



Poster description

The poster describes some of the activities underway by the F.A. Spa, in collaboration with other partners, as part of the projects aimed at reducing the environmental impact on the environmental matrix emissions into the atmosphere deriving from the casting phase and attributable to the auxiliary materials used to produce cast iron castings:

1. The manufacture of cores with inorganic binders;
2. The manufacture of cores with a low organic binder content;
3. The shaping of the molds with green earth with reduced quantities of carbon residues.

It is known to all those who work in the foundry or who live in the vicinity of the same that the characteristic odor that is released in the air during the liquid metal casting phase can give rise to olfactory harassment resulting from the pyrolysis of organic substances with the which liquid metal comes into contact. The F.A. Spa, for its close to the town center, for some years is working in a significant way to make more compatible with the environment and with the local contest its production activity aware that living with the local contest contributes to corporate sustainability in accordance with the directive CSRD 2022/2464.

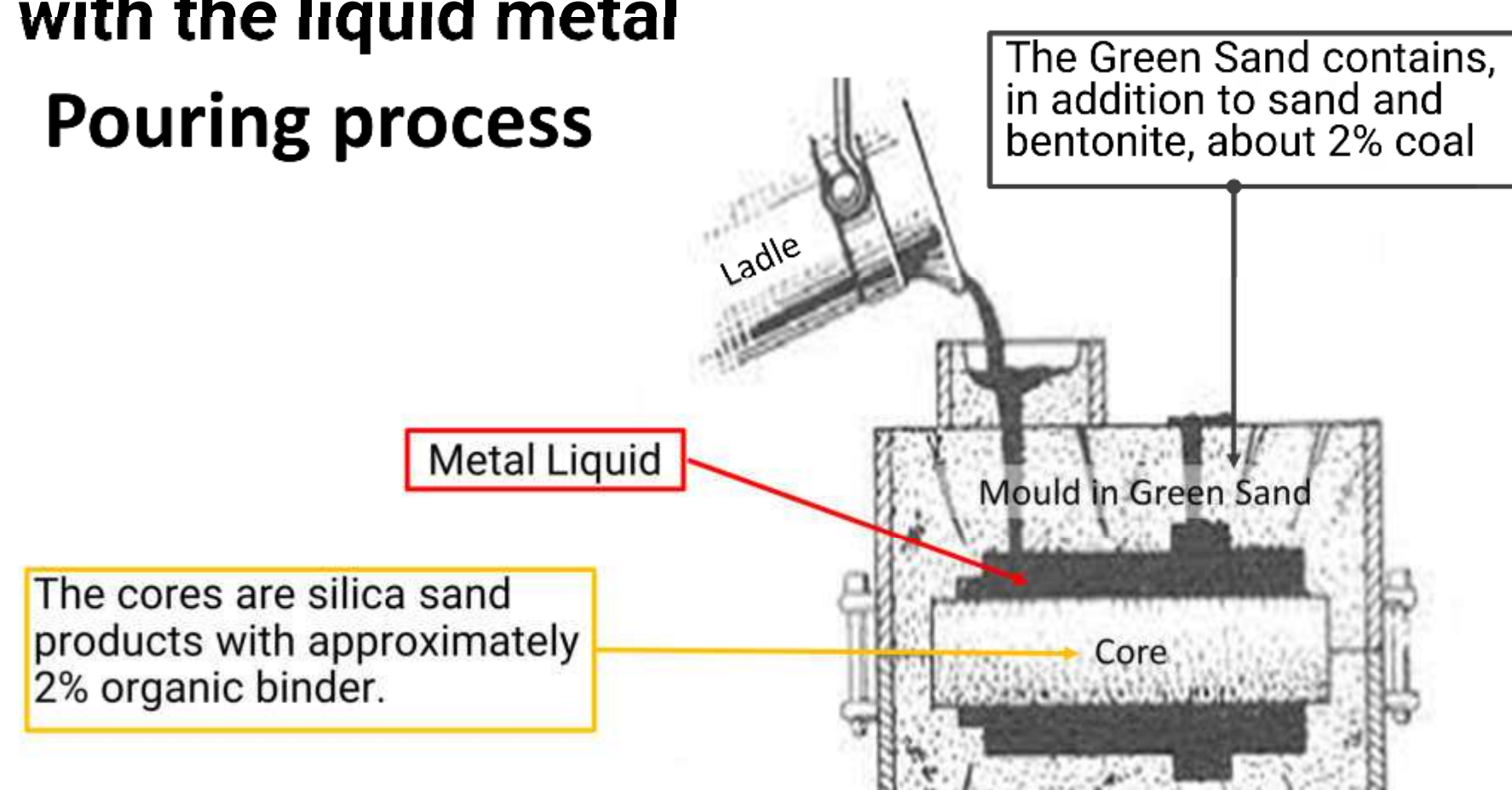
The experimental activity initially concerned the real possibility of using inorganic binders instead of organic ones to produce foundry cores. Inorganic binders, already widely used to produce cores for the aluminum foundries sector (650 °C melting temperature), are now also a valid alternative for cast iron foundries (1400 °C melting temperature), so much so that the use of these binders has been included as Best Available Techniques (BAT) Reference Document for the Smitheries and Foundries Industry approved in February 2024.

The experiments of F.A. Spa have recently also concerned the use of an organic binder that by the nature of the same allows a good use of 50% of the traditional one. This process enabled the start a new project for the integration of core production processes and targeted mottle forming, in addition to the reduction of emissions, also a significant reduction in waste produced for the reuse of green sand (waste) in the process of production of cores.

Scenario

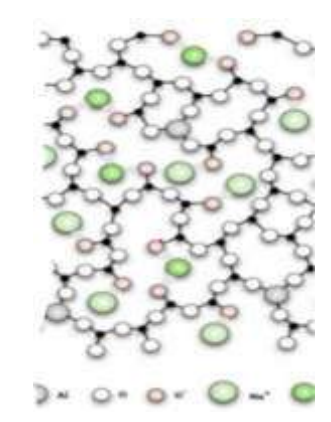
The typical foundry smell produced during the pyrolysis of organic substances due to contact with the liquid metal

Pouring process



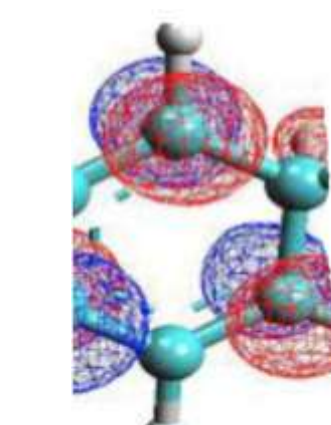
Main Ideas

Core binders



Inorganic binder with use of hot air and hot core-box C to curing and hardening cores

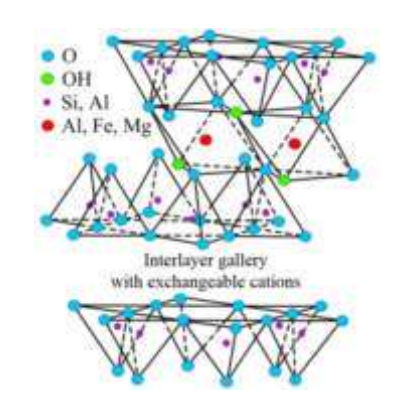
Green Casting Project



Low Organic binder with cold core-box

Low COT Project

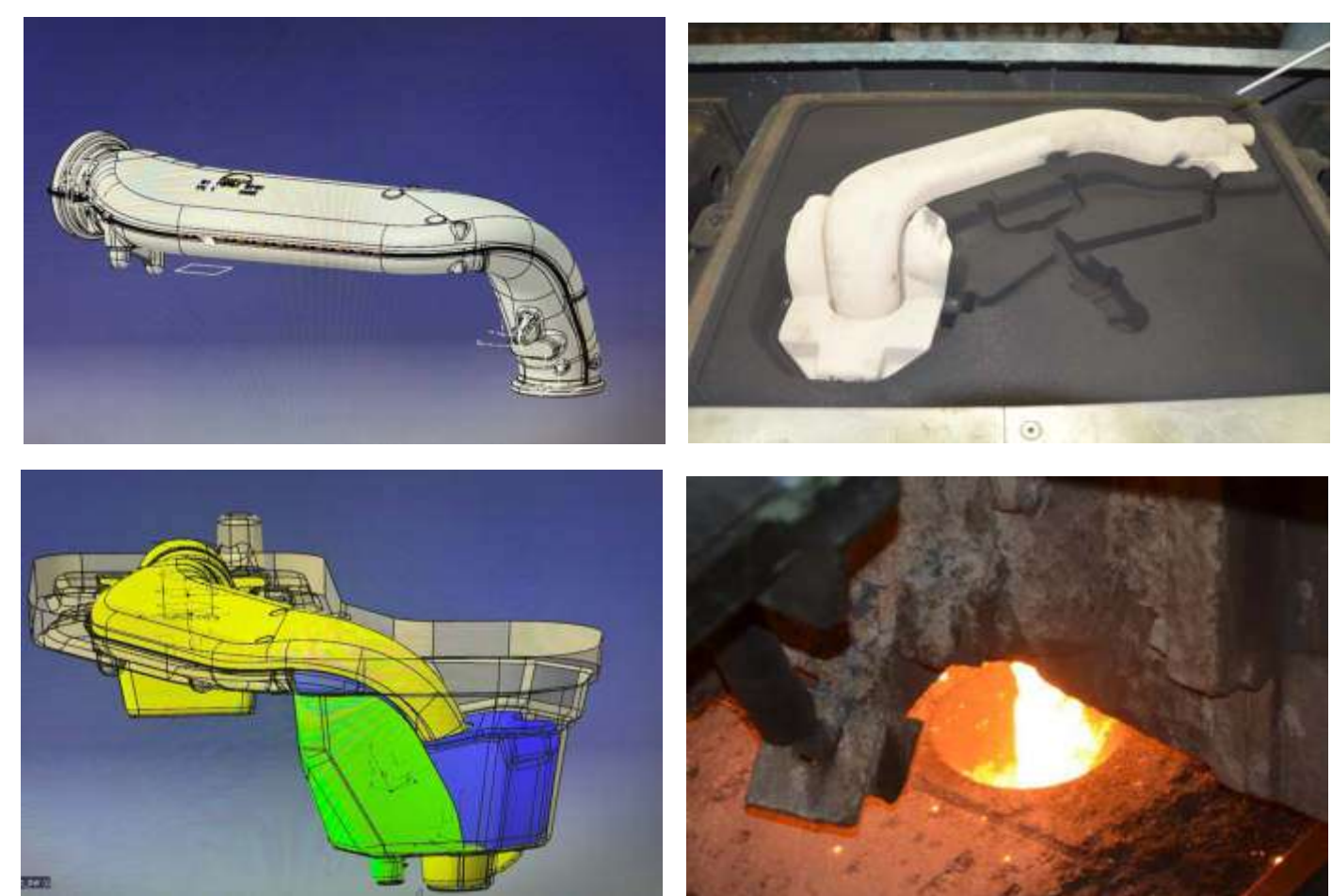
Green sand



Green sand with silica sand, bentonite and additives with low coal content

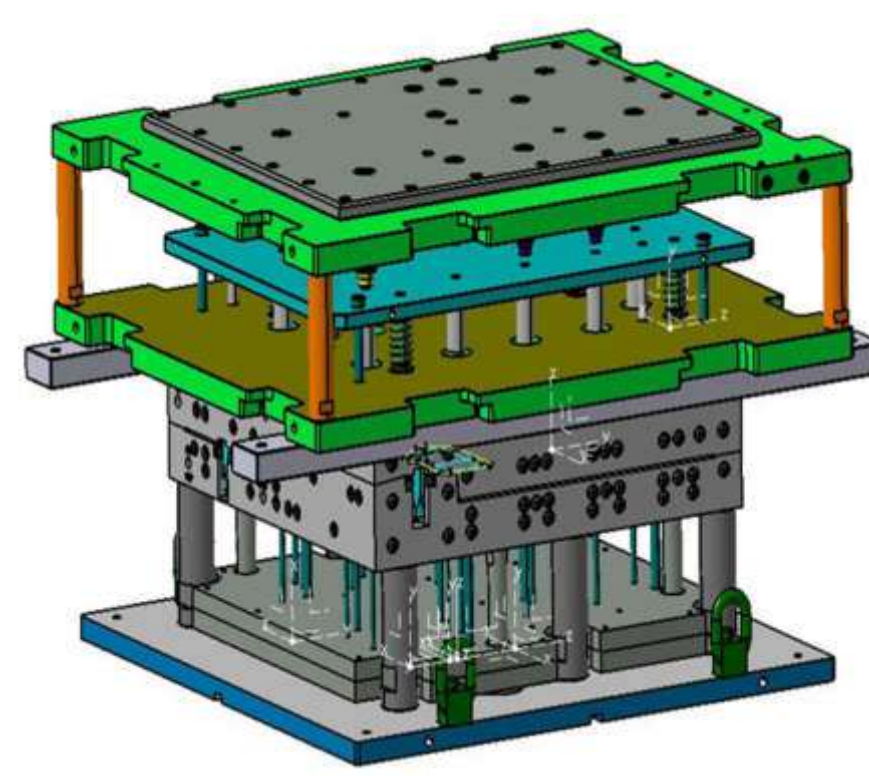
Low Coal Project

Pretests to production cores



DESIGN OF EXPERIMENT N°1

N° TEST	SYMBOL ON CORE	BINDER	PAINT	POURING T [°C]	N° SAMPLES
1	5	STW50	NO	1420	6
2	2	STW20	NO	1420	6
3	O	OB	NO	1420	8
4	O	OB	NO	1370	8
5	2X	STW20	YES	1370	6
6	5	STW50	YES	1370	6



DESIGN OF EXPERIMENT N°2

LETTER	METALLURGY	POURING T [°C]	BINDER	COAT	N° SAMPLES
A	SIMO	1410	STW20	YES	20
B	SIMO	1410	STW20	NO	20
C	SIMO	1410	FB	YES	20
D	SIMO	1410	FB	NO	20
E	SIMO	1410	FV	NO	20
F	SIMO	1410	FV	YES	11



DESIGN OF EXPERIMENT N°3

N° TEST	LETTER ON THE SAMPLES	BINDER	COAT	N° SAMPLES	POURING T [°C]	METALLURGY	TIME
1	A	FV	AB	10	1380	Gray Iron	6:00 AM
	B	FV	WB	10	1380	Gray Iron	6:07 AM
	C	ES	NO	10	1380	Gray Iron	6:14 AM
2	C	ES	NO	10	1380	Gray Iron	6:21 AM
	D	OB	NO	10	1380	Gray Iron	6:28 AM
3	E	OB	WB	10	1380	Gray Iron	6:35 AM
	H	FV	NO	10	1410	SIMO	6:42 AM
4	I	OB	AB	10	1410	SIMO	6:49 AM
	Z	ES	NO	10	1410	SIMO	6:56 AM
	S	ES	AB	10	1410	SIMO	7:10 AM
	T	ES	WB	10	1410	SIMO	7:17 AM

DESIGN OF EXPERIMENT N°4

CURE TIME [s]	CORES PAINT	BINDER P	BINDER A	NUMBER O SAMPLES
35	YES	P1	A1	3
	NO	P2	A2	3
50	YES	P3	A3	3
	NO	P4	A4	3
70	YES	P5	A5	3
	NO	P6	A6	3
90	YES	P6	A7	3
	NO	P8	A8	3

Results

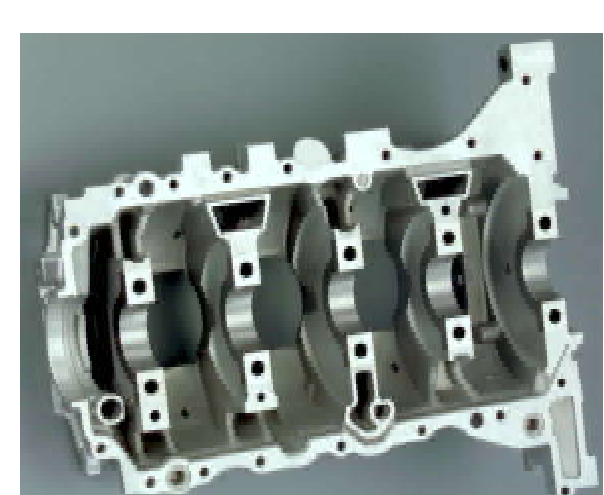


Future Steps

FINISH THE EXPERIMENTS N. 3 AND N. 4 COMPARISON BETWEEN CORES PRODUCTION PROCESSES

1. COMPLETE THE ANALYSIS OF THE PRESENCE OF DEFECTS, METALLURGICAL AND DIMENSIONAL OF THE SAMPLES PRODUCED
2. COMPARE THE RESULTS OBTAINED BETWEEN THE DIFFERENT PRETESTS TO ASSESS THE ENVIRONMENTAL AND ECONOMIC SUSTAINABILITY OF THE SWITCH TO THE PRODUCTION OF CORE FOR THE CAST IRON SECTOR

EXPERIMENTATION WITH EPOSET BINDER IN THE REALIZATION OF CORES FOR SUB-BASES FOR ENGINE



REPLICATE THE STUDY CARRIED OUT FOR THE STAINLESS STEEL SECTOR (1620 °C Melting Temperature)



CARRY OUT PRODUCTION WITH GREEN SAND WITH LOW COAL CONTENT

