

LIFE RESKIBOOT

MID-TERM SECTORIAL TECHNICAL WORKSHOP

Production process optimization and
component manufacturing with secondary raw
materials

DALBELLO



TIMING

TIMETABLE

Action		2020				2021				2022				2023				2024			
Action number	Name of the action	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
A. Preparatory actions (if needed)																					
B. Implementation actions (obligatory)																					
B.1	Recovery of post-consumer ski boots and sorting to turn them into secondary raw materials that will be characterized in comparison to virgin ones			■	■	■	■	■	■	■											
B.2	Design for recycling					■	■	■	■	■	■										
B.3	Production process optimization and component manufacturing with secondary raw materials					■	■	■	■	■	■										
B.4	Ski boot assembly, characterization and testing											■	■	■	■	■	■				
B.5	Replication and business planning												■	■	■	■	■	■			
C. Monitoring of the impact of the project actions (obligatory)																					
C.1	Evaluation and monitoring of environmental and circularity impacts and benefits			■	■	■	■	■	■	■	■	■	■	■	■	■	■				
C.2	Monitoring using Life Programme Webtool			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
D. Public awareness and dissemination of results (obligatory)																					
D.1	Dissemination and Communication			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
E. Project management (obligatory)																					
E.1	Project Management			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		



KEY RESULTS

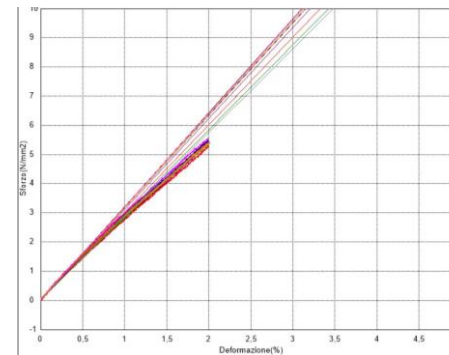
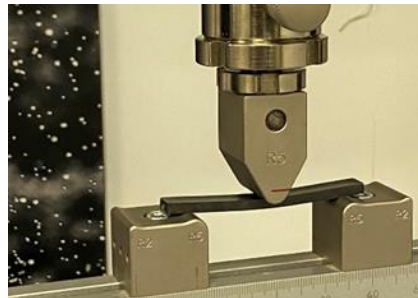
Main results	Completion
Lab test on recycled materials for external parts	100%
Installation of rebonding machine	100%
Liner and external sample parts production	100%
Lab test on components for liners and external parts	100%
Liner and external parts production	On-going



ACTIVITY - WORK DONE

Lab test on recycled materials for external parts

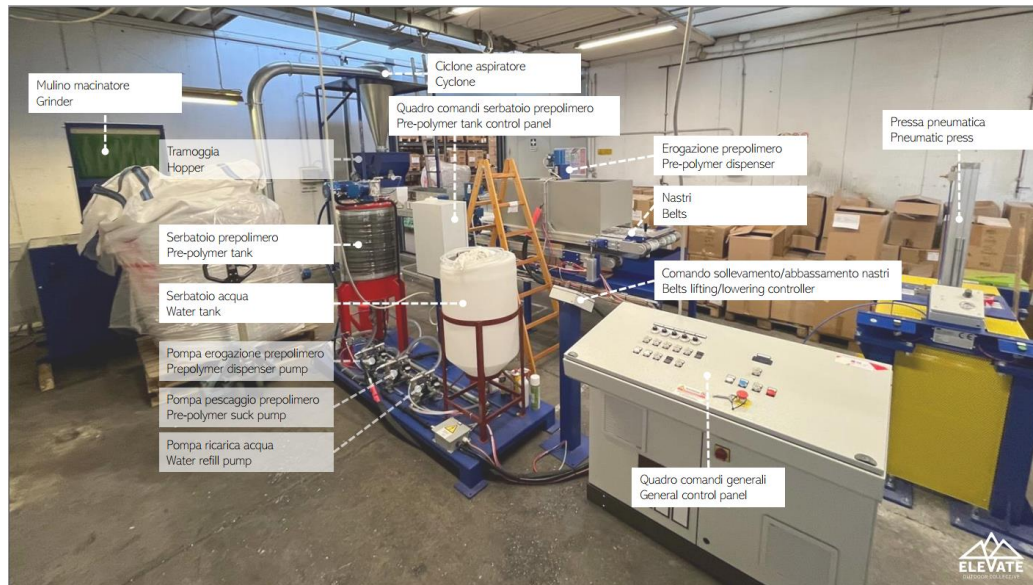
- Plastic specimens were injected to characterize the recycled plastic material and evaluate its suitability with the ski boot applications
- The tests performed are the standard tests to evaluate the plastic materials



ACTIVITY - WORK DONE

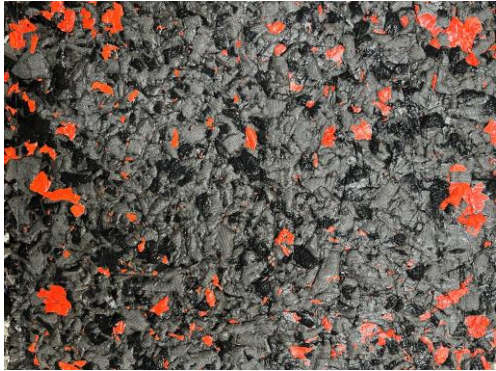
Installation and production of rebonding machine

- A rebonding machine has been installed and is working to produce the parts for the liners.
- The rebonding machine allows to create a material called agglomerato from soft plastic scraps. The machine uses water and prepolymer to pack together the soft material.
- The output is a block that can be cut in layers and used for liners paddings.



ACTIVITY - WORK DONE

Installation and production of rebonding machine

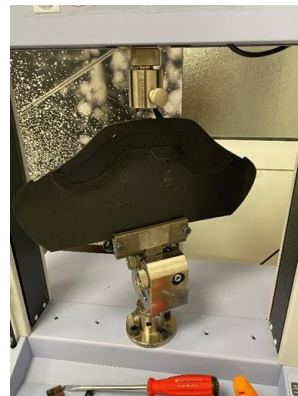
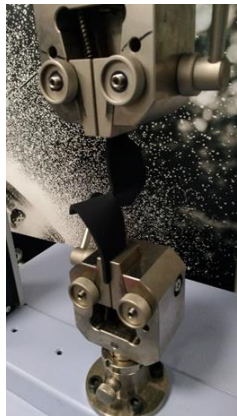


ACTIVITY - WORK DONE

Lab test on materials for liners

The recycled materials used in the liner have been subjected to the following tests:

- **Tear strength test:** useful to determine if a material is strong enough to be processed and to resist for all the life of the product
- **Delamination test:** very important to determine if the adhesion between the layers is good enough
- **Traction/pulling test:** used to test stitching resistance.
- **Martindale tests:** it's use to determine the abrasion resistance of the textiles.
- **Static-column tests:** gives information on the water-proofness of the materials.








RAFFORDO DI PROVA N. **4134509** data: 14/11/2022

CLIENTE: **CabaRaffica D'ALIBELLO SRL**
 via Fontanarigo, 12
 33030 Casello D'Acis
 Udine

ALL'ATTENZIONE DI: **Fabio Zorzi**

CAMMINAMENTO: **da parte del cliente**

RICEVIMENTO CAMPIONE: **07/11/2022**

TEST ESIGURE: **01-1411/2022**

MATERIALE: **Campioni di magline, denominati "P" e "V".**

RICHIESTA: **Prove per la determinazione della resistenza a:**
 - penetrazione di acqua (EN ISO 811:2018);
 - trazione con prelievo (Riv. o ISO 502:02) o a secco senza cortina interna (EN ISO 1247-2:2014), come richiesto dal cliente.

ESITO: PASS

Tutti i valori di riferimento e di tolleranza sono espressi in percentuali di tolleranza.
 Il presente rapporto è valido per il periodo di validità indicato in calce.
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PARTE	DESCRIZIONE NUOVI MATERIALI	Tear strength	Delamination	Traction pulling	Martindale	Static-column test
TORNAIA	ART. 3160 COL. 90 SPACE SHELL WVR TECHNO RECYCLED M4.4	✓	✓		✓	✓
BORDO COLLARINO	ART. 3160 COL. 90 SPACE SHELL WVR TECHNO RECYCLED M4.4	✓	✓		✓	✓
BORDO LINGUA	ART. 3160 COL. 90 SPACE SHELL WVR TECHNO RECYCLED M4.4	✓	✓		✓	✓
RSBOTTITURA COLLARINO	AGGLOMERATO 100120 ADESIVO (hooking assembly see material)	✓				
RSBOTTITURA CAVIGLIE	AGGLOMERATO 10040 ADESIVO (hooking assembly see material)	✓				
RSBOTTITURA MANICELLO	AGGLOMERATO 100107 ADESIVO (hooking assembly see material)	✓				
RSB.COPRESTENSIONE	HLC 3 X 90 ADESIVO	✓				
RSRINFORZO TORNAIA	PI TEX (FABRIL 2004 10 S.T. BRONIA) (see 1.00 AOSP RT)	✓				
RSBOTTITURA LINGUA SINGOLE	AGGLOMERATO 13 X 150 ADESIVO (hooking assembly see material)	✓				
RSBOTTITURA LINGUA SUPERFINE	HLC 5005 ADESIVO	✓				
FODERA LINGUA	TESSUTO MEL TRICOLOR NEW LIFE (MTR) M4.4	✓	✓		✓	✓
FODERA PUNTA	VILL NEW LIFE-HOR + ADESIVO	✓	✓		✓	✓
FODERA TORNAIA	VILL NEW LIFE-HOR + ADESIVO	✓	✓		✓	✓
FODERA COLLARINO	TESSUTO MEL TRICOLOR NEW LIFE (MTR) M4.4	✓	✓		✓	✓
SOTTOPEDE STROBEL	COMPACT SOFT RECYCL 40 STR BCO M4.2				✓	✓
SOTTOPEDE ESTERNO	CUBA NEW LIFE NERCH-FILM TA 90				✓	✓
LINGUA STAMPATA	MARFAN LR 40 RICICLATO			✓		
COLLARINO STAMPATO DS MX	MARFAN LR 38 RICICLATO			✓		
BOTTONE COLLAR STAMPATO DS MX	ZYTEL 801					
ELASTICO	ELASTICO H 90 MM					
COPRIFORO	CUBA NEW LIFE NERCH-FILM TA 90		✓			
PETTUCCIA CHIUSURA TORNAIA	PETTUCCIA ART 40 H14 MM NERO RICICLATO			✓		
PETTUCCIA LINGUA	PETTUCCIA ART 40 H14 MM NERO RICICLATO			✓		
ATTRITORE MASTICE SIDA-ETI-ME	DESMOOLUR PFE					
MASTICE SIDA-ETI	HELMETRA					
FILO STROBEL	PLATINUM ECO GREEN 80 (100% POLIESTER RICICLATO)			✓		
FILO NERO	PLATINUM ECO GREEN 80 (100% POLIESTER RICICLATO) (01 2236)			✓		
ETICHETTA LOGO	ETICHETTA LOGO RICICLATO					
FORMA DI MONTAFORDI						
SOTTOPEDE ESTERNO	ART. 3160 COL. 90 SPACE SHELL WVR TECHNO RECYCLED M4.4 LASTRA ESTERNA (LIFE 2004/04)	✓			✓	✓



ACTIVITY - WORK DONE

Sample of recycled liner

- The starting point is the commercial DS MX liner, the most used in rental ski-boots
- Every material has been replaced with a recycled alternative.
- The material recovered from used liner has been used for the internal paddings and the footbed.
- The material recovered from used ski boots has been mixed with production waste (the elastic modulus is too high to use it as it is) to produce the tongue and the collar.
- The upper and the lining need to be bonded with textiles (also recycled), therefore this parts are provided by an external supplier.



ACTIVITY - WORK DONE

Sample of recycled injected parts

- The reference for the external part is DS MX. For the injection of shell, cuff, heels, water gasket and boot board the normal production molds have been used .
- The material coming from action B1 was used to inject all the parts that are needed in the ski boot.
- The injection process was composed by the following steps:
 1. Visual inspection of the material
 2. Drying and filtering (magnets placed in the pipeline collect eventual metal particles that might damage the injection machine or the molds)
 3. Injection with a vertical injection machine (designed to produce ski boots)
 4. Quality inspection and injection parameters definition.



ACTIVITY - WORK DONE

Lab test on materials for injected parts

The recycled materials used in the liner have been subjected to the following tests:

- **Lateral shell impact test:** important test to define plastic part resistance. The shell is fixed, and it's hit many times by a pendulum with increasing energy.
- **Ball drop:** similar to above but the shell is not fixed, and the impact area is more random. Both tests are important to detect injection problems.
- **Cuff flex test:** an exaggerated deformation of the cuff to determine flexibility at cold temperatures.
- **Hard plastic UV test:** aging test to study material degradation.
- **Hard plastic wear test:** done on injected heels to assure durability.



Impact tests will be performed also on the production of the 1000 pairs



THANK YOU FOR THE ATTENTION!



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