this PhD position is to study the communication between the different specialists working in the construction industry and to understand how manufacturers should strive to transform their products into digital objects, associating them with data able to guide the user in selecting the right technical solution to be implemented and providing support in the use of the product or products adopted.

The PhD Candidate will investigate different aspects :

1. Identification, integration and management of process and project information (times, costs, quality, safety, sustainability) associated with the relative products.
2. Standardisation of information transferred throughout stages:
  - new construction project or maintenance project
  - surveys
  - definition of technique
  - selection of suitable materials
  - description of executive stages
  - drafting of project documents
3. Implementation with the software, related or non-related to the object geometries, of the information models relating to the systems and solutions defined in points 1) and 2).
4. Planning of user (designer, job manager, executing company) training courses

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## Thematic Scholarship 32b T2: “BIM for CHEM”

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

The first year of Candidate’s work is devoted to exploration, to Doctoral Courses and to other basic training activities on technological items and ICT ones, to consolidate the choice of the Research Topic, to obtain a deep understanding of the research activity about that topic and to define the main objectives of his/her work, explaining which advancement (and how) he/she is going to produce.

Training activities will be developed at Politecnico di Milano and in the BASF Construction Chemicals context.

A first list of Phd Courses is drafted:

1. Information Technology for Planning, Architectural Design and Built Environment Management
2. Research in Building Process Management
3. Composites as Reinforcement for Concrete Structures and Strengthening for Existing Structures

During the second year, Candidates will produce a clear view of their Research Project and start their PhD Thesis, under the guidance of their Supervisors and the research group.

International activities will be developed to get experience and to publish research results.

During the third year, Candidates will develop the Phd thesis, concluding the whole research activity.

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## Thematic Scholarship 32b T2: “BIM for CHEM”

### **Educational objectives**

At the end of the Doctoral Programme, the Candidate will have a deep knowledge of design, testing, implementation and management processes of the construction and maintenance of concrete and masonry structures, hydraulic and non-hydraulic infrastructures, with courses, laboratory and field-testing training activities, jointly developed by Politecnico di Milano and BASF Construction Chemicals, in Treviso, providing the candidate with the tools to operate in the field of structural systems renovation. In addition, the candidate will develop skills relating to the professional role responsible for producing BIM models (BIM Field), through:

- the computerised management of databases and product categories
- the creation and management of an object
- the modelling of the object and its related interface
- the practical use of the digitalised object and of the information related to the object in a project and on site (e.g. enhanced situation on site)

### **Skills of the candidate**

At the end of the research project the candidate will have acquired expertise to operate as:

- Expert in the field of the digitalised BIM design (with reference both to new construction projects and maintenance projects and to the use of chemical products).
- Professional consultant in the field of manufacturing companies of BIM design software.
- Technical expert for solutions related to the chemistry of constructions integrated in a design context.