Nanosafety: From research to implementation of risk management and Safe Innovation in the nanotechnology industry

Strategies, methods and tools for occupational nanosafety in construction: Results of the EU project Scaffold.

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Industry and Transport Division

Amsterdam, 2016-06-22
Innovative strategies, methods and tools for occupational risks management of manufactured nanomaterials in the construction industry

14.1 million operatives

6.5% of Europe’s total employment

28.7% of industrial employment

42.3 million workers

3 million enterprises

€1,211 billion total construction in 2014 (EU28)

95% are SMEs with fewer than 20 and 93% with fewer than 10 operatives

OHS performance: Close to one in four (23.1%) fatal accidents at work took place within the construction sector

Subcontracting: 45%
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Source: FIEC and EFBWW (2009)
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- “The **employer** shall have a **duty to ensure** the safety and health of workers **in every aspect related to the work**” (Directive 89/391/EEC).

- “The **employer** shall be **alert** to the need to adjust these measures to take account of **changing circumstances** and aim to improve existing situations” (Directive 89/391/EEC).

- “… **nanomaterials** are similar to normal chemicals / substances in that some may be toxic and some may not. Possible risks are related to specific nanomaterials and specific uses” **COM(2012) 572 final, Second Regulatory Review on Nanomaterials**
Companies and workers are using and handling MNMs and nano-products in construction.

Exposures are produced at different stages of the construction industry life cycle.

Legal uncertainty.

Proactive approach (98/24/EC):
- Prevention of risks
- Assessment of risks
- Specific protection and prevention measures
- Arrangements to deal with accidents, incidents and emergencies
- Information and training for workers
- Occupational exposure limit value
- Consultation and participation of workers
- Health surveillance

SCAFFOLD is an industry-oriented idea specifically focussed on providing practical, robust, easy-to-use and cost effective solutions to the European construction industry, regarding current uncertainties about occupational exposure to MNMs.
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<table>
<thead>
<tr>
<th>Category of exposure scenario</th>
<th>nano-TiO2 (NPs, de-pollutant &amp; self-cleaning coatings)</th>
<th>nano-SiO2 (NPs, self-compacting concrete)</th>
<th>nano-Clay (fire retardant panels)</th>
<th>Carbon nano-fibres (coating laminates)</th>
<th>nano-cellulose (insulations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.- MNM manufacturing</td>
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<td>2.- Manufacturing products containing MNMs</td>
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<td>3.- Application / assembling on-site</td>
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<td>4.- Machining</td>
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<tr>
<td>5.- Demolition</td>
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<tr>
<td>6.- Accidental fires</td>
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</table>

MNM vs NEP, Low concentrations MNMs, Indoor/Outdoor

Industrial Technologies 2016, Amsterdam 2016-06-22
The aim of the SCAFFOLD project is 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 construction.
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1. FOUR QUICK GUIDES:
   1. Risk Prevention Guide
   2. Risk Assessment Guide
   3. Risk Protection Guide
   4. Risk Management Guide

2. TOOLKIT (Integration)
   Library of solutions for Risk Management

3. SCAFFOLD HANDBOOK
   (Project knowledge, contributions from partners, IAB, stakeholders, US/Asia-Pacific)

4. STANDARDIZATION (TR)
   (CEN TC 352/WG 3/PG 5/Scaffold)
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<table>
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<tr>
<th>MODULE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1. Library</td>
<td>It provides a library with documentation for managing nano-risks in construction (RP, RA, RPo, RM)</td>
</tr>
<tr>
<td>2. Customization</td>
<td>It allows companies to customize the application to their processes, tasks, scenarios and size. It uses the Module 1 to facilitate data input and generate the company profile.</td>
</tr>
<tr>
<td>3. Risk Management</td>
<td>It enables the initial assessment, implementation and audit of RMM guided by a step-by-step dialog. This module deploys two different setups, depending on the company profile (Large company or SME).</td>
</tr>
<tr>
<td>4. Tools</td>
<td>It contains the toolbox for nanosafety management: Risk management (scored checklist for diagnostic, implementation or audit), Risk assessment (Qualitative and quantitative approaches), Planning, KPIs, Documents and templates.</td>
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<tr>
<td>5. Help</td>
<td>It gives access to miscellaneous options: file management, configuration, and help (User manuals).</td>
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</tbody>
</table>
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<table>
<thead>
<tr>
<th>IUC</th>
<th>Company</th>
<th>Country</th>
<th>Size</th>
<th>Exposure scenario</th>
<th>MNM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TECNAN</td>
<td>Spain</td>
<td>SME</td>
<td>Manufacturing nanomaterials : nano SiO₂, powder</td>
<td>SiO₂</td>
</tr>
</tbody>
</table>

**Benefits for the company**

- Increased knowledge
- Improvement of workers safety
- Internal document for safety of MNMs
- Technical data sheet (MNMs and NEPs)
- Web-site
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<tbody>
<tr>
<td>2</td>
<td>ICECON</td>
<td>Romania</td>
<td>Large</td>
<td>Manufacturing NEP: Fire resistant panels</td>
<td>Nanoclay</td>
</tr>
</tbody>
</table>

Benefits for the company

- Improvement of working conditions (new product/patent)
- Product data sheet
- Alignement with other MS
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<tr>
<td>3</td>
<td>MOSTOSTAL</td>
<td>Poland</td>
<td>Large</td>
<td>Use of NEP in building construction: Application of coatings with three methods:</td>
<td>SiO_2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>brush, roller and spray gun)</td>
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**Benefits for the company**

- Increased knowledge
- Safely use of materials (NEP)
- Consultancy on risk prevention and protection
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<td>4</td>
<td>ACCIONA</td>
<td>Spain</td>
<td>Large</td>
<td>Use of NEP in civil construction: Construction of a concrete slab</td>
<td>SiO₂</td>
</tr>
</tbody>
</table>

Benefits for the company

- Implementation of new specific activities for the management of nanorisks (OHSMS)
- Awareness of the MNMs/NEP and the associated risks
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<tr>
<td>5</td>
<td>ROSSAL</td>
<td>Romania</td>
<td>SME</td>
<td>End of life of NEP: Demolition of fire resistant panels</td>
<td>Nanoclay</td>
</tr>
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**Benefits for the company**

- “The perfect occasion to demonstrate the validity of the OHSMS in a new field”
- Expanding the OHSMS applicability (demolition of buildings containing MNMs)
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Scaffold

This project has received funding from the European Union’s Seventh Framework Programme for research, technological development and demonstration under Grant agreement no. 280135

Main Guides & Tools

Scaffold’s best practice guides:

- Risk preventor. April 2015.
- Risk management. April 2015.

Scaffold’s Toolkit for the Risk Management of manufactured nanomaterials (MNMs) in the construction sector:

- Toolkit (software): Link coming by 31/12/2015.
- Handbook: expected release on 31/12/2015.

Other Guidance

Risk Protection


Exposure register model for MNMs in the construction industry. June 2014

EN ISO 12100: 2010
EN ISO 14123-1:2015

"PLATFORM" TOOL FOR SAFE-BY-DESIGN OF PILOT PLANTS

SAFE PRODUCTION

- Buckypapers
- Prepegs
- Veils
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Thank you very much for your attention

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(http://www.scaffold.eu-vri.eu/)