



APPLICANT INFORMATION: Case Study overview

Brief description of the problem to be solved with the NewSkin services (500 words)

Explain the scenario in which the technology will be deployed with the associated challenge

Intumescent coatings are a simple and cost-efficient technology to protect steel structures from fire effects. Intumescent coatings exhibit poor durability due to its relatively hygroscopic composition and the reduced amounts of resins used in its formulation. To increase resistance, top-coats are used, however these topcoats provide limited protection to intumescent coatings. Two main challenges are to be addressed, increasing the barrier properties of top-coats, at the T⁹⁰ ranges I.C durability testing involves, and providing a suitable methodology to demonstrate I.C durability up to 25 years as current EAD methodology provides outcomes up to 10 years.

Introduce the product, item or process and the benefits NewSkin will bring.

- a) Nano-formulated coatings bring two key properties to I.C. On the one hand the barrier properties are maximized by formulating flat barrier particles for thin coating layers compared to standard coatings. On the other hand, the barrier properties of nano-formulated coatings are not depending on temperature, while polymeric coatings barrier properties are temperature depending. As the I.C testing is conducted at T up to 70 °C the use of nano-formulated coatings opens a new path to extend intumescent coatings durability.
- b) Currently there is not a standard to demonstrate 25 years durability for I.C. While EN 16623: 2015 testing methodologies claim to represent 25 years durability, The EAD 350402-001106 that adopts these testing methodology limits the durability to 10 years, although it is open to claim 25 years if the manufacturer provides information to the TAB in charge of the ETA. By applying the 25 years cycles proposed by NewSkin we aim to provide the TAB in charge of the ETA validations with the necessary complimentary information as well as monitoring protocols to demonstrate I.C durability up to 25 years.

Company presentation

Provide a pitch-type presentation of your company (main goals, markets, sectors, R&D efforts, etc.).

General company description including activity

The aim of ECCS is to promote the use of steelwork in the construction sector by the development of standards and promotional information. It also helps to influence decision makers through the management of working committees, publications, conferences, and by active representation on European and International Committees dealing with standardization, research and development and education.



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ECCS is also involved within European projects to always extend knowledge and research further about all possibilities offered by steel.

Please insert here at least three keywords which describe your company's sector.

Help us to quickly understand your role, interests and activities

Steel, Construction, Sustainability.

DESCRIPTION OF THE CASE STUDY: Excellence

Which is the problem your company needs to solve? Which is the objective you seek to achieve with the participation in this Open Call? How will your company benefit from these services? Which challenges will be addressed?

In this section it is important to describe the S.o.A and the technology we are proposing. In the case that a NewSkin technology is requested it is important to highlight the benefits related to the application of the technology. If an own technology is to be evaluated the maturity and novelty as well as the technology itself is to be described.

Here we refer to a case in which we are asking for an own technology to be evaluated in NewSkin.

S.o.A:

For cellulosic fires (reference scenarios for buildings), moderate FR values can be efficiently achieved by means of Intumescent Coatings. Two main technologies are used, water borne, and solvent borne systems. While water borne systems offer environmental and performance advantages its application is limited to interior use. For exterior application solvent borne less efficient systems are necessary. For both systems (and for other such as thermoset resins-based systems) durability is limited to 10 years.

Technology:

A novel graphene dispersion for its application in nano-formulated top-coats water borne system compatible with water borne intumescent systems for cellulosic fires. The system exhibits enhanced properties in terms of enhanced barrier properties that have been demonstrated after heating and salt spray exposure. Formulated on existing intumescent coating topcoats, the system exhibits also better barrier properties that are kept when tests are conducted at higher temperatures. Water vapor transmission has been demonstrated to increase in the 60-90% range depending on the nano-particles load. The stability of samples formulated is maintained once re-homogenized after a 3 months storage period.

Problem to be solved:

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The new range of nano-formulated topcoats will enable the use of water-based system in exterior conditions. In addition, we aim to capitalize the knowledge generated by NewSkin in order to test the intumescent coatings system according to the 25 years durability. Results will be presented TAB and in combination with the proposed monitoring methodology to ETA TAB we expect to meet the for the 25 years durability claim, thus extending the service life of intumescent systems from to 25 years.

Moreover, nano-safety evaluation of the system spraying is demanded to ensure the safe use of the novel technology.

The following Sustainable Development Goals will be addressed:

- 11. Sustainable Cities and Communities: improving cities' waste management, air quality, urban planning, and infrastructure to reduce their adverse environmental impact, and improve their resilience to disasters.
- 13. Climate Action: reduce greenhouse gas emissions (mitigation efforts).

DESCRIPTION OF THE CASE STUDY: Implementation

Which NewSkin service do you think will help you technically solve this problem and how? (Please, refer to [the services of the catalogue](#)).

Work Plan:

ECCS produced formulations will be delivered to NewSkin for its nano-safe application and evaluation on intumescent coating systems consisting of primers and intumescent systems.

ECCS will provide the samples (10 liters) and coated specimens for durability testing of intumescent coatings.

The following services are requested:

- Nano-safety evaluation of the spraying operation of the novel formulation (3 levels of nanoparticles)
- Evaluation of the durability of the novel nano-formulated topcoat on the defined intumescent systems up to 25 years. 3 different levels of nano-formulated systems.
- Access to rights on monitoring of intumescent coatings behavior methodology.
- Technology introduction across the supply Chain.
- Corporate funding services.

Own resources:

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ECCS will invest 1000 € as raw materials and delivers while will allocated 1 M/M distributed between a technician and the R&D Manager during the 6 months execution (5000 €). The overall in-kind costs are about 6000 €.

Contingency Plan:

R1: In case that nano-safety issues are identified during spraying, then the alternative application techniques as brushing, PPE or controlled on-site application will be considered.

R2: Should the system fail to meet exterior conditions due to the lower resistance of water-based systems, the scope will be limited to interior conditions and exterior conditions will be addressed in the future on a solvent based system.

DESCRIPTION OF THE CASE STUDY: Impact

Provide the product features as well as impacts (environmental, social and economic). Include a market estimation and the forecasted penetration or market creation by the novel product or services.

Increasing intumescent coatings service life enabling the use of water borne system in exterior conditions for up to 25 year will bring on the one hand a significant reduction on costs. Fire resistance cost may account up to a 15% of total structural costs in an LCA approach reducing the number of maintenance operation to 1 in the overall service life of buildings. 50% savings (7% overall cost reduction of LCA basis)

CO2 savings are due to the reduced by reducing the number of maintenance operations to 1 and the avoidance of the use of solvents, net V.o.C generators with CO2 equivalents for 50 to 100 per Kg of V.O.C. Up to 50 kg of CO2 per ton steel CO2 footprint reduction is expected.

The use of water-based systems has also an important impact of the workers safety that are not exposed to V.O.C's as well as reducing the fire risks associated to solvent storage and handling.

From a commercial point of view, nano-formulated coatings represent the first commercial impact for ECCS with a forecasted annual revenue of 5M€/yr after 5 years of first sales.

The company forecast is to extend the technology to WB corrosion protective systems and other WB and SB applications in harsh environments to a total 30 M€/yr in 10 years.



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