Environmental Product Declaration

In accordance with ISO 14025 for:

CAST MANGANESE STEEL RAILWAY CROSSING

from

OUTREAU TECHNOLOGIES – VOSSLOH Group

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-01638
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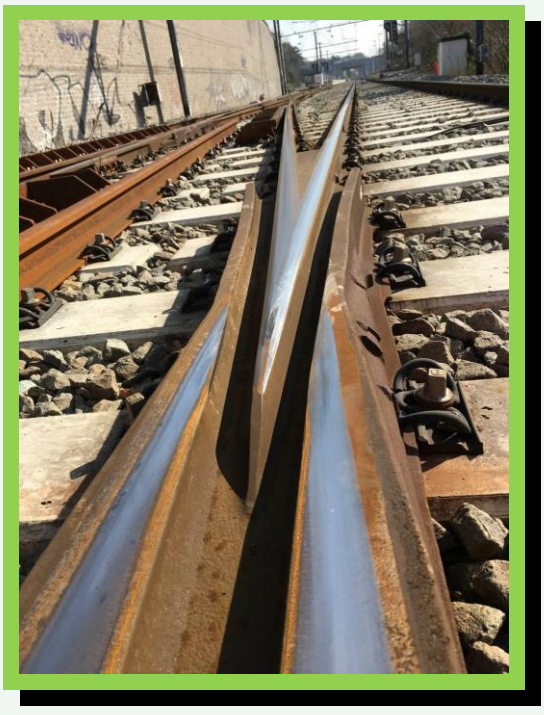
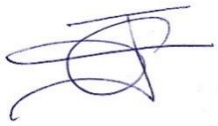


An EPD should provide current information, and may be uptaded if conditions change. The stated validity is 5 years therefore subject to the continued registration and publication at www.environdec.com

Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com

Product category rules (PCR): *2014:10 <Fabricated steel products, except construction products, machinery and equipment product category classification: UN CPC 412, 422, 429 ; Version 2.1 2019-01-18 ; Valid until: 2021-10-04>*
PCR review was conducted by: < *The Technical Committee of the International EPD® System. Review chair: Massimo Marino. Contact via info@environdec.com* >
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: <*Julie ORGELET, DDEMAIN and signature of the third party verifier*> *In case of recognised individual verifiers:* Approved by: The International EPD® System 
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable.

Product information

Owner of the EPD:

OUTREAU TECHNOLOGIES +33 (0) 3 21 99 53 04, out.sales@vossloh.com
43 rue Pierre Curie – BP 119
62230 Outreau
France

Name and location of production site: Outreau Technologies / North of FRANCE

Company information

The History of Outreau Technologies

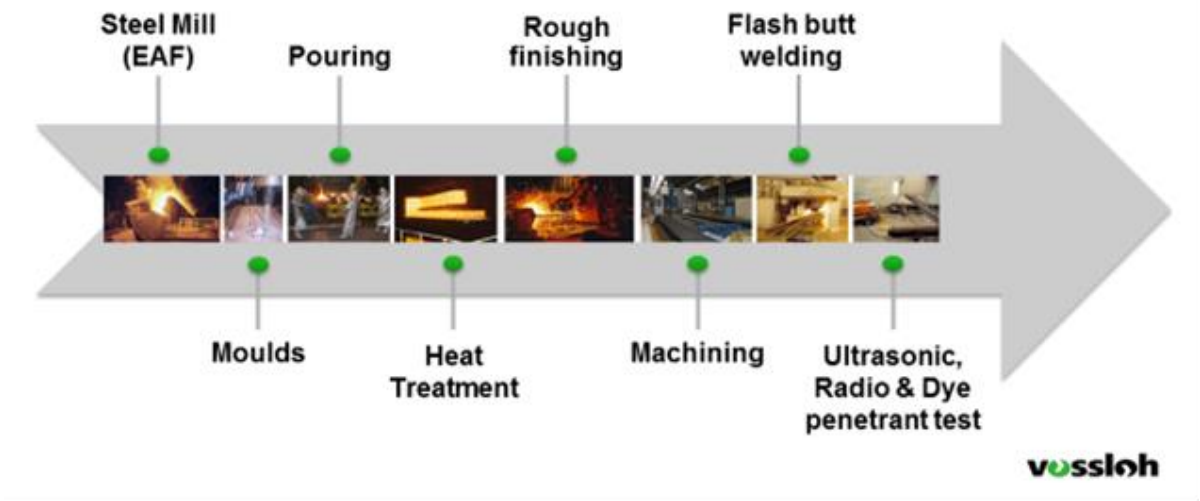
1857: Creation of 4 blast furnaces
1919: Installation of the steel mill
1954: First Manganese Crossing
1985: Acquisition by Manoir Industries
2013: Acquisition by Vossloh Group
2016: Construction of new plant

Quality and environmental management: Our Certifications
OUTREAU TECHONOLGIES has an ISO9001 v2015 certified Quality Management System and an Environment Management System based on ISO 14001 to be achieved in a few years. Our organization allow us to manage legal requirements of the French Administration.

Networks & Contractors- Our products all over the world
France, Switzerland, Belgium, UK, Italia, Sweden, Netherlands, Russia,
Paris metro, Israel, Morocco, Chile, Japan

Thanks to its specific manufacturing means, Outreau technologies is able to build all kinds of networks for any specifications until 12 meters length.

Manufacturing process



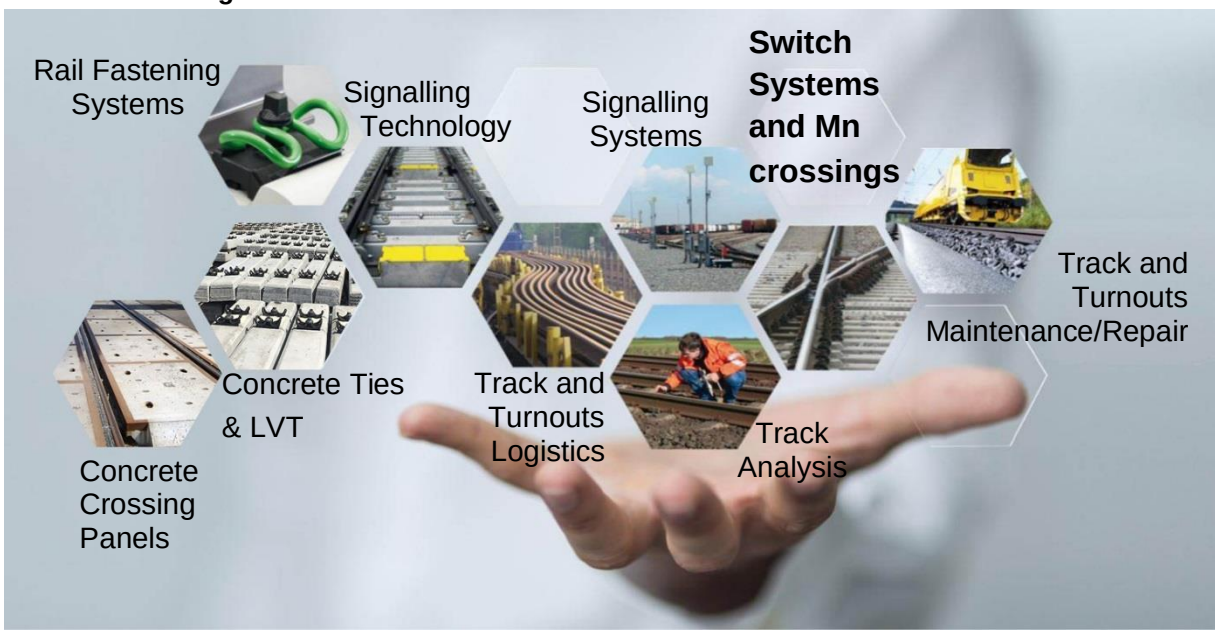
All cast manganese products have the same grade that could answer to many technical specifications. Manganese steel is 100% recyclable after use in service even after many years. It means that we can always melt “recycling” crossings in our furnace and manufacture new crossings.

The Vossloh Group

As a rail infrastructure company, we produce tried-and-tested key components and modules. To this end, we are a single-source provider of integrated solutions and services that cover the entire rail lifecycle.

Vossloh is a technologically leading Group in the field of rail infrastructure. We provide our customers around the world with integrated railway solutions.

Our Product Range

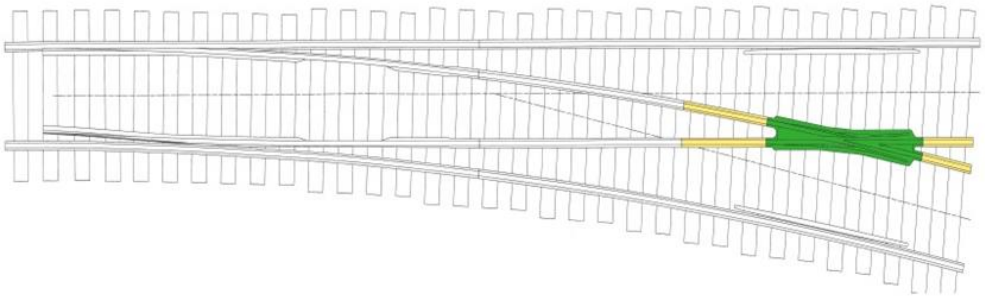


Product information

Product name: Cast Manganese steel railway crossing
Product identification: Steel railway crossing product
Product description: Cast manganese steel railway crossings are employed at safety critical location throughout railway infrastructure due to their work hardening material properties.
The track crossing is located at the centre of the turnout and provides the continuity of two intersecting routes, as the picture below.

Outreau Technologies supplies crossings and cradles that meet the internal health criteria of European standard CSN EN 15689:2009.
Outreau Technologies crossings are installed all over the world : in Algeria, Saudi Arabia, Belgium (Infrabel), Bolivia, Chile, Denmark, Egypt, United Arab Emirates, Eurotunnel, Finland, France (SNCF, RATP), Hong Kong, Italy (RFI), Morocco, Mauritania, Mexico, Norway, Netherlands, Portugal, United Kingdom (Network Rail), Sweden, Switzerland (SBB), Tunisia, USA, etc.
Outreau Technologies cast manganese crossing are already homologate for SNCF, RATP, INFRABEL, RFI, PRORAIL, BANEDANELARK, CFF, NETWORK RAIL

UN CPC code: UN CPC 412
Geographical scope: Production in France. Use not considered in EPD, so applicable all over the world.



LCA information

The LCA study was carried out in accordance with the following standards:
- ISO 14040:2006. Environmental management. Life cycle assessment. Principles and framework

- ISO 14044:2006. Environmental management. Life cycle assessment. Requirements and guidelines

- ISO 14025:2010. Environmental labels and declarations. Type III environmental declarations. Principles and procedures

- International EPD System General Program Instruction. (Version 3.0) 2017-12-11

- PCR 2014:10 Fabricated steel products, except construction products, machinery and equipment (Version 2.1)

Functional unit / declared unit: “One ton of product made of steel”
For information a classical product is made of 1014 kg.
Reference service life: Not applicable for this product category
Time representativeness: Specific Data from Outreau Technologies have been collected in the reference year 2018 (January to December 2018). Outreau Technologies process of production have been not changed from 2019.
Database(s) and LCA software used: BDD CODDE-2018-11; EIME V5.8

Description of system boundaries:
From cradle to gate

System boundaries:
As indicated in the PCR references (“PCR Fabricated steel products, except construction products, machinery and equipment 2014:10 version 2.1”) shown here below, system limits

of crossing production include the production and the transport of the raw material.

In details, the processes to consider for the assessment of the life cycle of the cast manganese steel railway crossing:

Upstream processes

- Extraction and production of raw materials for all main parts and components of the product
- Recycling process of recycled material used in the product
- Transportation of raw material to the upstream processes

Core processes

- Transportation of the steel to the core process where the final steel product will be manufactured
- Transportation to the core processes of materials used as auxiliary materials in the core production
- Manufacturing process for main parts and components (including core process related material consumption, energy production and consumption, emissions to air, water and soil…)
- Assembly of the final product
- Waste treatment of waste generated during manufacturing,
- Impacts due to the production of electricity and fuels used in the core module

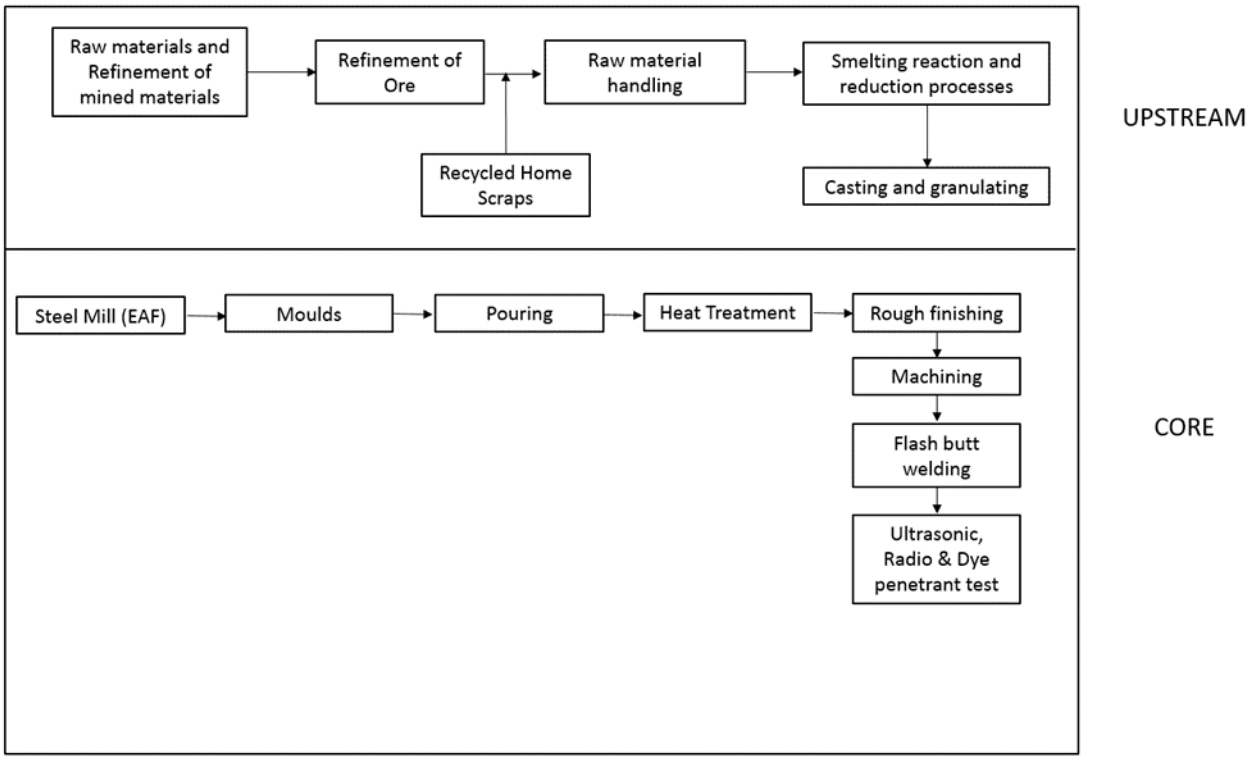
Excluded lifecycle stages: Downstream processes

- Not included in the system boundaries according to the Cradle to Gate scope

The different steps leading to the manufacturing of the product are described in the following figure.

More information: LCA study released by LCIE Bureau Veritas (website: www.codde.fr ; contact: codde@fr.bureauveritas.com)

For more information of the product: https://media.vossloh.com/media/01_product_finder/vco/switch_systems/manganese_crossings/FTC41_OT_EN_V1_100317.pdf



Content declaration

Product

Materials / chemical substances	%
Iron	85,4
Manganese	12,8
Carbon	1,2
Silicon	0,4
Chromium	$5{,}27.10^{-02}$
Phosphorus	$2{,}6.10^{-02}$
Copper	$2{,}3.10^{-02}$
Nickel	$1{,}9.10^{-02}$
Niobium	$1{,}8.10^{-02}$
Nitrogen	$1{,}8.10^{-02}$
Cobalt	$1{,}7.10^{-02}$
Vanadium	$1{,}34.10^{-02}$
Molybdenum	$0{,}5.10^{-02}$
Tin	$0{,}5.10^{-02}$
Aluminium	$9{,}6.10^{-04}$
Sulfur	$4{,}0.10^{-04}$

Packaging

This product is distributed directly by truck without protection to the implementation place.

Reused material

Provence of reused materials (pre-consumer or post-consumer) in the product: circulating scrap come from outside the company (42,05%) and Home scrap come from the company (45,45%). No virgin steel is used for the crossing manufacturing.

Environmental performance

Product level declared unit scope “unit product”

Potential environmental impact

PARAMETER		UNIT	Upstream	Core	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	$9{,}96.10^{+02}$	$4{,}33.10^{+02}$	$1{,}43E^{+03}$
	Biogenic	kg CO_2 eq.	$2{,}99.10^{+00}$	$2{,}32.10^{+01}$	$2{,}62E^{+01}$
	Land use and land transformation	kg CO_2 eq.	INA*	INA*	INA*
	TOTAL	kg CO_2 eq.	$9{,}99.10^{+02}$	$4{,}56.10^{+02}$	$1{,}46.10^{+03}$
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	$1{,}43.10^{-04}$	$2{,}76.10^{-04}$	$4{,}19.10^{-04}$
Acidification potential (AP)		kg SO_2 eq.	$2{,}44.10^{+00}$	$1{,}12.10^{+00}$	$3{,}56.10^{+00}$
Eutrophication potential (EP)		kg PO_4^{3-} eq.	$5{,}27.10^{-01}$	$1{,}96.10^{-01}$	$7{,}23.10^{-01}$
Formation potential of tropospheric ozone (POCP)		kg C_2H_4 eq.	$2{,}79.10^{-01}$	$1{,}15.10^{-01}$	$3{,}94.10^{-01}$
Abiotic depletion potential – Elements		kg Sb eq.	$2{,}86.10^{-03}$	$9{,}81.10^{-05}$	$2{,}96.10^{-03}$
Abiotic depletion potential – Fossil resources		MJ, net calorific value	$1{,}27.10^{+04}$	$5{,}93.10^{+03}$	$1{,}86.10^{+04}$
Water scarcity potential		m^3 eq.	$1{,}97.10^{+05}$	$1{,}56.10^{+06}$	$1{,}74.10^{+06}$

*INA: Indicator Not Assessed

In the LCA study, the values of “global warming as land use and land transformation” are not assessed. However, the indicator Global warming land use and land transformation are less relevant for this kind of product (steel product). These indicators are of higher relevance for agriculture sector and agribusiness.

Use of resources

PARAMETER		UNIT	Upstream	Core	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	$6{,}37.10^{+02}$	$1{,}27.10^{+03}$	$1{,}90.10^{+03}$
	Used as raw materials	MJ, net calorific value	$0{,}00.10^{+00}$	$0{,}00.10^{+00}$	$0{,}00.10^{+00}$
	TOTAL	MJ, net calorific value	$6{,}37.10^{+02}$	$1{,}27.10^{+03}$	$1{,}90.10^{+03}$
Primary energy resources –	Use as energy carrier	MJ, net calorific value	$1{,}66.10^{+04}$	$2{,}00.10^{+04}$	$3{,}67.10^{+04}$

Non-renewable	Used as raw materials	MJ, net calorific value	$1,17.10^{+03}$	$0,00.10^{+00}$	$1,17.10^{+03}$
	TOTAL	MJ, net calorific value	$1,78.10^{+04}$	$2,00.10^{+04}$	$3,78.10^{+04}$
Secondary material		kg	$0,00.10^{+00}$	$0,00.10^{+00}$	$1,40.10^{+02}$
Renewable secondary fuels		MJ, net calorific value	$0,00.10^{+00}$	$0,00.10^{+00}$	$0,00.10^{+00}$
Non-renewable secondary fuels		MJ, net calorific value	$0,00.10^{+00}$	$0,00.10^{+00}$	$0,00.10^{+00}$
Net use of fresh water		m^3	$6,08.10^{+00}$	$4,54.10^{+03}$	$4,54.10^{+03}$

Waste production and output flows

Waste production

PARAMETER	UNIT	Upstream	Core	TOTAL
Hazardous waste disposed	kg	$4,72.10^{+02}$	$3,10.10^{+02}$	$7,82.10^{+02}$
Non-hazardous waste disposed	kg	$7,39.10^{+02}$	$4,34.10^{+02}$	$1,17.10^{+03}$
Radioactive waste disposed	kg	$3,49.10^{-01}$	$5,79.10^{+00}$	$6,14.10^{+00}$

Output flows

PARAMETER	UNIT	Upstream	Core	TOTAL
Components for reuse	kg	$0,00.10^{+00}$	$1,46.10^{+02}$	$1,46.10^{+02}$
Material for recycling	kg	$0,00.10^{+00}$	$4,85.10^{+01}$	$4,85.10^{+01}$
Materials for energy recovery	kg	$0,00.10^{+00}$	$0,00.10^{+00}$	$0,00.10^{+00}$
Exported energy, electricity	MJ	$0,00.10^{+00}$	$4,80.10^{+00}$	$4,80.10^{+00}$
Exported energy, thermal	MJ	$0,00.10^{+00}$	$0,00.10^{+00}$	$0,00.10^{+00}$

Additional information

OUTREAU TECHONOLGIES has an ISO9001 v2015 certified Quality Management System and an Environment Management System based on ISO 14001 to be achieved in a few years. Besides, our organization allow us to manage legal requirements of the French Administration.

More than 80% of the charge of the arc furnace is made of recycling metal (home scraps and circulating scraps). In addition, our product of cast manganese steel railway crossing, with a long cycle life (10 years on average), is fully recyclable into the process.

Since 2004, OUTREAU TECHNOLOGIES also has a used foundry sand thermal regeneration facility that recycles up to 85% of the sand.
Additionally for many years, OUTREAU TECHNOLOGIES has implemented selective waste sorting.

Since 2016, OUTREAU TECHNOLOGIES has undertaken the reconstruction of production workshops: new buildings, process development…. This important project will significantly reduce the environmental impact of the site: reduction of covered areas, water withdrawals, risk of soil pollution….

References

General Programme Instructions of the International EPD® System. Version 3.0.
PCR 2014:10 “Fabricated steel products, except construction products, machinery and equipment” Version 2.1 2019-01-18, UN CPC 412, 422, 429.

Contact information

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