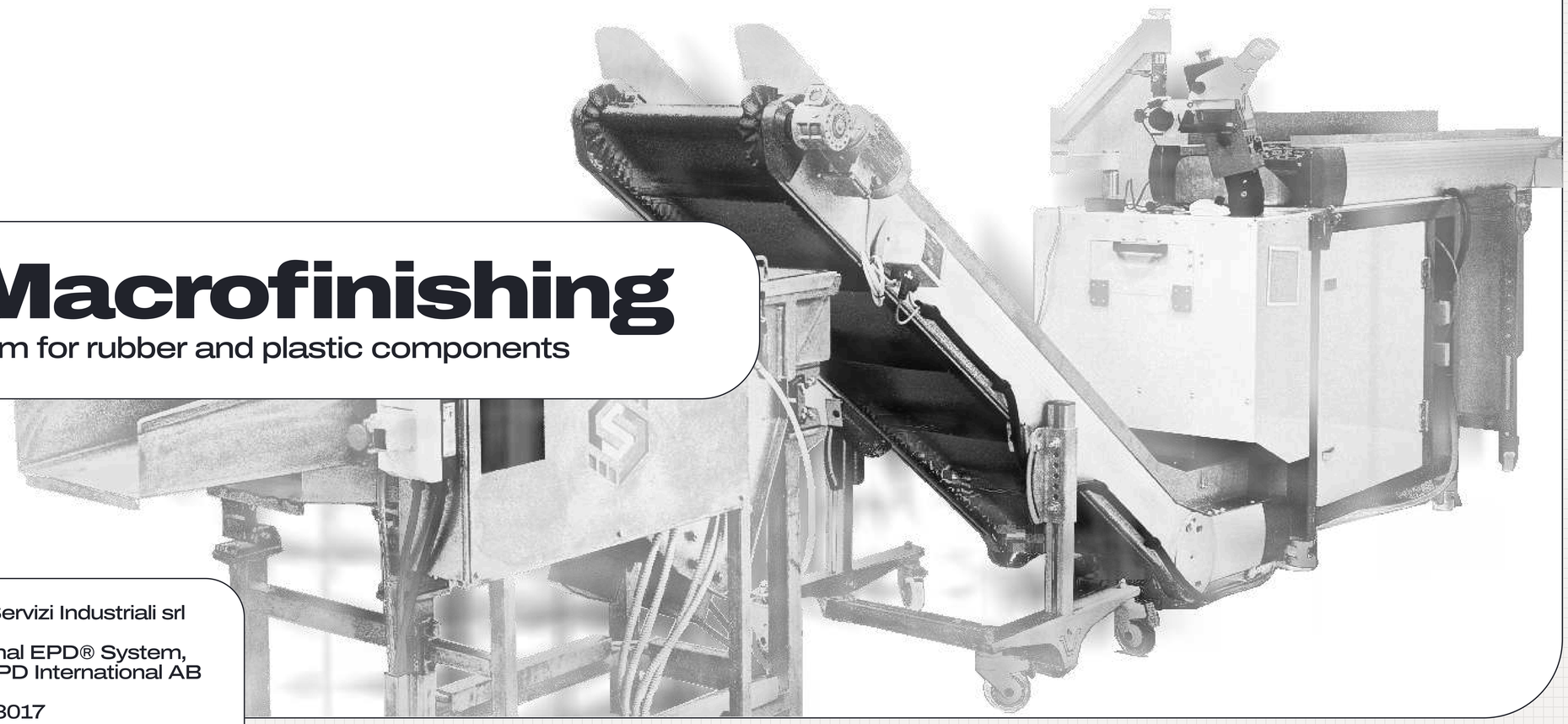
CENTRO SERVIZI INDUSTRIALI

EPD
INTERNATIONAL EPD SYSTEM

Environmental Product Declaration

MF-15L Macrofinishing

automatic deburring system for rubber and plastic components



EPD owner	C.S.I. Centro Servizi Industriali srl
program + operator:	The International EPD® System, operated by EPD International AB
registration number:	EPD-IES-0023017
publication date:	2025-05-16
valid until:	2030-05-16
revision:	1.0

Current EPD has been developed in conformity with ISO 14025 standard.

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

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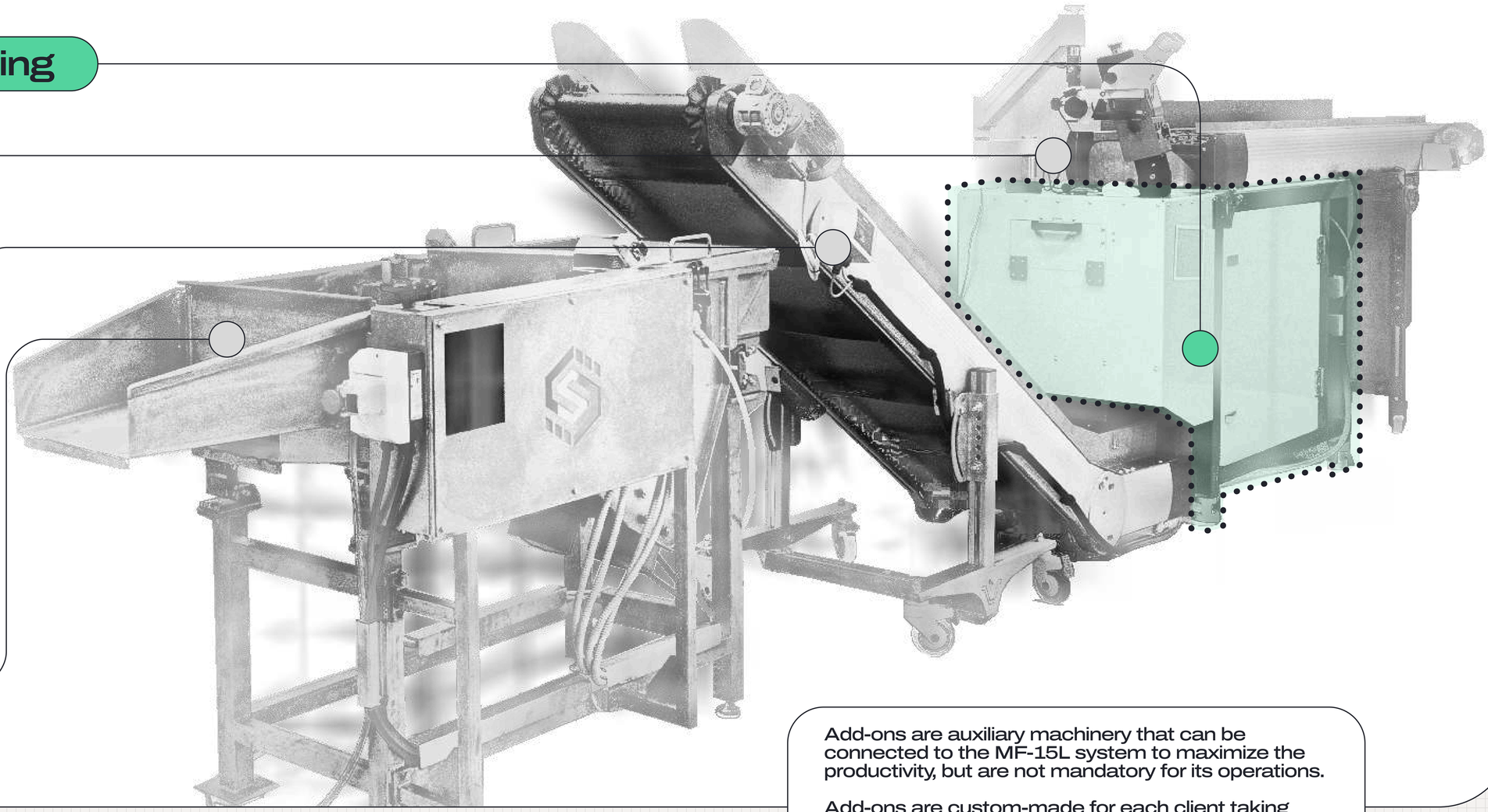
MF-15L Macrofinishing + add-ons

MF-15L Macrofinishing



loading belt

unloading belt

waste separator

Add-ons are auxiliary machinery that can be connected to the MF-15L system to maximize the productivity, but are not mandatory for its operations.

Add-ons are custom-made for each client taking into account their production needs.

Due to their bespoke nature, current EPD does not take into account impacts associated with add-ons.

programme information

program + operator:	The International EPD® System, operated by EPD International AB
product category rules:	PCR 2010:08 Other special- and general-purpose machinery and parts thereof, version 4.0
UN CPC	4491
registration number:	EPD-IES-0023017
publication date:	2025-05-16
valid until:	2030-05-16
p/o website:	environdec.com

PCR review was conducted by:	The Technical Committee of the International EPD® System. Claudia A. Peña (Chair)

independent verification of the declaration and data, according to ISO 14025:2006:	EPD verification
third-party verifier:	TUV SUD Italia srl *TUV SUD is an approved certification body accountable for the third-party verification*
the follow-up during EPD validity involves a third-party verifier:	no

product information

organization

EPD owner	C.S.I. Centro Servizi Industriali srl
production site:	Italy, Bolgare (BG), via Lago d'Idro, 8
life cycle assessment (LCA) performed by:	Tima Musin Sustainability Manager C.S.I Centro Servizi Industriali timur.musin@csi-servizi.it

C.S.I. Centro Servizi Industriali is a project created to provide industrial consulting for high-performance rubber and plastic processing.

A technology-driven company, C.S.I. operates the niche of post-molding processes, surface finishing and functional coatings.

C.S.I. has built an intersectional team of like-minded people, each with a vast expertise in their field and a desire to improve the quality of products and services on an industry level.

Consolidating years of experience, the team developed a new technology for surface finishing that would allow to mitigate associated environmental impacts – MF-15L Macrofinishing.

C.S.I. Centro Servizi Industriali is certified ISO 9001.

product information

general information

commercial name:	MF-15L Macrofinishing
functions:	deburring of rubber and plastic components
main components:	chassis, electronics
spare parts:	abrasion teeth (aluminium – once a year, rubber – once a week)
used fuels or energy vectors:	electric energy
size and dimension, m:	1.8 x 0.65 x 1.5 (l x w x h)
weight, kg:	470

technical information

productivity:	up to 20 kg/h of finished material
nominal power, kW:	7.5
energy consumption, kWh:	5.72 (average)
chemical products and other consumables:	lubricant CSIC01P – 0.005 kg/h, water – 1.0 kg/h cleaning ethanol – 0.1 kg/h, water – 1.25 kg/h. degreaser – 0.06 kg/h, paper towels – 0.004 lg/h

operations

MF-15L is an automatized deburring system that mechanically deburrs components at room temperatures, without the use of abrasives or cryogenic conditions.

Processed components are subjected to short-term, negligible mechanical stress that does not affect their physical-mechanical characteristics.

It detaches production residues such as bursts and flashes mechanically at room temperature, what allows to substitute manual / cryogenic deburring and to reduce the necessity for cryogenic deflashing during finishing processes.

CSI aims to bridge the gap and foster new technologies for polymer component production, with decision making driven by environmental data, with development of the EPD being a crucial part of our commitment.

product information

LCA methodology

Life Cycle Assessment has been performed to provide the base for the current EPD.

LCA defines the assessed system parameters and characterizes its environmental impacts associated with MF-15L from raw material production to the end-of-life stage of the machine (cradle to grave), in accordance with guidelines set by:

ISO 14025, ISO 14040 and ISO 14044[1–3],

General Programme Instructions of the International EPD® System, version 4,0[4],

PCR 2010:08, Other special- and general-purpose machinery and parts thereof, version 4.0[5].

In this study, specific data has been used to model core processes, materials used in upstream process and their logistics, and inputs that define the use stage.

Uncertainty of data has been considered to be normally distributed. For data where it has been impossible to evaluate standard deviation, 5% uncertainty interval has been considered.

Ecoinvent 3.11 database has been used to cover gaps in primary data such as emissions generated during extraction and transformation of raw materials, logistics, energy production and waste treatment.

Due to the fact that MF-15L has been on the market only since 2023, specific data for the end-of-life stage is not readily available yet.

assessment details

functional / declared unit:	one (1) MF-15L Macrofinishing deburring system
reference service life:	15 years
use stage operations:	2000 machine-hours per year
geographical scope:	Italy
time representativeness:	march 2024 – march 2025
system boundary:	cradle-to-grave
LCA software:	openLCA 2.4
LCI databases:	ecoinvent 3.11 + ÖKOBAUDAT

electricity mix

core stage

use stage

Core stage electricity composition mix has been provided by supplier (Enel), which has been modelled for current LCA in openLCA software using ecoinvent emission datasets.

For the use stage, Italian residual mix has been used, with data sourced from the AIB report on European residual mixes composition in the year 2023[5].

The function of the product must be comparable for the EPD results to be compared.

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product information

MF-15L system

upstream

raw materials production

steel
silver
nylon
wood
paper
cast iron
aluminium
electronics
polyurethane
polycarbonate
electric components
polymethylmethacrylate

semi-products manufacturing

logistics
raw materials
semi-assemblies

coating
welding
machining
laser cutting

waste management >>>

core

MF-15L construction

logistics
to the core phase

assembly

downstream

use

>>> water
>>> energy
>>> consumables

logistics
to the use site

MF-15L operation

emissions >>>

end-of-life

disassembly

logistics
to the waste treatment

waste management >>>

emissions >>>

product information

data quality

Data have been classified into three categories:

specific data (“primary” or “site-specific”)
that has been sourced by measuring actual processes, and data from other parts of the life cycle traced to the product system under study,

selected generic data
data from commonly available data sources that fulfill prescribed data quality characteristics, and

proxy data
data from commonly available data sources that do not fulfill all of the data quality characteristics.

data quality index

The quality of the data is analyzed by evaluating each dataset against requirements defined in General Programme Indications and PCR 2010:08:

type of LCA modelling

reference year for data collection

geographical representativeness

technological representativeness

completeness of data
data has to represent 99% of described processes

precision
collected data should represent average values over a reference year

Ranging each criteria from 1 to 5 allowed us to calculate a data quality index (DQI) and evaluate the quality of inventory and impact assessment results.

cut-off

PCR 2010:08 requires a cut-off rule of 1% to be applied:
the included inventory data shall together give rise to at least 99% of the results of any of the environmental impact categories.

In the current EPD, the cut-off equals

0.1%

reliability

The reliability of this LCA results in terms of data quality is verified by evaluating the share of each data category in overall environmental impact of MF-15L life cycle.

Proxy data contribution shall not exceed 10%; in case of MF-15L, its share is below 0.1%.

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content declaration

MF-15L Macrofinishing system weighs 470 kg. Together with packaging crate, freight weight of MF-15L reaches 900 kg.

These numbers do not account for weight of add-ons and their packaging.

This page presents the material content of MF-15L, based on family of materials used in a single unit of MF-15L Macrofinishing upon delivery.

All presented values are expressed in kg.

MF-15L Macrofinishing unit does not contain hazardous substances as defined by GHS.

CSIC01P, protective lubricant used in downstream stage, does contain hazardous substances and should be handled according to dangers indicated on its packaging.

plastics

	chassis	electronics	spare parts	packaging
ABS		0.35		
nylon 6	0.82	0.50		
nylon 6,6		1.09		
nylon 6,6 + glass fiber		0.46		
PBT		0.01		
PBT + glass fiber		0.01		
polycarbonate		0.44		
polyethylene				0.80
polyester		0.04		
PET		0.03		
PMMA	0.38			
POM		0.01		
PVC		0.05		
polyurethane	0.64			

metals

	chassis	electronics	spare parts	packaging
aluminium	3.94	0.92	1.32	
brass	0.17	0.44		
cast iron	9.07			
copper		0.05		
mild steel	256.59	21.43	0.15	0.03
silver				
stainless steel	50.61	0.22		
zamak		0.37		

rubbers

	chassis	electronics	spare parts	packaging
silicone		0.01		
SBR			32.77	

wood

	chassis	electronics	spare parts	packaging
wood				272.45
plywood				35.55

paper

	chassis	electronics	spare parts	packaging
cardboard		0.33		
paper		0.09		

other materials

	chassis	electronics	spare parts	packaging
electronic components	46.98	44.93		
paint	3.60			

content declaration

packaging

MF-15L Macrofinishing system is delivered in a wooden crate, designed to protect the machine during logistics and installation at the operations site. The machine inside is wrapped in PE film, which provides protection from mechanical damage and possible water ingress that may occur during transportation.

MF-15L packaging shall be classified as distribution type.

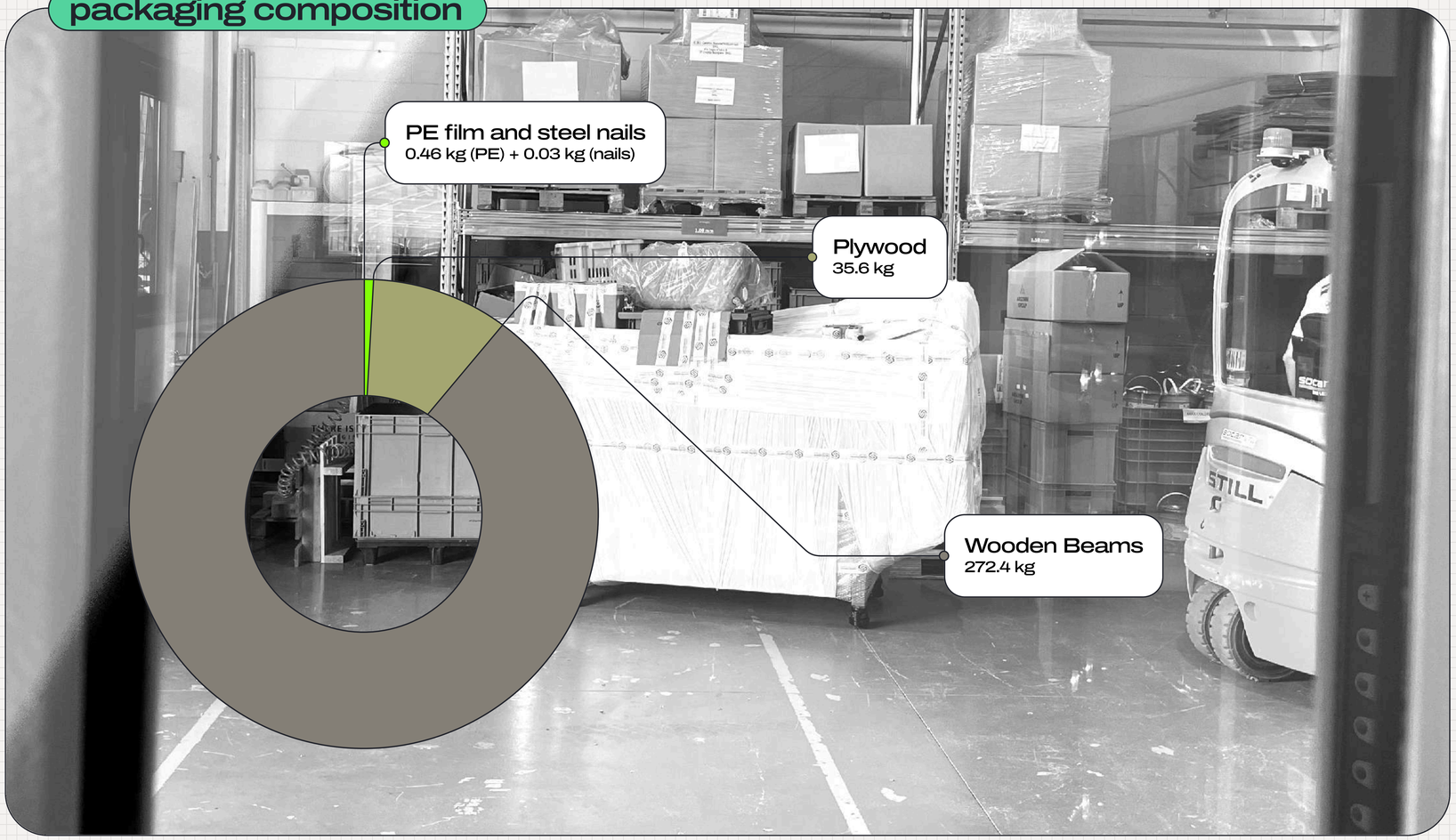
Wooden crate is made of 10 x 16 mm sized wooden beams and is sided with 8 mm thick plywood sheets using mild steel nails. Finished crate weighs 308 kg. Protective polyethylene film adds 0,5 kg.

Total packaging weight stands at 308,5 kg.

None of packaging materials have been declared to be made of recycled materials. CSI is researching solutions that would allow to reduce the uptake of virgin materials.

The packaging described is the type used only for MF-15L Macrofinishing machines, and does not account for additional packaging in case of add-ons.

packaging composition



environmental performance

environmental impact indicators

core indicators	EF 3.1. – EN15804 reference package	unit	upstream	core	downstream	total
global warming potential (GWP)	total (GWP-total)	kg CO_2 eq.	4,69E+03	2,03E+01	1,30E+05	1,35E+05
	fossil fuels (GWP-fossil)	kg CO_2 eq.	4,66E+03	2,03E+01	1,27E+05	1,32E+05
	biogenic (GWP-biogenic)	kg CO_2 eq.	1,46E+01	1,42E-02	1,72E+02	1,86E+02
	land use and land use change (GWP-luluc)	kg CO_2 eq.	8,11E+00	1,37E-02	2,35E+03	2,36E+03
depletion potential of the stratospheric ozone layer (ODP)		kg CFC-11 eq.	1,57E-04	4,61E-07	2,79E-03	2,95E-03
acidification potential, accumulated exceedance (AP)		mol H^+ eq.	9,95E+01	9,08E-02	4,60E+02	5,59E+02
eutrophication potential (EP)	freshwater (EP-freshwater)	kg P eq.	5,61E+00	4,30E-03	3,75E+01	4,31E+01
	marine (EP-marine)	kg N eq.	9,72E+00	2,84E-02	1,26E+02	1,36E+02
	terrestrial (EP-terrestrial)	mol N eq.	8,63E+01	3,06E-01	1,07E+03	1,16E+03
photochemical ozone creation potential (POCP)		kg NMVOC eq.	2,80E+01	1,16E-01	3,46E+02	3,74E+02
abiotic depletion potential (ADP)	non-fossil (ADPE)	kg Sb eq.	9,97E-01	3,26E-04	8,55E-01	1,85E+00
	fossil (ADPF)	MJ, net calorific value	5,98E+04	2,98E+02	1,81E+06	1,87E+06
water (user) deprivation potential (WDP)		m^3 world eq. deprived	1,84E+03	3,26E+00	4,41E+04	4,59E+04

The results of ADPE, ADPF and WDP env. impact indicators shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

environmental performance

resource use indicators

primary	unit	upstream	core	downstream	total
use of renewable primary energy as energy carrier (PERE)	MJ, net calorific value	1,29E+04	2,05E+01	1,08E+06	1,09E+06
use of renewable primary energy resources used as raw materials (PERM)	MJ, net calorific value	4,32E+03	0,00E+00	8,16E+04	8,60E+04
total use of renewable primary energy (PERT)	MJ, net calorific value	1,72E+04	2,05E+01	1,16E+06	1,18E+06
use of non renewable primary energy as energy carrier (PENRE)	MJ, net calorific value	6,19E+04	3,17E+02	3,36E+06	3,42E+06
use of non renewable primary energy resources used as raw materials (PENRM)	MJ, net calorific value	1,61E+02	0,00E+00	1,34E+04	1,35E+04
total use of non renewable primary energy resource (PENRT)	MJ, net calorific value	6,21E+04	3,17E+02	3,37E+06	3,44E+06

additional	unit	upstream	core	downstream	total
use of secondary material (SM)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
use of renewable secondary fuels (RSF)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00
use of non-renewable secondary fuels (NRSF)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00
net use of fresh water (FW)	m^3	4,51E+01	1,44E+00	9,19E+02	9,66E+02

environmental performance

waste and output flow indicators

waste categories	unit	upstream	core	downstream	total
hazardous waste disposed (HWD)	kg	1,01E+01	1,64E-02	1,63E+02	1,73E+02
non-hazardous waste disposed (NHWD)	kg	5,17E+02	7,66E+00	5,47E+03	5,99E+03
radioactive waste disposed (RWD)	kg	1,61E-01	4,00E-04	1,76E+00	1,92E+00

output flows	unit	upstream	core	downstream	total
components for re-use (CRM)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
materials for recycling (MFR)	kg	0,00E+00	0,00E+00	3,39E+02	3,39E+02
materials for energy recovery (MER)	kg	1,02E+00	0,00E+00	9,24E+02	9,25E+02
exported electrical energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	2,74E+03	2,74E+03
exported thermal energy (EET)	MJ, net calorific value	0,00E+00	0,00E+00	4,82E+03	4,82E+03

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environmental performance

interpretation

Results show the share of each life cycle stage within overall environmental impact of MF-15L life cycle.

Upstream stage, which accounts for emissions from the production of raw materials used in MF-15L, contributes 10% to the overall impact and 2% of overall resource use. Most of the impact is associated with electronic components, specifically electric motor and its auxiliaries.

Core stage, which contains logistics of raw materials to C.S.I. and emissions related to the assembly of MF-15L Macrofinishing unit, contributes only 0.01% to the overall results.

Downstream stage has the biggest impact – 90%. It includes emissions that occur during the use of MF-15L, be it electricity consumption, cleaning and maintenance (spare parts) and uptake of consumables.

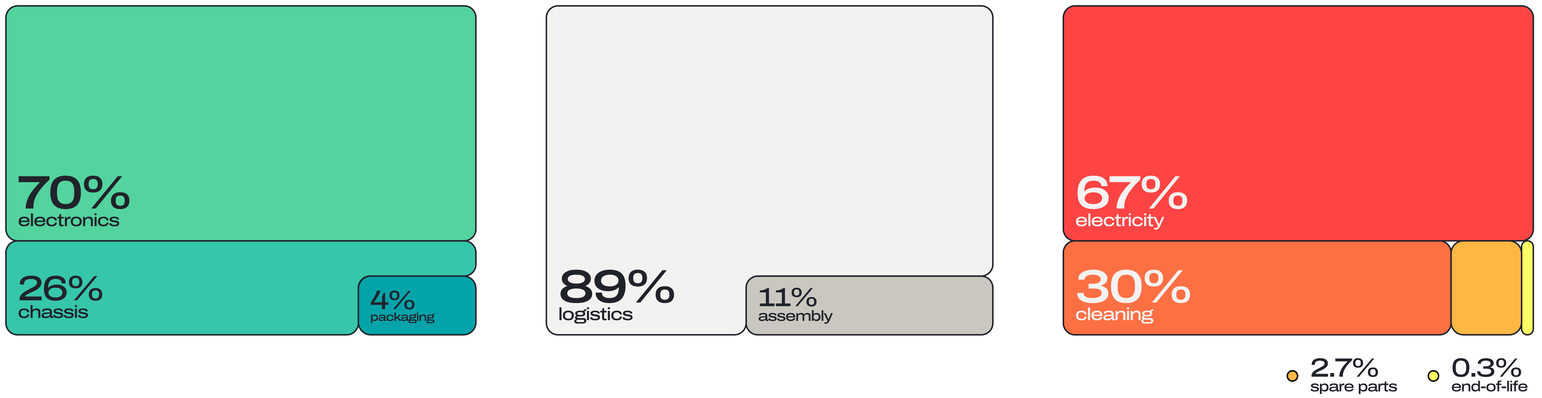
More than 95% of the electricity impact is a consequence of fossil energy vectors present in the composition and voltage transformation processes.

Fossil-powered electricity affects also the balance of ecosystems around us: use of non-renewable fuels promotes eutrophication of water and soil, and increases the acidity of oceans.

complete environmental impact

MF-15L total environmental impact distribution

composition per stage



environmental performance

conclusions

The main contributor to MF-15L environmental performance is electricity mix of the use stage.

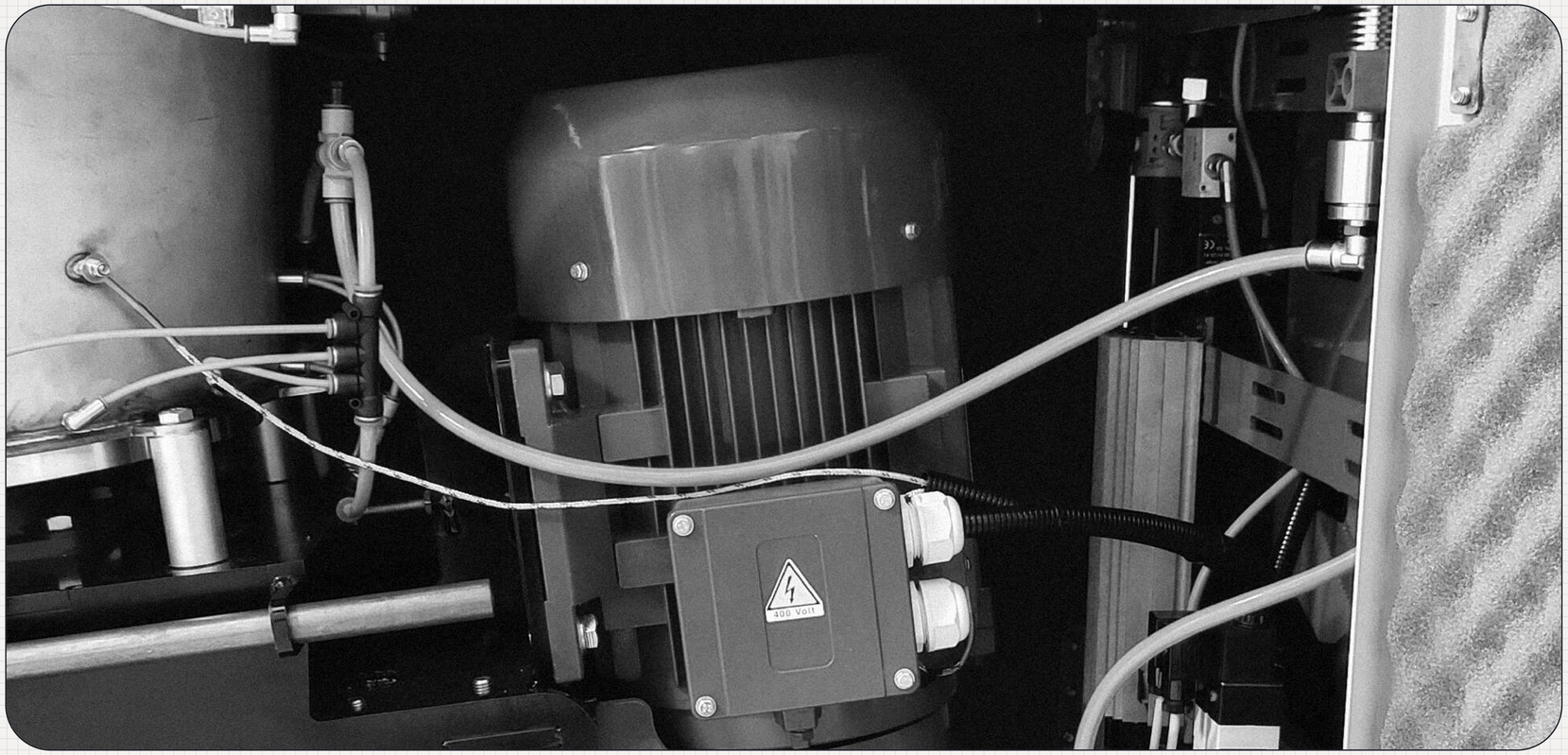
It clearly underlines the importance of transitioning to renewable energy vectors for industries and demonstrates how energy management can help mitigate environmental impacts of existing processes.

For C.S.I., results of life cycle assessment of MF-15L provide data to define future steps.

While most of MF-15L weight is its steel chassis, most of the impact comes from electronics. Optimizing these components is the first step towards the mitigation of impacts.

4.7 tons of CO2-eq are generated during the production of MF-15L Macrofinishing (upstream + core).

Transition to raw materials of non-fossil origin should be prioritized to reduce impacts on acidification, global warming potential, eutrophication and PENRT used.



references

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2. International Organization for Standardization. ISO 14040:2022. Environmental Management – Life Cycle Assessment – Principles and framework; Edition 2, 2006, last reviewed and confirmed in 2022.
3. International Organization for Standardization. ISO 14044:2022. Environmental Management – Life Cycle Assessment – Requirements and Guidelines; 2006, Edition 1, 2006, last reviewed and confirmed in 2022.
4. EPD International AB. General Programme Instructions for the International EPD® System, v. 4.0.; 2021.
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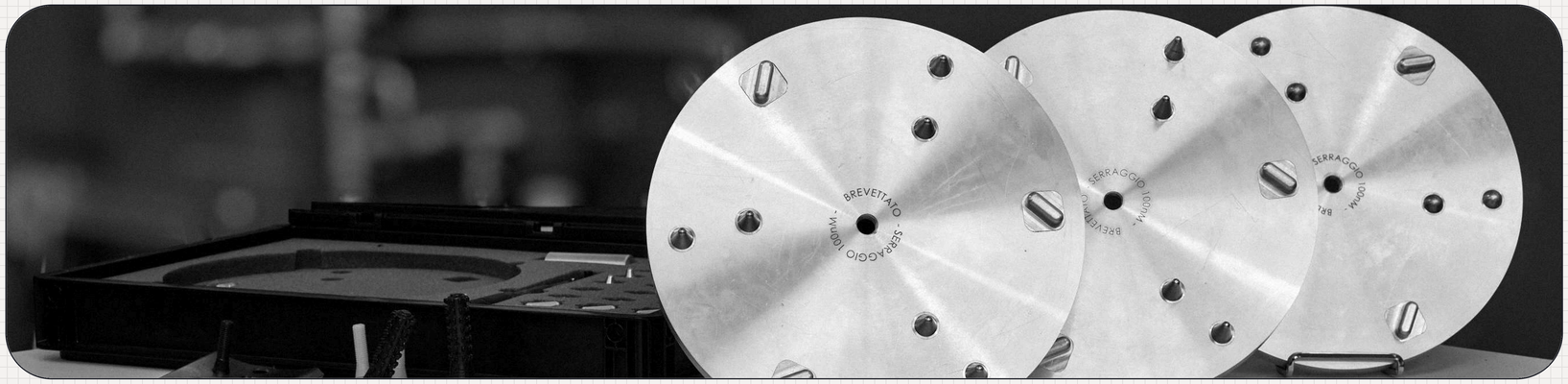
6. Association of Issuing Bodies. European Residual Mixes. Results of the calculation of Residual Mixes; 2024. https://www.aib-net.org/facts/european-residual-mix/2023



differences versus previous versions

This a first revision of environmental product declaration done for MF-15L Marcofinishing. Future revisions will contain list of modifications in this section.

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