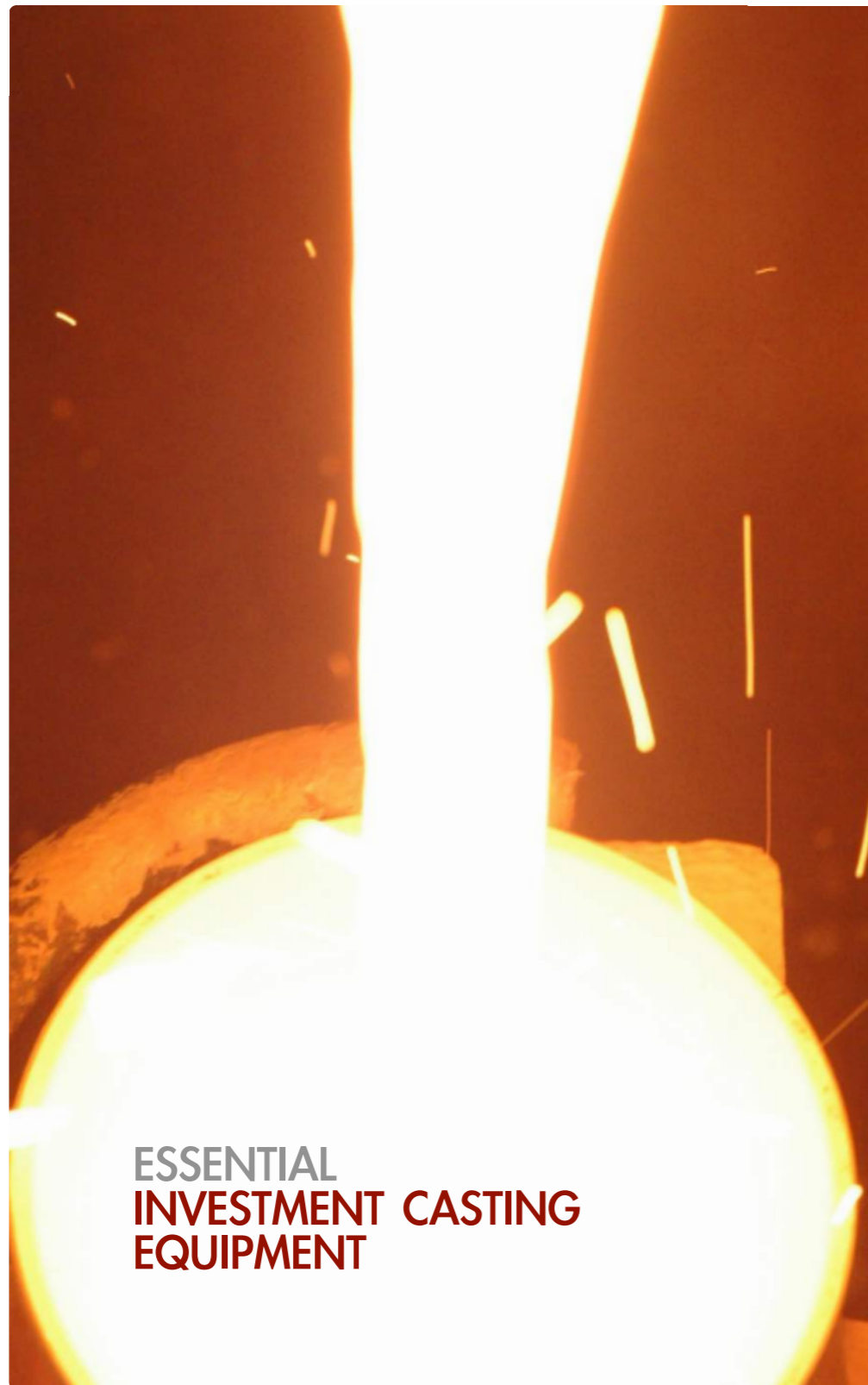




ESSENTIAL INVESTMENT CASTING EQUIPMENT

FURNACES, WAX INJECTION, SHELL MAKING SYSTEMS, CORE LEACH



ESSENTIAL
INVESTMENT CASTING
EQUIPMENT

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FOREWORD

ESSENTIAL INVESTMENT CASTING EQUIPMENT

is a comprehensive offer of equipments and services for the investment casting foundry.

This catalog is born from the expertise of two SMEs of the southern Italy, namely **Mosaico** s.r.l., and **Strazza** s.r.l.

Since more than 10 years, these companies provide cutting edge technology solutions to Italian aeronautic foundries.

Basically, almost all aspects of the investment casting process have been covered and mastered along years: from the wax injection presses to the core leaching process, building new equipment or reconditioning outdated plants, always with production data collected and

ready to be exploited using the most modern IT tools.

Please take your time to browse this catalog, and I'm sure you will find the solution you are looking for that particular need in your process.

Looking forward to share our experience with you.

Riccardo Natale

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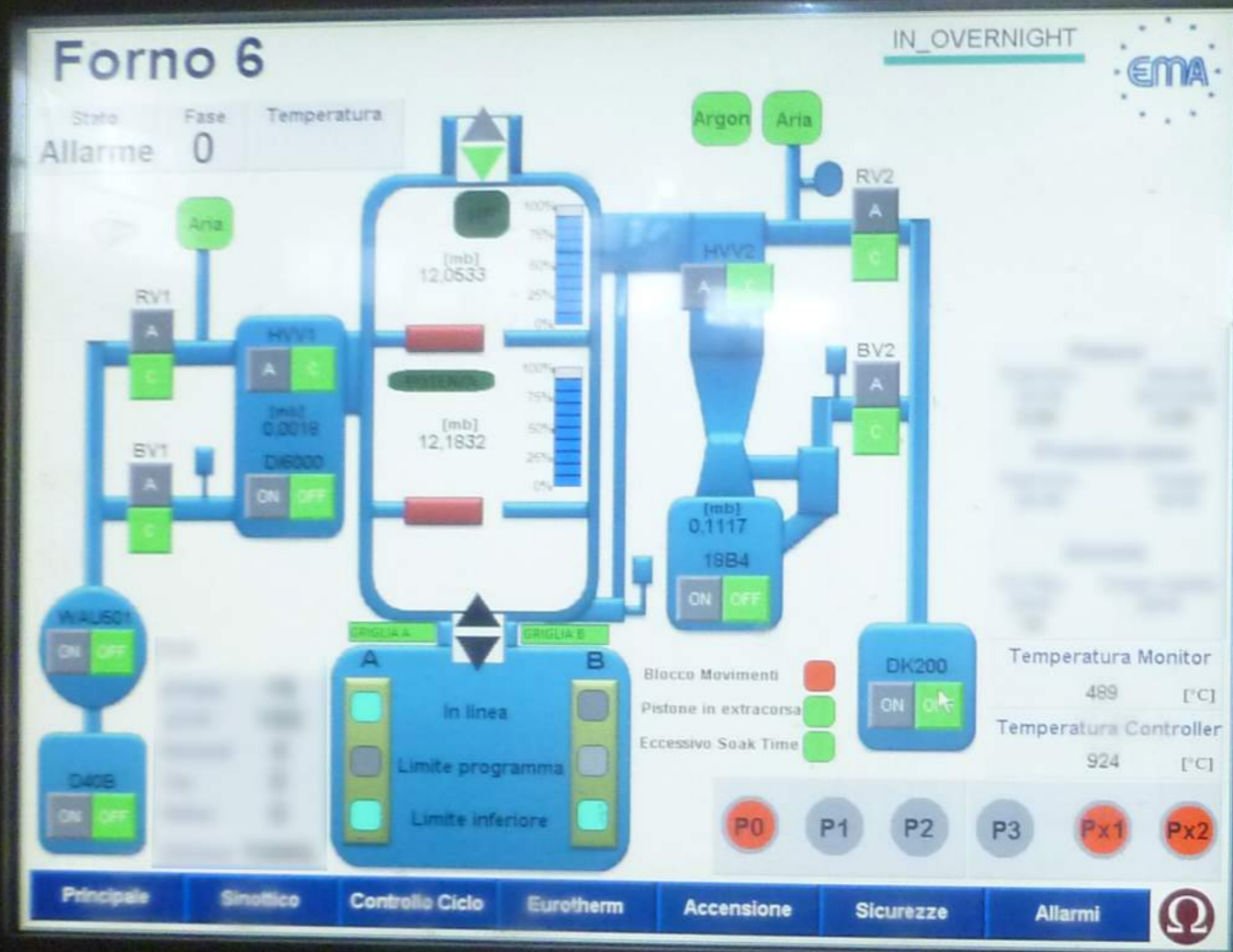
ESSENTIALS

PRODUCE

**CUSTOMIZABLE
EQUIPMENT TO MATCH
YOUR PRODUCTION
REQUIREMENTS**

INVESTMENT CASTING EQUIPMENT

Wax injection, shell making, furnaces, cut up, core leach





PRE CAST

WAX INJECTION PRESS

2 MOVING TABLES

3 AXIS INJECTOR

100 TONS

HIGH PERFORMANCES,

that's the only real requirement.

No matter if your mould needs to be carefully injected at 5 bar(s) or needs to be rapidly filled at 700cc/s, your recipe is always accurately executed.

State of art control technologies give you full command of pressures or flows over either time or injected volumes, so that you can always design the correct filling pattern for your mould.

We design the machines to give you injections with high repeatability with little maintenance, and, when maintenance is due, you will be surprised on its simplicity.

The machine has two moving tables to allow two moulds working alternatively: one is under the press while the other one can be prepared for the next injection.

The press is equipped with a rotatable suspended control



panel, as shown in the picture, or can be supplied with control panel fixed to the shop floor.

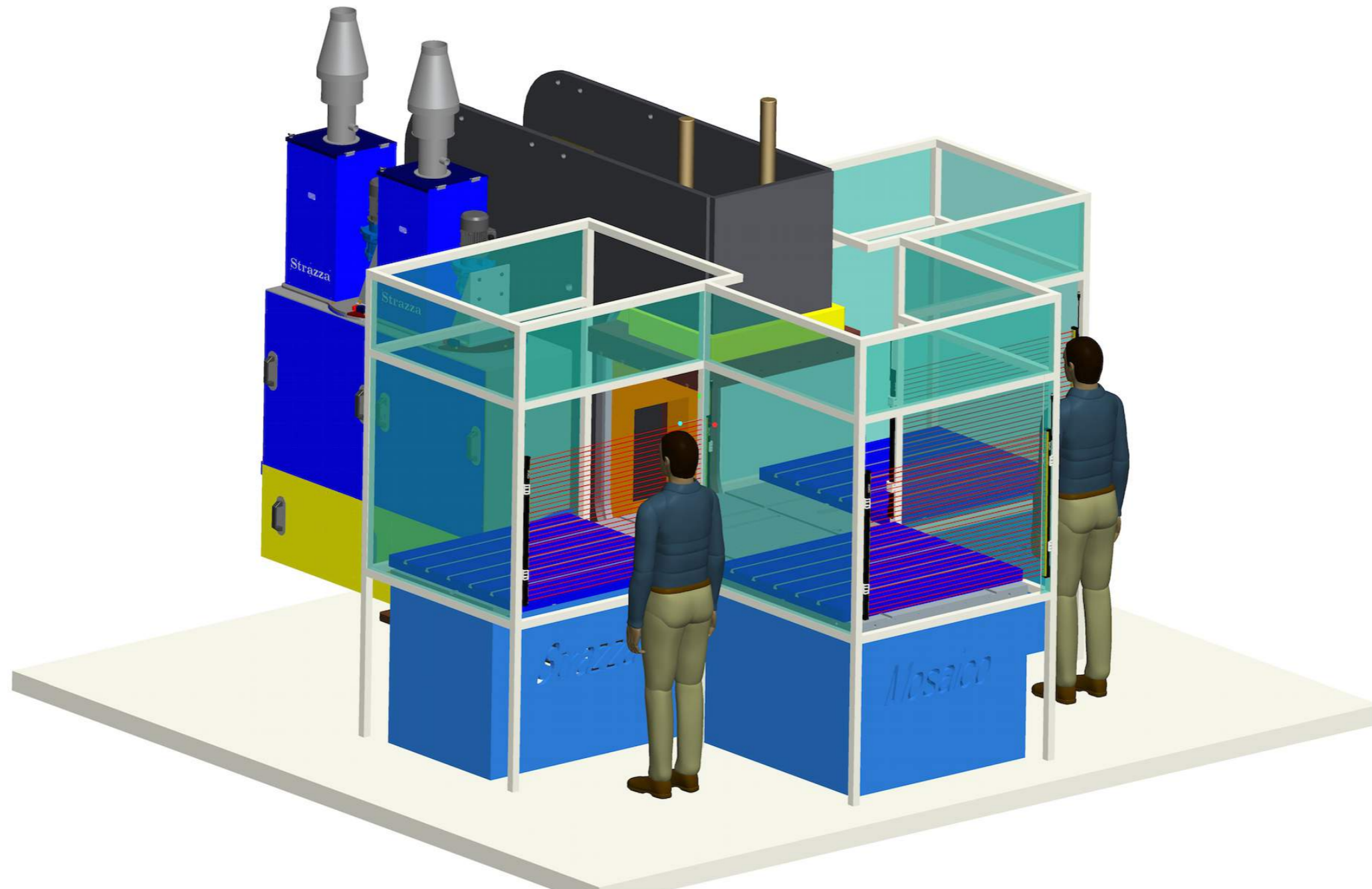
We have also designed a new concept of equipment with three moving tables so to enhance the overall productivity of the machine. As a plus we can supply the press with two built-in wax melters and two independent injectors, so that you can use a single press for two types of wax one injection after the other.

In this type of equipment the two injectors will have each two independent y-axis (the axis that goes toward the mould), while they

will move together along the the z-axis and the x-axis. Only one wax is allowed at each injection.

The two wax tanks, and wax melters will be each equipped with its own wax melter pneumatic filler so to be completely independent.

To help the operator to correctly align the wax injector toward the mould will be helped by 3 axis dome camera positioned to the side of the injector. The machine then learns the injector position, to be re-used for the same mould for subsequent injections.



WAX WORK BENCH

WAX MOULD ASSEMBLY

WORKBENCH FOR MOULD ASSEMBLY WITH 6 INDEPENDENTLY SET WAX MELTER

ERGONOMIC MOULD HANDLER

MACHINES WORKS WITH HIGH EFFICIENCY

but operator care and experience are always needed for optimum results, that's why we design wax workbenches so that your workforce can work with higher precision and less personal effort.

The operator can set the three axis assembly handler in the most suitable position and orientation to complete his job, and he has the melted wax tray right at hand reach. The wax is kept at the correct temperature with 6



independent regulators.

The workbench has been carefully designed so that no shadow will be in wrong position, and the wax vapors will be aspired out of the way with two fix and one orientable extractor hoods.





PRE CAST

WAX DIPPER

CONSISTENCY MATTERS !

SINGLE MELTED WAX TANK
AUTOMATED DIPPER

A SIMPLE IDEA

to put in practice a simple concept: eliminate as many variables as possible from a complex process to make it highly reproducible.

In this case the user requirement is to dip into the melted wax some parts of the assembly to create the first wax layer.

Due to parts shape complexity this equipment has been designed: a tank containing

the melted wax at a specific temperature, a pneumatic cylinder to dip the assembly into the wax with specific timings, and an external shield to repair the operators from hot wax drops.

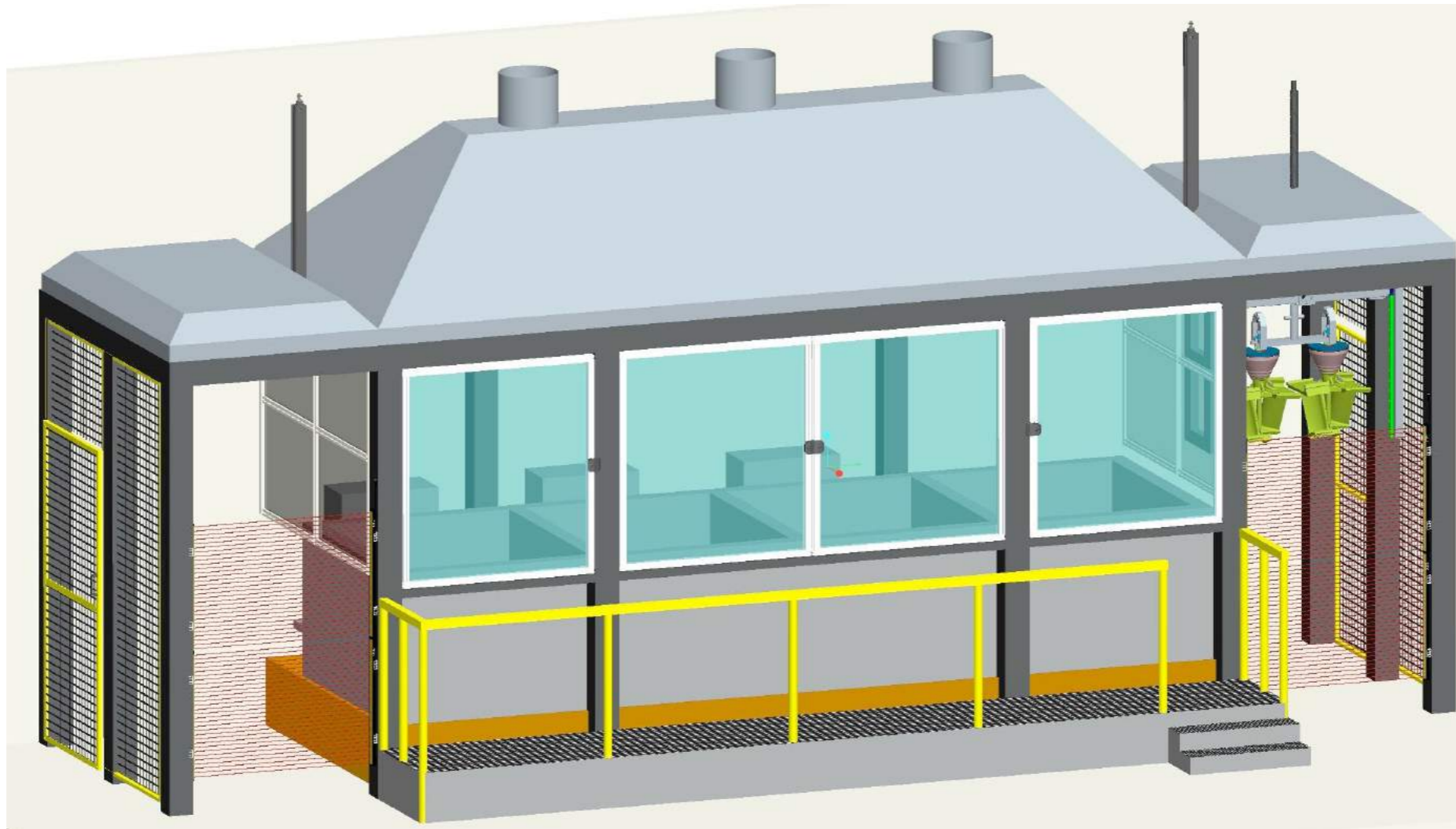
Simple as that but very effective!

ASSEMBLY WASHER

We propose the automatic assembly washer with cleansing solutions and water to process assemblies with higher speed and repeatability: one tank with the cleansing solution at a set point temperature, two tanks with water at two independently set temperature and one drier tank with rotative air nozzle. Air extractors are designed to remove any vapor and safety gates protect the

operator from incautious access to the equipment while it's moving. Transparent interlocked doors permit access to the tanks for inspection and maintenance.

The equipment is designed to be installed along the wall to reduce the workshop overall volume occupied.



6 AXIS ROBOT
MULTIPLE TANKS
MULTIPLE SANDERS

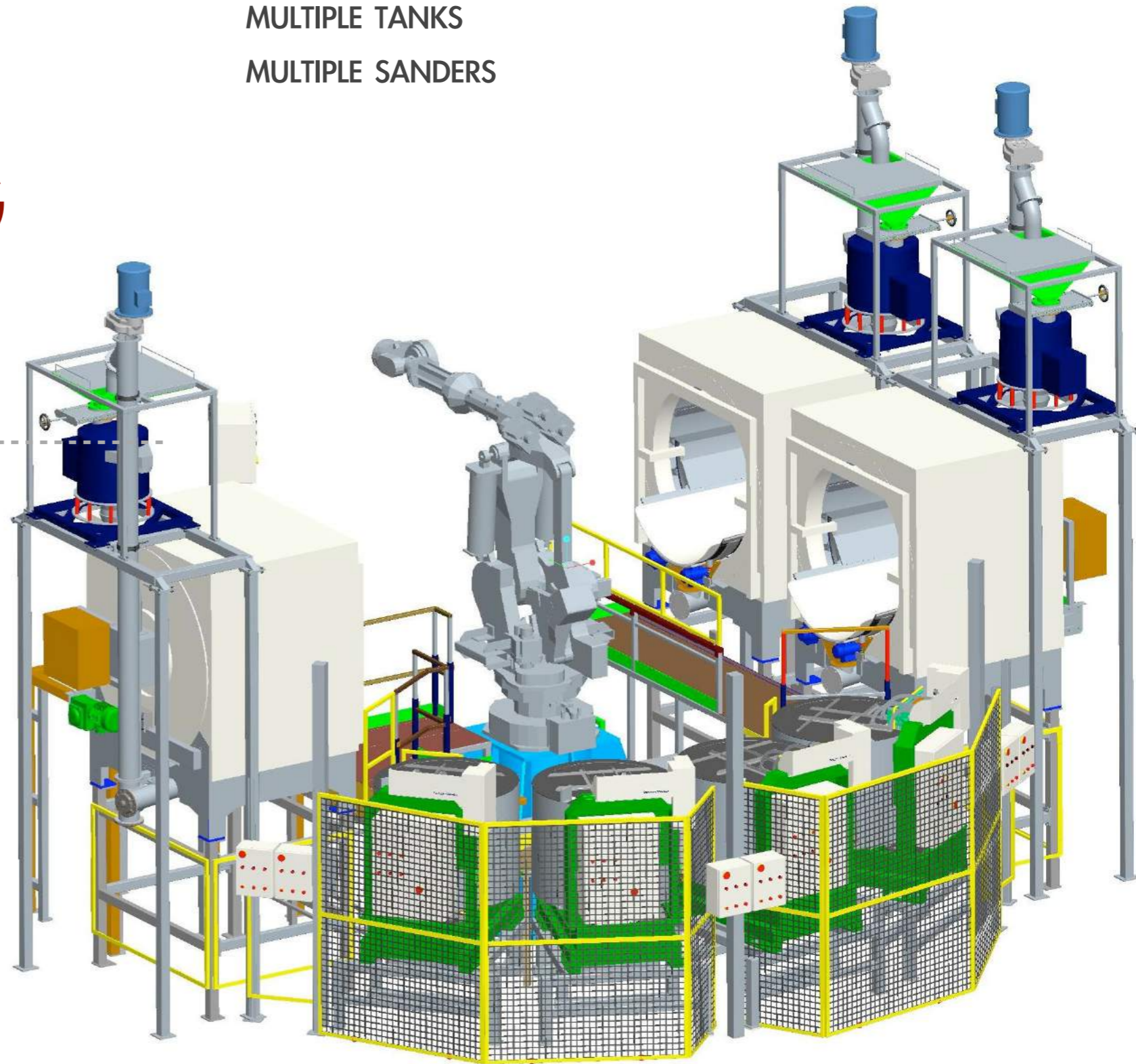
SHELL MAKING SYSTEM

DESIGNED TO SUITE YOUR PROCESS
REQUIREMENTS

WE BELIEVE

that the design and the construction of a shell making plant is a team job; many skills are necessary to make it work: electrical engineers, mechanical engineers, IT engineers, safety specialists, all of them well coordinated. At the same time in a shell making system, there are rotary tanks of different sizes, sanders, shell driers, automatic lifters to load and unload the finished shells, data acquisition system, and everything is orchestrated to serve the main robot standing in the middle.

Safety is our main concern in all plants, but this one require specific attention due to the robot presence. It will be our pleasure to show you each



detail that make this plant safe for the operators and very easy to use and maintain.

One of the most important concept you have to care about when designing this kind of work cell is reliability. For whatever reason this plant stops due to power supply failure, the plant must restart as soon as energy recovery occurs without losing the partially finished shells. That's why we have designed this plant to accept two different power supplies so that if first fails, the electric cabinet automatically switches to the one still available.

At each working step, all data are backed up on your database server, so that in the remote event that both power supplies fail, or in the unlikely event that the main PLC cpu fails, you can recover from backup without losing a single shell, or a single rotary cabinet slurry.

Our rotary cabinet are designed to recognize their position inside the cell or outside in the maintenance areas, so that every operation done with the tank is recorded and stored away for later analysis.

The tank itself is designed to be safe for the operator and safe for the process. Each tank has its own rotatory speed (inverter) and temperature regulation on board, so that it can work far from the cell in the slurry preparation area, but still networked with cell to keep track of the operations.

Simplicity first: each tank has only one connector with power, network, position identification signals and compressed air, so that with just one plug, you will have the tank up and running.

As a plus, our rain cabinet are equipped with sand sievers to remove the sand that does not respond to requirements.





PRE CAST

STIFFENING

STIFFENING MACHINE

8 STATIONS

FULL AUTOMATED

TO BUILD A MACHINE

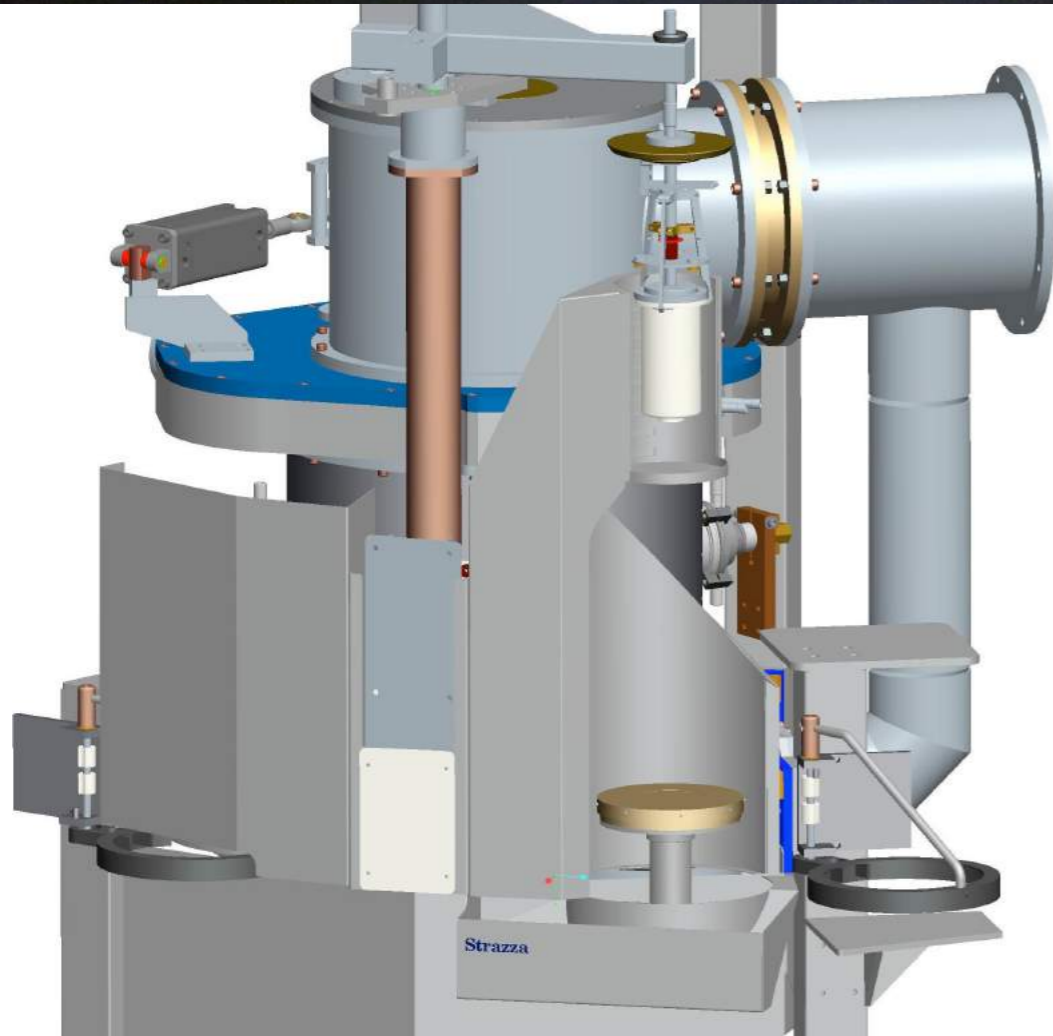
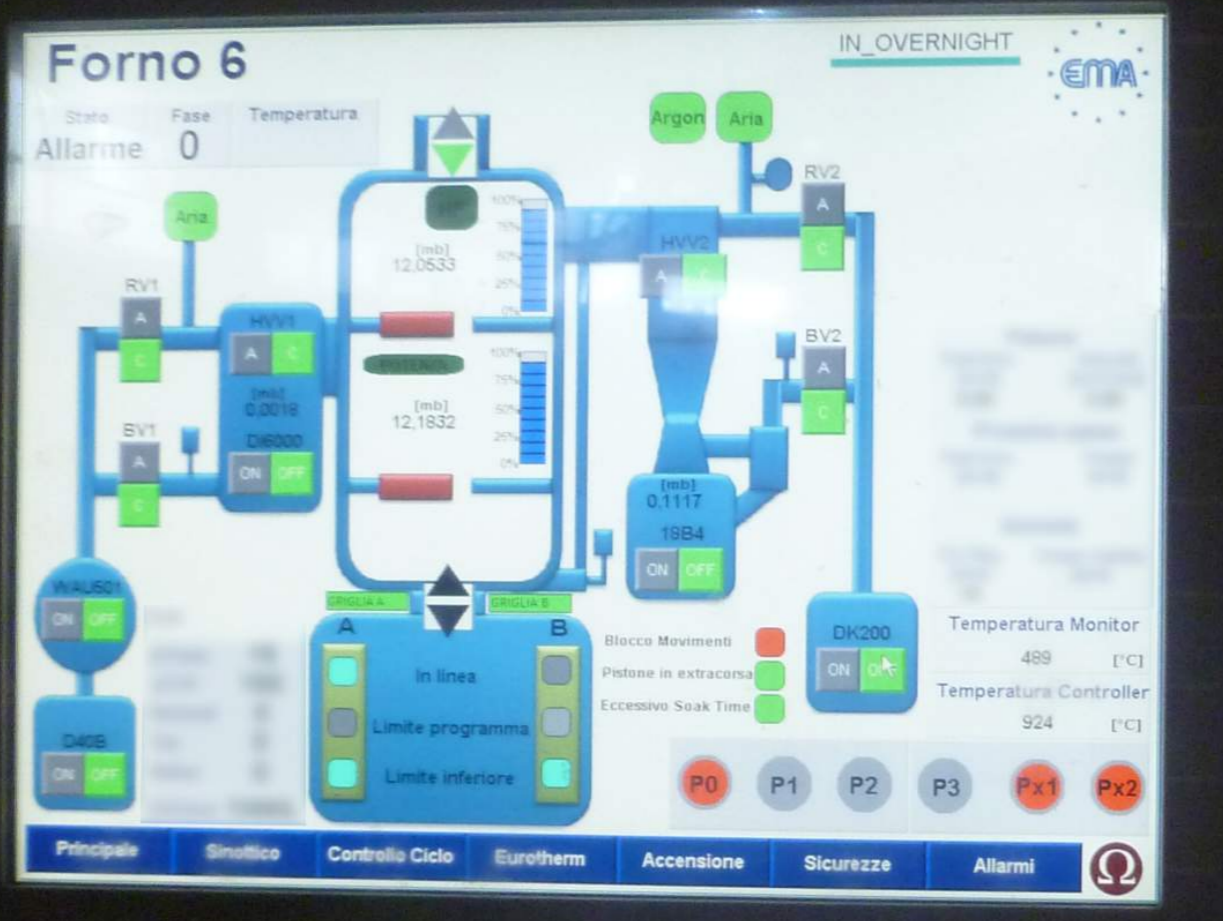
it is not sufficient to be a proficient machine builder; you must gain deep knowledge about the process you are automating.

That's why we work shoulder to shoulder with our customers to find the best solutions to the production needs. For example we always design the first recipes to be used on our equipments. This way we learn from our customers, while training the operators.

From our experience we have give birth to the stiffening machine. With this machine you can stiffen ceramic parts by subsequent soaking phases in synthetic urea.

Different parts, with different recipes, can be treated simultaneously in this equipment with high time efficiency.

The equipment has been modularly designed so that it can be effortlessly adapted to every production need.



CAST

CASTING FURNACE

2 RAMS

INCREASED PRODUCTION EFFICIENCY

CASTING IS TECHNOLOGY,

but mastering the casting technology is an art.

We have optimized a furnace with two rams. Several different size for ram diameter are available. Furnace temperature is regulated with a pyrometer and casting temperature can be periodically calibrated with an external thermocouple

Furnace start up and furnace shut down are automated, and temperature control is achieved within tight range.

We provide modern software tools to design the cast recipe, that the furnace will strictly comply with.

And all the working parameters all collected and stored along with the casting recipes on external databases. Tools to analyze the casting data will give you feedback on your production choices.

Your engineers will love to finally take full control of the casting process.



Automatic Probe Check and Full Thermal Profile procedures
Mosaico Monitoraggio Integrato s.r.l.

CAST

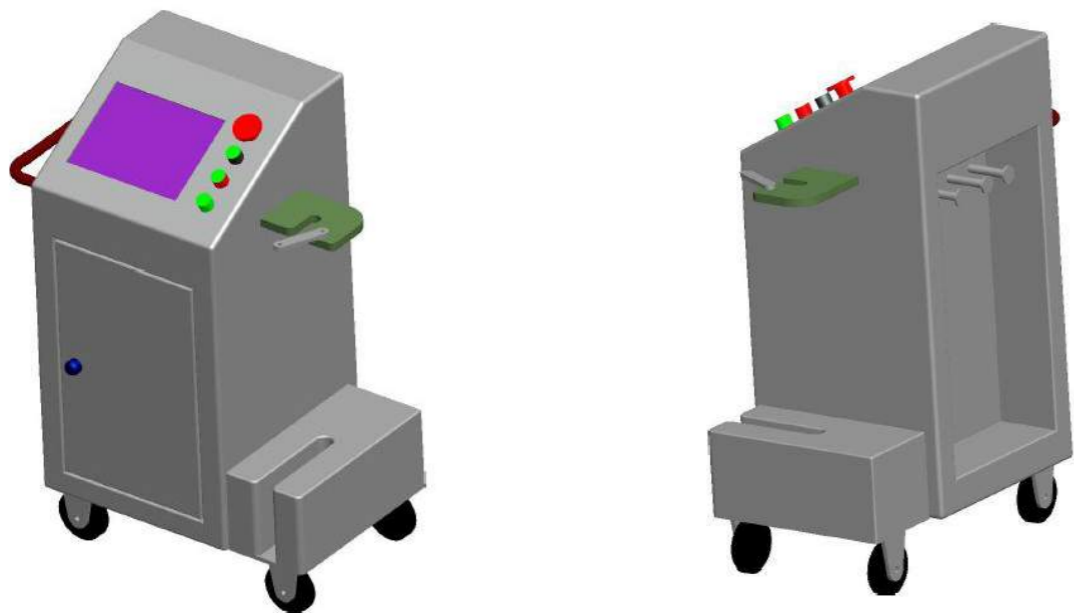
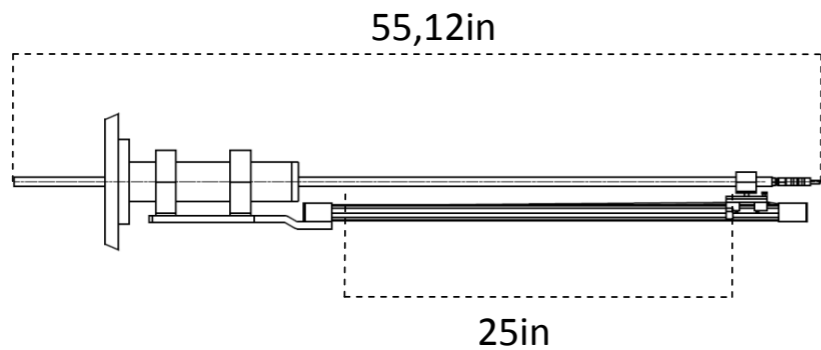
PROBE CHECK

AND FULL THERMAL PROFILE AUTOMATED

MOTORIZED THERMOCOUPLE PROBE

TEMPERATURE GRADIENT

FURNACE TEMPERATURE CALIBRATION



FURNACE TEMPERATURE

is maybe the most important parameter that needs to be guaranteed for a successful cast, and most of the times the temperature is read with a pyrometer. The value read by the pyrometer is then used to close the temperature control loop around the set-point temperature.

To account for the natural drift of the pyrometer readings, the temperature must be

measured with higher precision inside the furnace at specific depths.

The automated probe check (APC) let you automatically obtain the furnace thermal profile, and can be interfaced with your main furnace control cabinet to auto adjust the set point to match the desired furnace temperature.

GRINDING

MACHINE WITH TWO STATIONS

2 INDEPENDENT STATIONS

2 BELTS GRINDING AT 2.000 RPM

TIME AND MATERIALS EFFICIENCY

TIME IS MONEY

so we designed a machine that saves working time by dynamically measure the real height of the part under process before starting the process itself. In this way the machine starts the grinding operation just where the grinding is needed, thus saving unnecessary steps.

Furthermore the equipment adjusts the relative position of the belt so that almost all the belt surface is used thus saving the number of belts used per unit time.

Given the high energy consumption of this type of equipment, the electrical cabinet is recover energy during motors deceleration.



CUT-UP

WATER JET CUTTER FEEDER

2 INDEPENDENT COORDINATED STATIONS

1 SUCCESSFUL RETROFIT

RETROFIT TO RENEW

an outdated equipment is crucial to keep the pace with technology evolution, but it is also vital to make a good design to truly benefit from it.

As an example we tell you about the retrofit an old water cutter, which still did very good the cutting job, but needed an update.

Besides the mandatory safety upgrade to the equipment, we came up with an add-on automatic feeder which could load the water cutter with pre-made trays of part to cut.



The operator can prepare the trays well outside of the dangerous area and load the cutter constantly remaining out of contact with single drop of water.

Furthermore the feeder has been built with two stations, so that while the operator is unloading and then loading the left tray, the machine is cutting what has been fed to it by the right tray.

With this retrofit we upgraded the old equipment by adding safety and increased production with just one add-on.

DRESSING

WORKBENCHES AND TOOLS

3 AXIS MANIPULATOR
AIR EXTRACTOR.

OPERATOR TAILORED WORKBENCHES

design descends from accurate observations of the operator at work. We have designed a dressing workbench, with proper illumination and lightings, with a 3 axis manipulator which can be oriented by the operator the way that most suits the job he is performing.



CORE LEACH

INTEGRATED PLANT

CUTTING PRODUCTION COSTS WITH CHEMICALS USE OPTIMIZATION

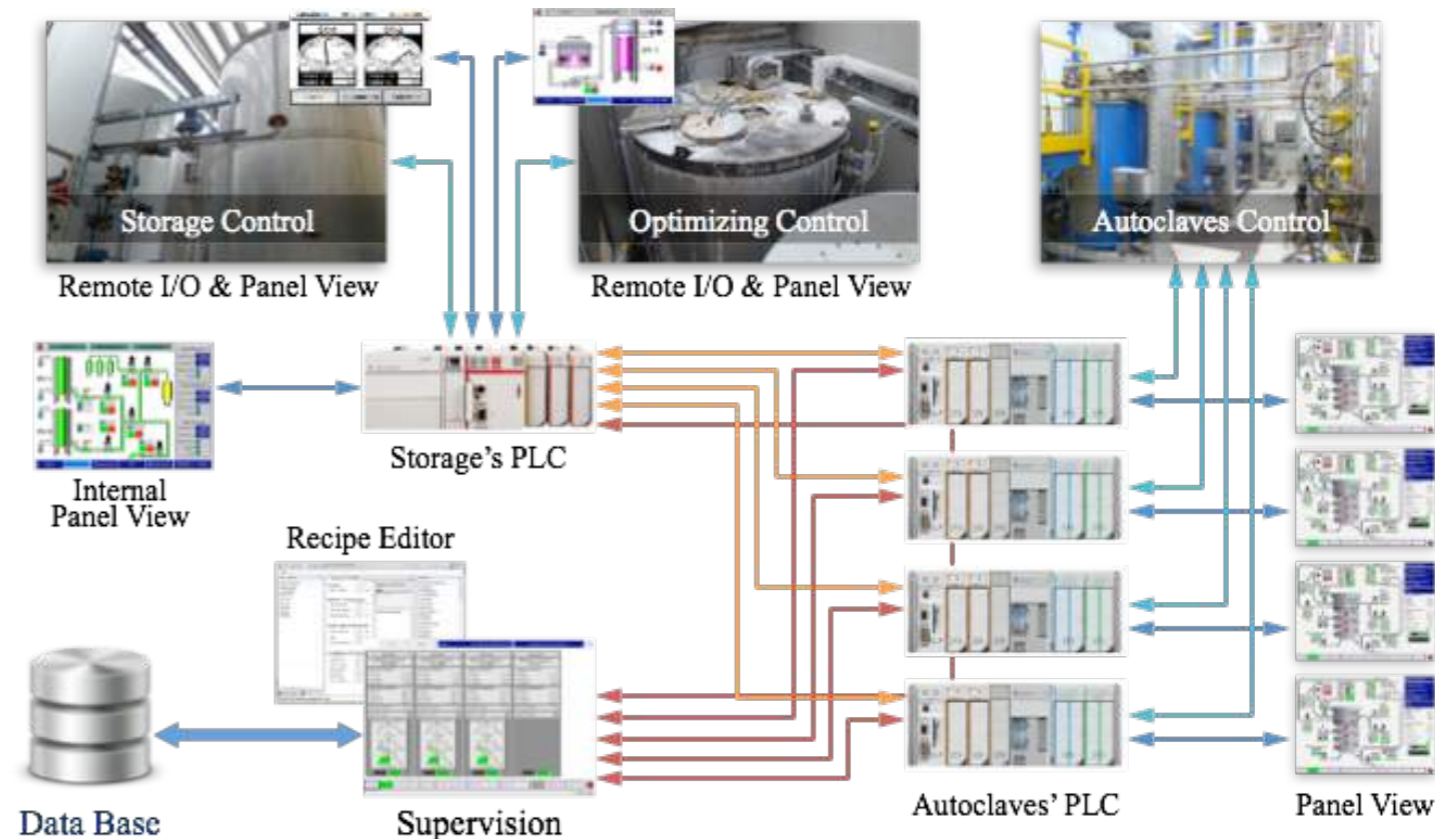
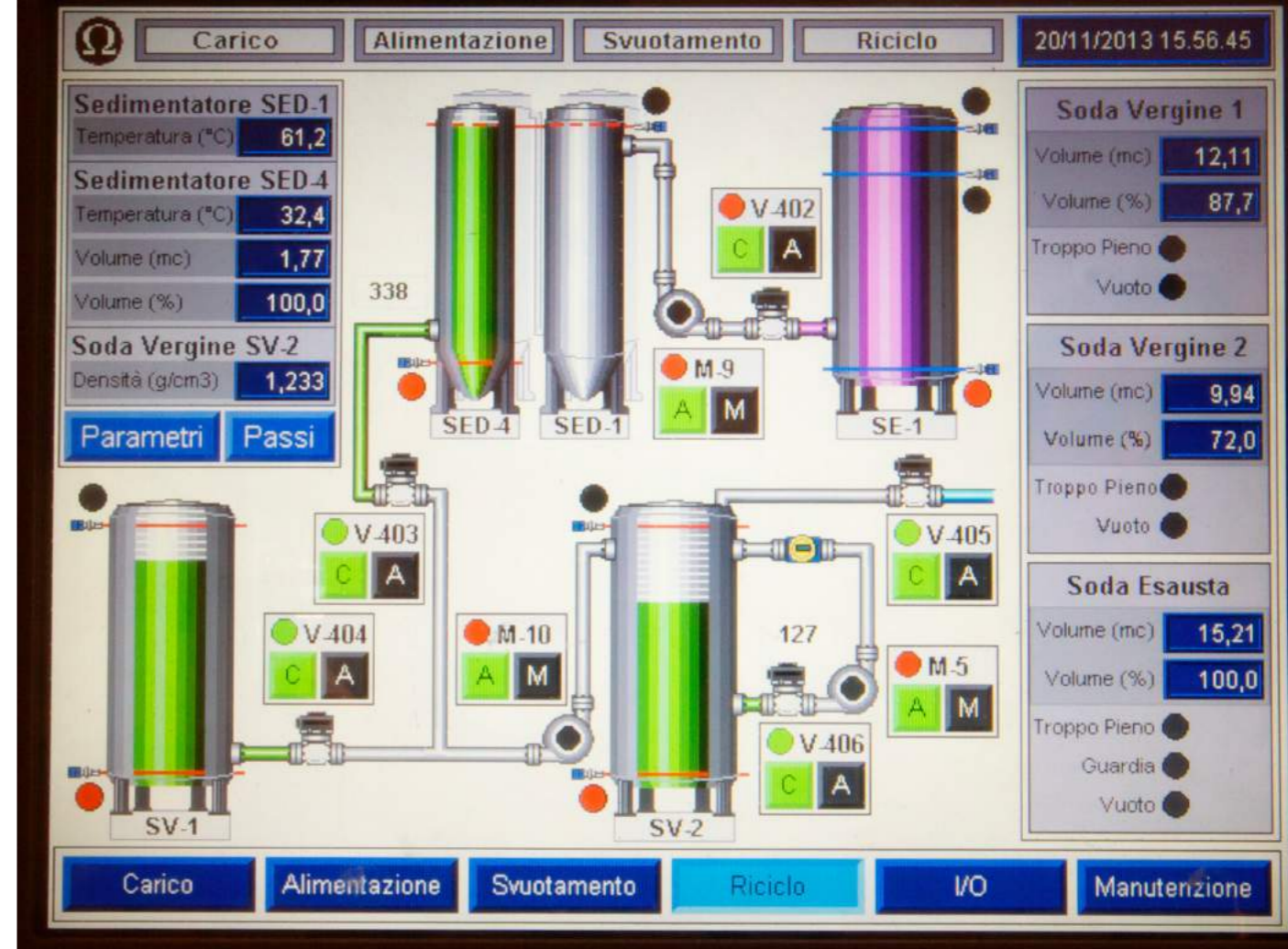
WE DON'T BUILD AUTOCLAVES

but we have a deep knowledge of the core leaching process.

We propose an integrated plant that manages the chemical treatments and the chemicals storage, in a way that let you save a great amount of caustic soda per production batch.

With just one supervisory positions, you can handle the initial soda loading, the feeding of soda to the autoclaves, actually knowing when its time to book your new soda supply.

If you decide to re-engineer your old autoclaves with our integrated technology, the amount of real cost you will cut will be literally amazing.





POST CAST

BLADE DRYER

WITH HOT WATER

AFTER FLUXING CASTING INTERNAL CONDUCTS

A DEEP BATH IN HOT WATER

is just what is needed to efficiently dry a group of almost finished castings.

The operator puts the set of castings into a metal basket, which is then dipped inside a tank of boiling water for a predefined amount of time.

When ready, the basket comes up again and the temperature of the castings let the remaining water evaporate through the air extractor.

When done, a compressed air gun comes handy to the operator to remove any residual water droplet.

The equipment can be directly connected to the plant water supply to automatically replenish the tank to the working level.

The tank is well isolated to speed up the water temperature rise at startup and to reduce energy costs.

CONTROL

ENVIRONMENT CONDITION MONITORING

SCALABLE

COST EFFICIENT

KNOW THYSELF

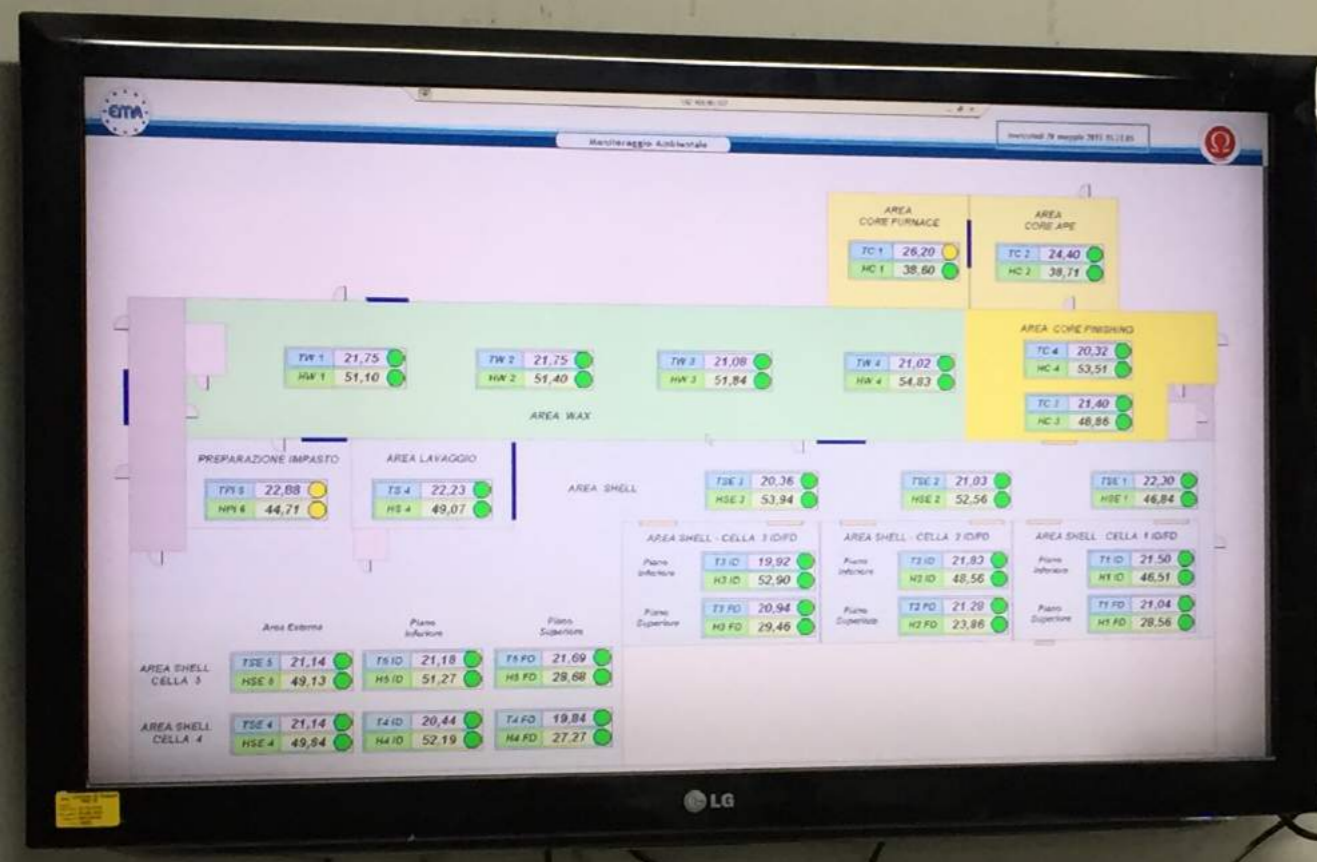
is a must to manage a complex and long production process. A subset of the many variables influencing the investment casting process contains the environment parameters: temperature and humidity.

We propose a scalable system using which an entire plant can be covered. The system is made up of a hub for up to 8 coupled temperature/humidity sensors. Each hub is then connected to the plant local

area network, to reach a data storage server. Throughout the plant as many as needed monitor can be installed to inform workers and maintenance operators on the environment condition.

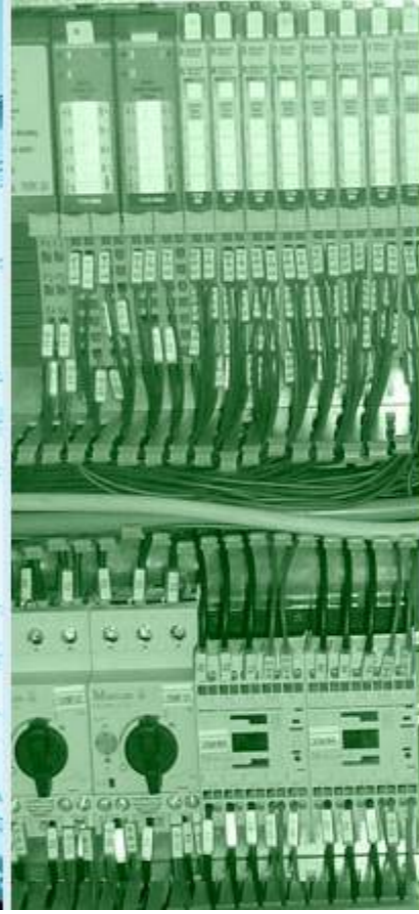
Panels are designed to show the actual readings but what is most important, the informations are also shown with simple green/yellow/red indicators to signal anomalies.

Data can be downloaded from the server for later analysis.



ESSENTIALS

PARTNERS



**MULTIPLE EXPERTISES
ONE TEAM.**

MOSAICO

MONITORAGGIO INTEGRATO S.R.L.

SPIN-OFF COMPANY OF THE UNIVERSITÀ DEGLI STUDI DEL SANNIO IN BENEVENTO, ITALY.

We are system integrators,

and as system integrators we strongly believe that constantly developing our competencies is the only way to assist our customers during daily high quality manufacturing.

We can be valuable partners of machine builders to co-design new equipments by exploiting the most recent industrial technology advancements, or we can improve directly on production sites KPIs by fine tuning existing plants.



Understand Design Wire up Commission Go live!

Our expertise ranges from discrete to continuous process control, distributed as needed on modern information networks with applications to robotics.

Beside applications to aeronautic industries as shown in this publication, we have experience in environmental monitoring in nuclear plants, and railway test equipment.

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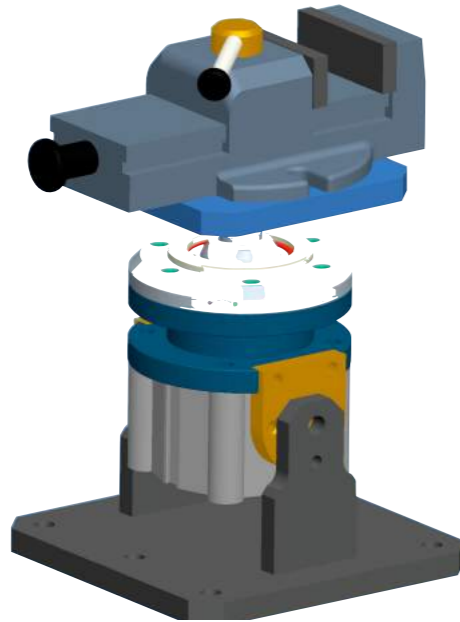
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STRAZZA S.R.L.

INDUSTRIAL PRECISION MECHANICS

CUSTOM DESIGNS FOR INVESTMENT CASTING FOUNDRIES.

Effective designs

cannot prescind from a deep knowledge of customer implicit requirements; only more than a decade long experience in the field can provide successful solutions.

We offer well tested solutions for ergonomic workbenches with specific tools, handling systems, lifters and conveyors leveraging our side competences in hydraulic and pneumatic systems.

Co-design with the customer is important to us, so we share

concept drawings and final drawings throughout the design process, until we put everything in production.

Our services include training on site and post-sale assistance.

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