PROJECT FINAL REPORT

Final Publishable Summary Report

Grant Agreement number: 262453-1

Project acronym: ABSORBNET

Project title: ***New concept and technology for high energy rock fall protection fences***

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Date of latest version of Annex I against which the assessment will be made:

Periodic report: 1st ☐ 2nd X☐ 3rd ☐ 4th ☐

Period covered: from **October 2011** to **December 2012 (2nd Period)**

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the grant agreement

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm ; logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

Declaration by the scientific representative of the project coordinator[1]

I, as scientific representative of the coordinator1 of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate):

  ☐ has fully achieved its objectives and technical goals for the period;

  X has achieved most of its objectives and technical goals for the period with relatively minor deviations[3];

  ☐ has failed to achieve critical objectives and/or is not at all on schedule[4].

- The public website is up to date, if applicable.
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator1:

Date:

Signature of scientific representative of the Coordinator1:

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3 If either of these boxes is ticked, the report should reflect these and any remedial actions taken.

4 If either of these boxes is ticked, the report should reflect these and any remedial actions taken.

Table of Contents

1. Executive Summary 4
2. Summary description of project context and objectives 7
3. Description of main S & T results/foregrounds 9
4 Potential impact and main dissemination activities and exploitation results 16
5. Address of project public website and relevant contact details 17
   5.1. Consortium Members 17
   5.2. Project Contact and Logo 17

1. Executive Summary

ABSORBNET project aims at fabricating a rock fall protection net to be used as basis of a kit that meets the requirements of ETAG 27 (European Technical Agreement Guidelines). A document that defines the technical performances that rock fall protection kits should satisfy including the relevant characteristics for the net and the set up for a verification and assessment method.

Compared with other rock fall protection standards, ETAG 27 imposes the kits to support two service launches. The net product should absorb energies up to class 8 (MEL>4500kJ) in a temperature range between -40 and +50°C.

The function of the protection kit is to absorb the energy of the rock and this is currently done in three steps by the three major components of the system:

1. The **net** intercepts the rock. Its function is to transmit almost 100% of the energy to the brakes.
2. The **brakes** (energy dissipating devices). Their function is to absorb energy (by plastic deformation or friction) to minimize the strain transmitted to the anchorages.
3. The **anchorages** (foundations) transmit the remaining energy to the ground and hold the system.

All the systems on the market today are based on this process which has got two major disadvantages:

- The net transmit correctly the whole energy to the brakes but in a short time, so the strain to be supported (by the brakes and the anchorages) is high.
- The design of majority of nets has not been modified for the last 50 years. The design used today by the big majority of competitors is the one of anti-submarine (ASM) nets used during the 2nd world war.

In ABSORBNET we seek to overcome these two disadvantages and meet the ETAG27 requirements by creating a net with absorbing properties. The absorbing net will be an inorganic reinforced polymeric composite having the dual characteristics of being an energy absorbing material which will deform to dissipate part of the rock energy and a strength material that will transmit the non-absorbed energy to ensure the net integrity and solidity. The net will be designed to maximise the absorbing capability. As a consequence, the strain which will be transmitted to the brakes will be lower (than current products) and spread over the time. That will in turn increase the global performance of the system; minimize the number of anchorages needed and so installation costs. To create this solution, it is necessary to develop new technology in composite materials and dynamical mechanics testing.

The most remarkable results achieved can be listed as follows:

- A finite element (FE) simulation methodology for the analysis of the high performance materials and net innovative designs has been developed. The methodology is applied to a net design demonstrator in order to check robustness and find necessities and problems.
- Fibers of the most appropriate materials have been obtained by two processing methods: e-spinning and gel-spinning from new designed materials based on

composites from UHMWPE and nanoclays for re-enforcement and the mechanical properties of the corresponding yarns evaluated.

- All the nanofibres produced with the electrospinning process both with the rotating disk or the charged rod as collecting system showed to be aligned within the yarn. Regarding the process for the continuous production of fibers, the electrospinning process is the one that presents some limitations. However, several common electrospinnable polymers (PCL, PAN, PVB, PVP, PS) have been tested using different proposed continuous collecting systems. Although not valid to meet ABSORBNET requirements, very promising results were obtained by electrospinning of synthesized: polyamides (PA-1, PA-2, PA-2', PA-3, PA-3', PA-4), polyamic acids (PAA-1, PAA-2) and an aromatic polyimide (PI-2).
- The most outstanding effect on the enhancement on the mechanical properties of composites prepared by addition of nanofillers to the polymer matrix is observed for the yarns processed by gel-spinning from APE-27 and APE-35.

Indeed all of the following composite materials: APE-15, APE-34, APE-19U, APE-21 presented enhance mechanical properties when compare to reference APE-12 (UHMWPE=Dyneema)

- The mechanical properties of the synthesized fibres and yarns have been evaluated and the stress-strength curves were used in the simulation model to help on the validation of the theoretical model.

According to the results on FEM simulations, a possible reduction on the hole-border diameter would be possible with the used of this new materials based in UHMWPE.

- To protect the high performance fibers against UV radiation, several polymeric coatings have been identified in this first part of the project: silicones, polyurethanes, acrylic and fluoropolymers (PVF). Coated fibers were tested in order to evaluate the influence of weathering conditions.

The advantages of all of them, is that they can be formulated as waterborne coating satisfying VOC legislations. Several commercially available coatings based on these resins have been already identified. The application method has also been identified according to Alterfil facilities.

- A prototype of ABSORBNET has been developed. A net has been weaved and manufactured in order to be adapted to the support structure and perform the validation tests.
- It was found not possible, in practical terms, to produce enough quantities of the HPM materials synthesized in the project at the laboratory scale (i.e.: APE35) to build a full-scale net prototype (10x5m – 50m2) within the schedule of the project. Therefore, it has been decided to build the prototype of the net with commercial HPM material: Dyneema.
- Furthermore, it has been demonstrated according to the obtained FE simulation results that, with a given configuration of HPM e-fibre and weaving, ETAG27 requirements are fulfilled: 5MJ impacting energy, 50% of which absorbed by the APE35 net itself.
- Therefore, according to FE simulation results, it is feasible to use the new e fibres (APE35) as new HPM for, in the future, build a net able to stop the rock at MEL energy level under the previously commented requirements.
- Three additional handmade net prototypes have been proposed: Knot net, Splice net and Ring net.
- The candidate that was proposed for the final ABSORBNET full scale prototype is the Splice net. This prototype is not the most energy absorbing one, but the most feasible in terms of patentability and for the time available in the project.
- A full scale test was performed on the Splice net (6m x 3m) specimen and afterwards from the results obtained, the Finite Element (FE) analysis of the experimental full scale test was carried out.

- Results comparison showed good agreement in quantitative and qualitative terms at both levels, numerical predictions and experimental measurements.
- It has been achieved a successful numerical-experimental validation of the results from FE simulations used to predict energy absorption performance of the new HPM fibers and to provide recommendations to weaving design of the net itself.
- Regarding fulfillment of both, the ETAG27 requirement (5MJ absorbed by the barrier) and the ABSORBNET objectives (2.5MJ of which absorbed by the polymeric net itself, on the basis of using HPM materials and innovative weaving designs), it has been already reported in technical deliverables that the best Dyneema weaving design able to theoretically fulfill those requirements and objectives is the net configuration labeled "orientation 45º square-shaped net" with hole border (HB) braided rope diameter of 20mm.

2. Summary description of project context and objectives

ABSORBNET project aims at fabricating a rock fall protection net to be used as basis of a kit that meets the requirements of ETAG 27 (European Technical Agreement Guidelines).

The ETAG27 has been endorsed in January 2008 by EOTA. This document defines the technical performances a rock fall protection kit has to meet to get (CE) marking on the product. The rock fall protection market is growing rapidly (+17% p.a.) due to the new consciousness of safety, not only for existing infrastructures, but also for future ones for whom safety is considered at conception stage. ETAG27 will be fully applied from 2014. At this time only certified rock fall protection kit will be authorised to be retailed. ETAG27 raises a technical issue in the case of high energy rocks. Only two models for low energy rock fall protection were approved by EATO in November 2009 such a time gap proofs the technical challenge issued by ETAG27.

Compared with other rock fall protection standards, ETAG 27 imposes the kits to support two service launches. The net product should absorb energies up to class 8 (MEL>4500kJ) in a temperature range between -40 and +50°C.

Energy level classification	0	1	2	3	4	5	6	7	8
SEL	-	85	170	330	500	660	1000	1500	>1500
MEL≥	100	250	500	1000	1500	2000	3000	4500	>4500

Energy level classification depending on SEL or MEL values.
SEL: Service Energy Limit, MEL: Maximum Energy Limit

This difference is fundamental and it is the reason why at the beginning of the project, no product on the market met ETAG27 requirements in the case of high energy rock fall. Only three companies (Isofer, Geobrugg and Stahlton-AVT) provide protection kits approved by the Swiss norm which was the most rigorous after ETAG 27.

Current high energy protection barriers come from the Second World War anti submarines nets design and need efficient braking devices with huge supporting structures and foundations to fulfil standards like ETAG. The elaboration of a protection system which meets the ETAG27 requirements for high energy level will allow the protection of new areas but also the replacement of obsolete protection kits already installed, especially if this system is able to better dissipate and diffuse impact.

The function of the protection kit is to absorb the energy of the rock and this is currently done in three steps where the net catches the rock and this net, transmit most of the energy to the brakes, which absorb energy to minimize the strain transmitted to the anchorages.

All the systems on the market today are based on this process which has got two major disadvantages: The net transmit correctly the whole energy to the brakes but in a short time, so the strain to be supported (by the brakes and the anchorages) is high. Also, the design of majority of nets is obsolete and has not been modified for the last 50 years.

Our proposed solution was aimed to clear these two disadvantages and meet the ETAG27 requirements by creating a net with absorbing properties. The absorbing net will be a inorganic reinforced polymeric composite having the dual characteristics of being an energy absorbing material which will deform to dissipate part of the rock energy and a strength material that will transmit the non-absorbed energy to ensure the net integrity and solidity. The net will be designed to maximise the absorbing capability. As a consequence, the strain which will be transmitted to the brakes will be lower (than current products) and spread over the time. That will in turn increase the global performance of the system, minimize the number of anchorages needed and so installation costs. To create this solution, it is necessary to develop new technology in composite materials and dynamical mechanics testing.

The objective of ABSORBNET net was not only to meet ETAG27 requirement but also to minimise the remaining stress on anchorages below a level that allow installation of rock fall protection kit in every ground type and/or for higher energy impact.

The project concept is to develop new knowledge, an integrated solution and technology development that will enable to secure efficiently areas from high energy rock threats. The safety of roads, high ways, railways, beaches, hotels, etc will be guaranteed by a European standard. Moreover the load on anchorages will be limited which will enable to build protection barriers everywhere needed.

The overall objective is to develop an energy absorbing net that does represent an improvement of the existing systems in terms of materials and set-up. This radical improvement will be achieved by implementing novel techniques, all aimed at increasing the performance of the system. To enable this innovative technology, new knowledge must be acquired concerning the following points:

- Identifying the most adequate material to absorb energy and slow down force propagation in the appropriated condition (temperature range -40 +50 ˚C, speed 25 m/s, energy above 4500 kJ).

- Replace the actual material (steel) which gives strength by an electro-spun material both lighter, more cost-effective and easier to process.

- Selecting, developing and validating the **best system** / set-up to include the absorbing materials in the panel.

- Selecting, developing and validating the **best weaving** (2D, 3D, ring, Lacrosse, etc) for the net using dynamical mechanics simulation, lab scale tests and finally full scale testing.

The aforementioned points represent our scientific objectives. The specific scientific and technical objectives of our work, which need to be met to allow the project aim, are:

- To halve widen the peak of strain versus time curve measured on the anchorages.
- To keep strain applied on anchorages below 200 kN.
- To produce a rock fall system in which we have a high degree of confidence and that will meet ETAG27 requirements for class 8 products (MEL≥ 4500 kJ).

3. Description of main S & T results/foregrounds

The actual developments obtained for each result after the execution of the ABSORBNET project have been:

<u>Result 1</u>: new materials and process for the manufacture of oriented high performance fibres. According to Deliverables 2.4 and 2.5, the best obtained results were:

- <u>APE-27 fiber</u> (5wt% chemically modified carbon nanotubes, 95wt% commercial GUR Hostalen ® Ultra High Molecular Weight Poly Ethylene, Mn=2-3 milions g/mol and with a powder grain size of 150 µm) by gel-spinning. Carbon nanotubes were Nanocyl NC7000 (Nanocyl®) with a diameter of 9.5nm and a length of 1.5 µm. In order to favour the interaction between the polymer and the fillers, carbon nanotubes were chemically modified: treated with acid (HNO_3 and H_2SO_4) and functionalized with a titanium complex (Tyzor®, Du Pont).
- <u>APE-35 fiber</u> (1wt% graphene platelets, 99wt% GUR ®) by gel-spinning. The used graphene was the xGnP® graphene nanoplatelets Grade M (XG Sciences) with a diameter of 5 µm, a thickness of 6-8nm and a surface area of 120-150m^2/g. The draw ratio (DR) was >7.

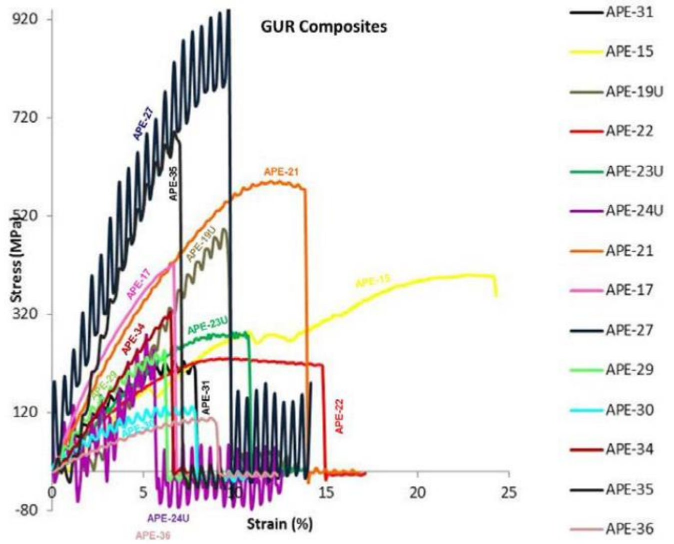

Figure 1. Stress-strain curves for the synthesized wet-spun and gel-spun fibres

As Figure 1 shows, APE-27 and APE-35 have the best strain curves which mean that the beneficial effect of the fillers (carbon nanotubes and graphene) on the tensile modulus and tensile strength on the UHMWPE composites is the highest. Moreover, Table 1 shows a summary of the fiber properties that hints the better performance of APE-27. It’s also interesting to mention that the draw ratio (DR) of APE-35 was >7 because gel-spinning was done by an automatic machine, while the DR for APE-27 was probably lower since the gel-spinning and drawing process was semi-manual. The higher the draw ration (pulling the fiber as it is spun in order to align the polymer chains), the higher the orientation of the chains and therefore the better the properties. Thus, APE-27 seems even better than APE-35 given that its DR is even lower.

Table 1. Mechanical properties of selected fibers

Fiber	E (MPa)	Tensile Strength (MPa)	Elongation at break (%)
APE-35	9.562,0	666,25	6,99
APE-27	11.656,60	878,79	7,54

- PA-1 fiber (self-synthesized by ITAV poly-*m*-phenylene-4,4'-oxydiphenyl amide; an aramid with the carbonyl groups in meta-orientation and the diamine with an oxo bridge, as Figure 2 shows), obtained by electro-spinning under the following conditions: 13wt% in DMAc ($CaCl_2$) Flow: 0.1ml/h V: +3KV -15KV.

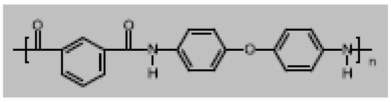

Figure 2. PA-1 chemical structure

- PI-2 fiber (self-synthesized by ITAV poly-p-phenylene biphenyl tetracarboximide, a polyimide with benzidine as shown in Figure 3). It's a polyimide obtained from pyrolysis (400°C) of electrospun PAA-2 (poly-p-phenylene biphenyl tetracarboxylic acid, a polyamic acid with benzidine) in conditions 11wt% in DMAc Flow: 0.1ml/h V: +3KV -15KV.

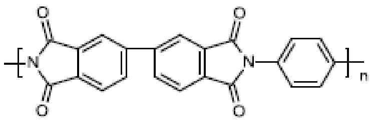

Figure 3. PI-2 chemical structure

As Figure 4 shows, PA-1 (red line) has the largest area under the curve, which proves that this fiber has the best mechanical properties among all self-synthesized materials. However, the stress at break is very low in comparison with APE fibers because the processing method was electrospinning and not gel-spinning. The impact of the processing method on the properties of the final fiber is very significant.

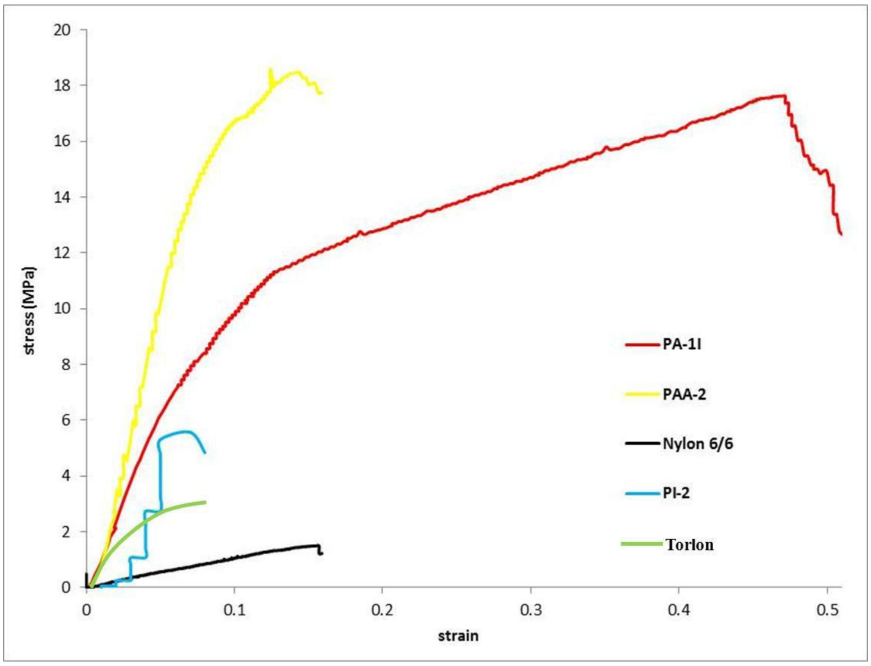

Figure 4. Stress-strain curves of the synthesized electrospun yarns using the rotating disk as collecting system.

<u>Result 2</u>: threading process to get an optimum yarn and external protective coating.

<u>Regarding the threading process</u>, the project expanded the results from simple threading to a whole rope configuration.

- <u>Double 12-strand braided rope</u>

Result 2 expected to develop a manner to process and set-up material (from Result 1) to optimise energy compression as well as providing protective housing to ensure end product resistance to field based operative conditions. Therefore this consortium has not only developed a yarn made of filaments, but a whole rope made of strands, which are in turn made of yarns.

Experimental results in Deliverable 3.2 Weaving Modelling Report pointed out that braided ropes have higher mechanical performance than twisted ropes. A lot of rope designs exist but, between these different types of weaving, it was concluded that the 12-strand rope configuration is the best in term of capability to absorb energy in the rope design, torque balance, flexibility and also because it is easy to splice into a net and so to fix the ends.

Therefore, the best threading process developed was a double 12-strand braided configuration rope (bottom picture of Figure 5) using Dyneema SK78 (equivalent to APE-35 or APE-27 materials) of 1760 dtex. From the simulation of FE-model no significant differences in term of energy absorption capacity have been found between a net made by braided rope with a diameter of 16 mm or 20 mm.

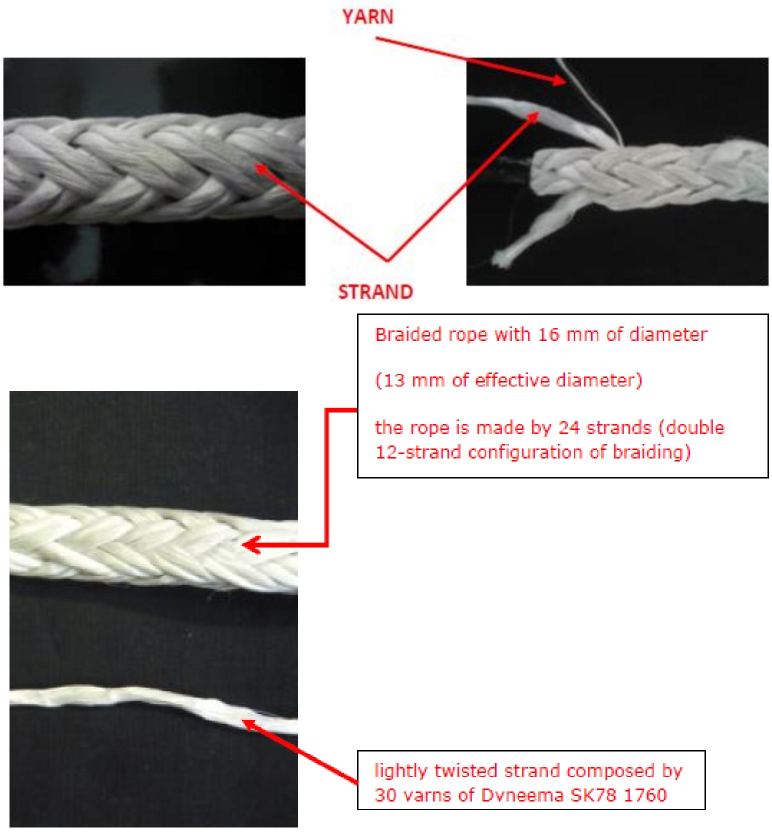

Figure 5. Rope configuration used in ABSORBNET.

Each double 12-strand rope is made of 24 strands, divided in 12 pairs of double strands (two parallel strands) as shown in the top left picture of Figure 5. In turn, each strand is made of 30 twisted yarns (bottom picture of Figure 5). Each yarn has a

Regarding the coating for fibers, the best obtained results were:

- 6A polyfluoroethylene vinyl ether coating (45.4% Lumiflon 4400® + 5.3% Bayhydur 305® + 2% DMM + 47.3% H_2O).
- 6B polyfluoroethylene vinyl ether coating (23.5% Lumiflon 4400® + 2.7% Bayhydur 305® + 1% DMM + 72.8% H_2O).

The weatherability of Dyneema® SK75 yarns coated with Lumiflon® (AGC Chemicals Europe) water-based coating was the highest. Results in Deliverable 3.1 (Yarn Protective Coating Solutions) show that the formulated coatings with a higher content on water are better homogeneously dispersed through all the fibres that compose the yarn and therefore the mechanical properties are similar to the uncoated Dyneema® SK75 yarn. Best performance regarding ageing stability is reached with the coatings with the higher content on water (approx. 70wt%) and a longer curing time (4 hours), corresponding to 6A and 6B. SEM analysis confirm the homogeneously deposition of the Lumiflon® coating with a thickness of 8µm.

In comparison with the uncoated yarns, it is concluded that the coating Lumiflon® based fluoropolymer can improve the ageing of the yarns. Using these coatings the stiffness (tensile modulus) and elongation at break are more or less maintained after all the different ageing test (heat, weathering, effect of light and environmental).

The weatherability of Dyneema® SK75 yarns coated with Lumiflon® (AGC Chemicals Europe) water-based coating was the highest among all coatings tested. However, the strength (tensile strength) is slightly decreased with the weathering test; 45% and 33% in the case of 6A and 6B coatings, respectively. It seems that neither heat nor UV light affect the mechanical properties of these samples, however the spraying of water each 30 minutes during 14 days in the presence of UV radiation (weathering test) diminish the strength of the samples. In this sense, the coating cannot assure the complete stability of the yarns under a weathering ageing test.

Result 3. Net weaving pattern and design optimised for the project. The best weaving nets resulted to be (Deliverable 3.2 Weaving Modelling Report):

- Splice net. Although it's the second best net (Figure 6 shows that the ring net has higher values of energy absorption due to an increase in breaking load and elongation at break) the partnership chose the hand-made Splice Net because it presents the best compromise between the mechanical performance and innovative design.

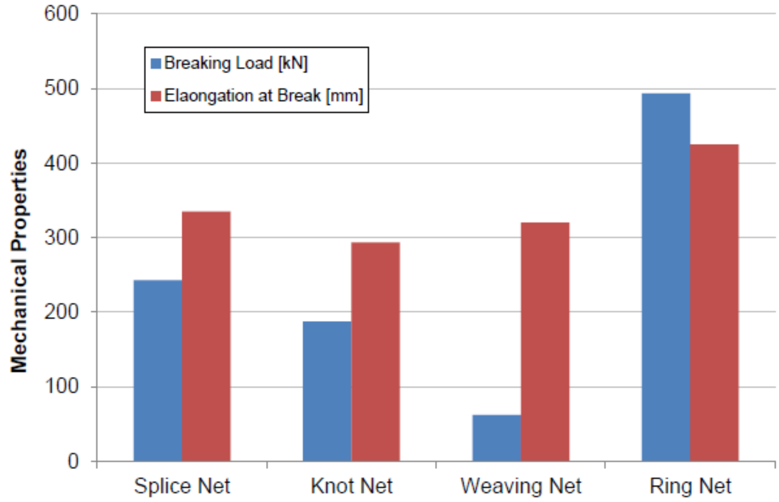

Figure 6. Mechanical properties (Breaking Load and Elongation at Break) for the 4 configurations net measured

The configuration of the ring net is described in Table 2.

Table 2. Structural and geometrical parameters of proposed nets structural and geometrical parameters of proposed nets

Parameters	KNOT	SPLICE	RING (Double configuration)
			
Rope diameter	16 mm	16 mm	10 mm
Net dimension	1 m x 1 m	1 m x 1 m	1 m x 1 m
Mesh size[a]	130 ± 20 mm	130 ± 20 mm	130 ± 20 mm
Rope material	Dyneema SK78	Dyneema SK78	Dyneema SK78
braiding parameters	Yarn: 1760 dtex 30 yarns per strand; Light twisted strand; 24 braided strands per rope; Braiding angle: 25° Pitch length: 135 mm Effective diameter 13 mm	Yarn: 1760 dtex 30 yarns per strand; Light twisted strand; 24 braided strands per rope; Braiding angle: 25° Pitch length: 135 mm Effective diameter 13 mm	Yarn: 1760 dtex 25 yarns per strand; Light twisted strand; 12 braided strands per rope; Braiding angle: 40° Pitch length: 65 mm Effective diameter 8.4 mm

[a] the mesh size is the internal dimension of mesh neglecting the thickness of rope and the size of junctions.

In Deliverable 3.3 Weaving recommendations it is stated that the partnership chose the Splice Net that presents the best compromise between the mechanical performance and innovative design. The Splice was implemented due to conserve the mechanical properties of the basic element of the net: the rope. Without a knot, or another configuration of junction, that can reduce the mechanical performance of rope, the Splice Net shows a high strength and high capacity to absorb the impact energy. Furthermore the Splice Net extrapolates the concept of the splice to create the junction of the net. For this reason the Splice Net has a new and very innovative design.

The braiding parameter of the braided rope, used to produce this configuration of net, is reported in the Table 2.The production process is a handmade process no so simple as might seem. The junction is realized in the following steps:

1. An end of a rope has to cross in a specific point (entry point) of the rope (Figure 7a);
2. The same rope end has to be inserted inside the rope at a strand-crossing from entry point (Figure 7b);
3. The internal rope has to be inserted for a distance of at least 4 strand-crossings (Figure 7c);
4. The internal rope has to exit from the external rope at a point opposite to that of entry (Figure 7d)

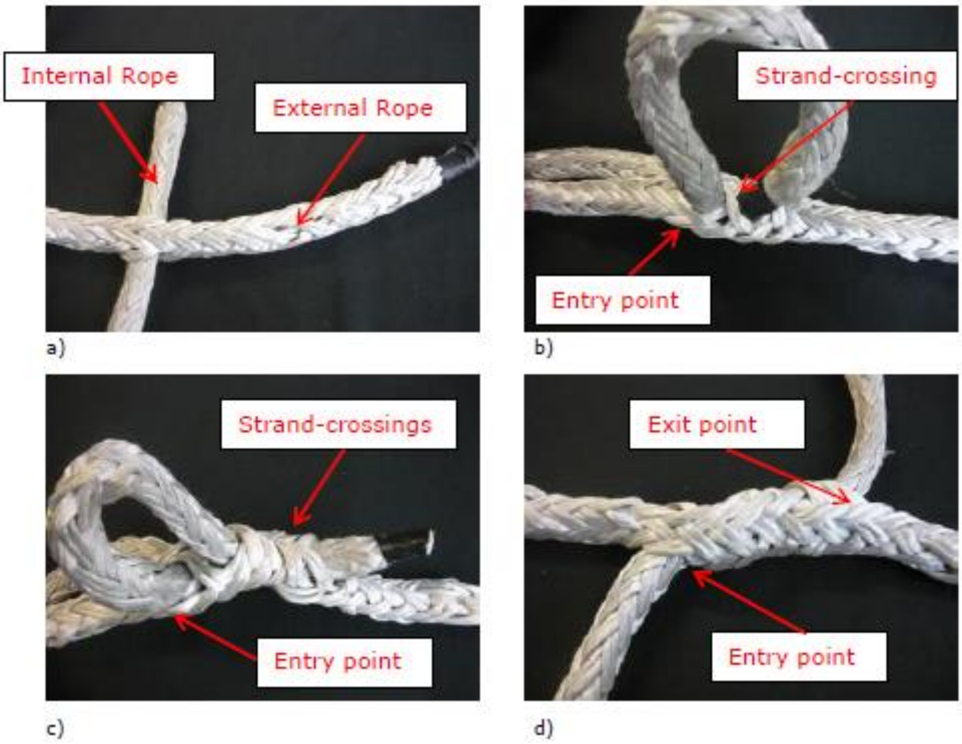

Figure 7 steps of the production of a junction for the Splice configuration of net

- <u>Square shaped mesh oriented by 45° as best weaving design</u>: the best net design of the splice net is a square shaped mesh oriented by 45° (Figure 8). This configuration allows a absorption of 100% of 2.5 MJ with a reduction in 2,5% of rope length needed. This configuration allows to pass the MEL test. In this square shape oriented 45º, load distribution is diagonal according to the HB ropes 45 degrees orientation. Load is transmitted through the external HB rope to the fixed sides. External HB ropes need an increased diameter due to high load transmission, this diameter has to be around 115 mm.

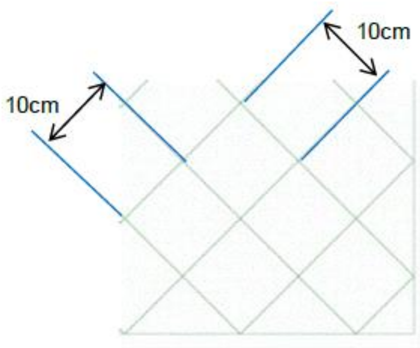

Figure 8 Zoom of 45º Squared Net

4 Potential impact and main dissemination activities and exploitation results.

The three results in the DOW are consistent with the repartition of the patents agreed by the consortium and owned collectively by all SMEs according Deliverable 6.8 (Preliminary plan for patents application in the view of exploitation agreements between partners, issued by month 9) which is the following:

Result 1 – Esfil-55%, Alterfil-15%, T.A.S-15%, Engineerisk-15%
Result 2 – Alterfil-55%, Esfil-15%, T.A.S-15%, Engineerisk-15%
Result 3 – T.A.S-55%, Esfil-15%, Alterfil-15%, Engineerisk-15%

In deliverable 6.8, a preliminary agreement was presented. As this plan is not totally completed, a detailed agreement between SMEs on the IPR management will be prepared and subscribed before the 5th of April 2013. The aim of this agreement is to protect the rights of SME partners that have been participated in this consortium, and will be based mainly on the pre-agreement done in deliverable 6.8.

The agreement will detail the following points:
• The cost of patents: initial costs and annual fees
• how will be the global management of them: in which countries and how it will be decided
• how to sell a share
• etc.

If any agreement cannot be reach between partners before the 5th of April, the project manager and the technical manager will manage it for the entire consortium.

Some dissemination activities took place during the project period:

- Start up and up-dating of the web page of the project: http://absorbnet.groupemnd.com/

Due to the novelty of the project, participation on conferences and presentation of the results as scientific papers or brochures/flyers has not been considered and it was preferred to keep results secret till the very end of the project.

5. Address of project public website and relevant contact details

5.1. Consortium Members

PARTNER	SHORT NAME	COUNTRY
Technologie Alpine de Securité	TAS	FRANCE
AKTSIASELTS Esfil Tehno	ESFIL	ESTONIA
Alterfil Nähfaden GmbH	ALTERFIL	GERMANY
Engineerisk	Engineerisk	FRANCE
Inspiralia Tecnologias Avanzadas	ITAV	SPAIN
Instituto Tecnológico de Aragón	ITA	SPAIN
Centro Tessile Cotoniero e Abbigliamento	CENTROCOT	ITALY

5.2. Project Contact and Logo

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