SCAFFOLD: Innovative strategies, methods and tools for occupational risks management of manufactured nanomaterials in the construction industry

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Introduction

- Use and handling of MNMs and nano-products in construction: large & increasing
- Exposures at different stages of the construction life cycle
- Low awareness
- Occupational Legislation: complex (Stakeholders)

How to

- prevent occupational exposure & risks?
- reduce uncertainty for stakeholders?
Low awareness of NPs in construction sector

Source: FIEC and EFBWW (2009)
Aim of the SCAFFOLD project

to develop, test, validate in real conditions and disseminate a new holistic, consistent and cost effective Risk Management Model (RMM) to manage occupational exposure to MNMs in the construction sector.

This will be done by integration of a set of innovative strategies, methods and tools developed by the project into consistent state-of-the-art safety management systems (OSHAS 18001 + ISO 31000).

Project Duration: Three years (2012 – 2015)
Project Budget: 3,7 M€
Call identifier: FP7-NMP-2011-SMALL-5
Work program topic addressed: NMP.2011.1.3-2 Worker protection and exposure risk management strategies for nanomaterial production, use and disposal.
Project EC Funding: 2,5 M€
### Innovative strategies, methods and tools for occupational risks management of manufactured nanomaterials in the construction industry

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<th>Short name</th>
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Expected results: RMM and its inputs

**WP1** Profile of construction industry

**RISK MANAGEMENT MODEL OF SCAFFOLD WP 5**

- General

**WP2** Risk prevention

- Planning
- MNMs risk identification, assessment and control determination

**WP3** Risk assessment

- Operational control
- Emergency response
- Performance measurement and monitoring of MNMs risk management activities

**WP4** Risk protection
Specifications for the RMM Toolkit

✓ Computer application
✓ Evaluates MNMs RMM implementation inside a construction company
✓ Adaptable to any company and especially to SMEs
  ➢ + SMEs version : simpler, for SMEs with/without OSHAS model / RMM experience
  ➢ Integrates the RMM from the company (with or without OSHAS 18001)
✓ Easy-to-use, practical, interactive, didactic
  ➢ Could also be designed for training, encourage personnel involvement, establish communication with stakeholders and check legal compliance
  ➢ Facilitates the legal compliance
  ➢ Helps for continual improvement
✓ Final example diagrams in each module
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LCA - Process

**BUILDING**
Residential, Educational, Commercial, Industrial, Military, Official, Sport

**2. Construction**
- Clearance and demolition
- Formwork and concrete
- Foundation laying
- Insulations and FR panels
- Iron works Walls
- Plumbing
- Finishing Paint
- Polish

**3. Use & Maintenance**
- Maintenance

**4. Demolition**
- Demolition

**ES7**
Concrete mixing for piles, slabs and special structures

**ES8**
On-site Assembly/Machining

**ES19/ES23**
Off-site manufacturing → Not considered in the project

**ES20/ES24**
Fitting of the panels and machining for the superficial instalations of other elements

**ES15**
Preparation, dosification of coatings

**ES16**
Application of coatings, superficial machining

**ES10/ES18/ES22/ES26**
Accidental Fire: MNMs combustion

**ES9/ES17/ES21/ES25**
Demolition, end of life

**WORKER EXPOSURE TO:**

- TiO$_2$
- Cellulose Nanofibers
- Nanoclay
- SiO$_2$
- Unknown

**EXPOSURE SCENARIOS:**
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RMM - Toolkit

General Operation Mode

Customized Operation Mode

MODULE 1: CONSTRUCTION

Template and information source for company profiling

MODULE 2: COMPANY PROFILE

Profiler company: Advanced/Large company or SME

MODULE 3: RISK MANAGEMENT

Setup for companies with advanced level of safety management

MODULE 4: TOOLS

Nanosafety management for Advanced/Large companies

Individual applications, testing tools, training

END USER

END USER

Knowledge, information’s source and training

AENOR
tecnalia


GA: 280535
Six applications of MNMs in construction

1. Depollutant mortars
2. Self-compacting concretes
3. Stabilised, Bituminous road-surface
4. Self-cleaning external coatings
5. Fire-resistant panels and
6. Insulations

Five MNMs: TiO$_2$, SiO$_2$, Cellulose Nanofibres, Carbon Nanofibres and Nanoclays

Six steps of exposure scenarios
(integrating 26 individual exposure scenarios)

1. Manufacturing NMs
2. Manufacturing products containing MNMs,
3. Preparation, mixing, and application on site
4. Assembly and machining
5. Demolition and disposal
6. Accidental fires (Combustion of MNMs)
Demonstration activities: 5 Industrial Use Cases (WP6)

5 stages of the MNMs Life Cycle

1. Manufacturing NMs
   - TECNAN (ES)

2. Manufacturing CP containing NMs
   - ICECON (RO)

3 & 4. Preparation and use of CP containing NMs
   - Buildings: MOSTOSTAL (PL)
   - Civil Works: ACCIONA (ES)

5. End of life of CP containing NMs
   - ROSSAL (RO)
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2-way communication ➔ better Outcomes more impact

1. **Safer products** for construction: dispersions, formulations for fire-retardant panels, concretes, bituminous pavements, coatings, insulations.

2. **Library of guidelines**: strategies, methods and tools for risk prevention, risk assessment, risk protection and risk management

3. **Toolkit** (Databases, procedures, models, CBA, targeted tools for training, etc)

4. **New device for trapping NPs**

5. **Standardization**: CWA + new ISO item PPE

6. Proposal for a **European OHS strategy**

7. **Roadmap** for construction

- Identification of needs
- **Common visions**: Delphi workshops
- Reviewing
- **Joint dissemination**: editing, publications, events,...?
- ...

Expected Impact

1. European Construction Industry and Society:
   - Workers exposed
   - SMEs are more vulnerable to occupational risks

2. Market (products):
   - Safe Nanoproducts (e.g. Nanocomposites)
   - Safety Management systems (e.g. OHSAS 18001)
   - New safety services for market (e.g. OHS, certification)

3. European policies, regulations and standards:
   - New information to elaborate better regulations and new standards (OHS and Safety of products)
   - Supporting deployment of new Community Strategy on Health and Safety at work, Action Plan for Construction of the Lead Market Initiative (LMI), European policy on nanotechnology, H2020, etc.

4. Strategic Research Agendas (SRAs) of the European Technology Platforms (ETPC, ETPIS, NANOFUTURE).
Acknowledgement

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