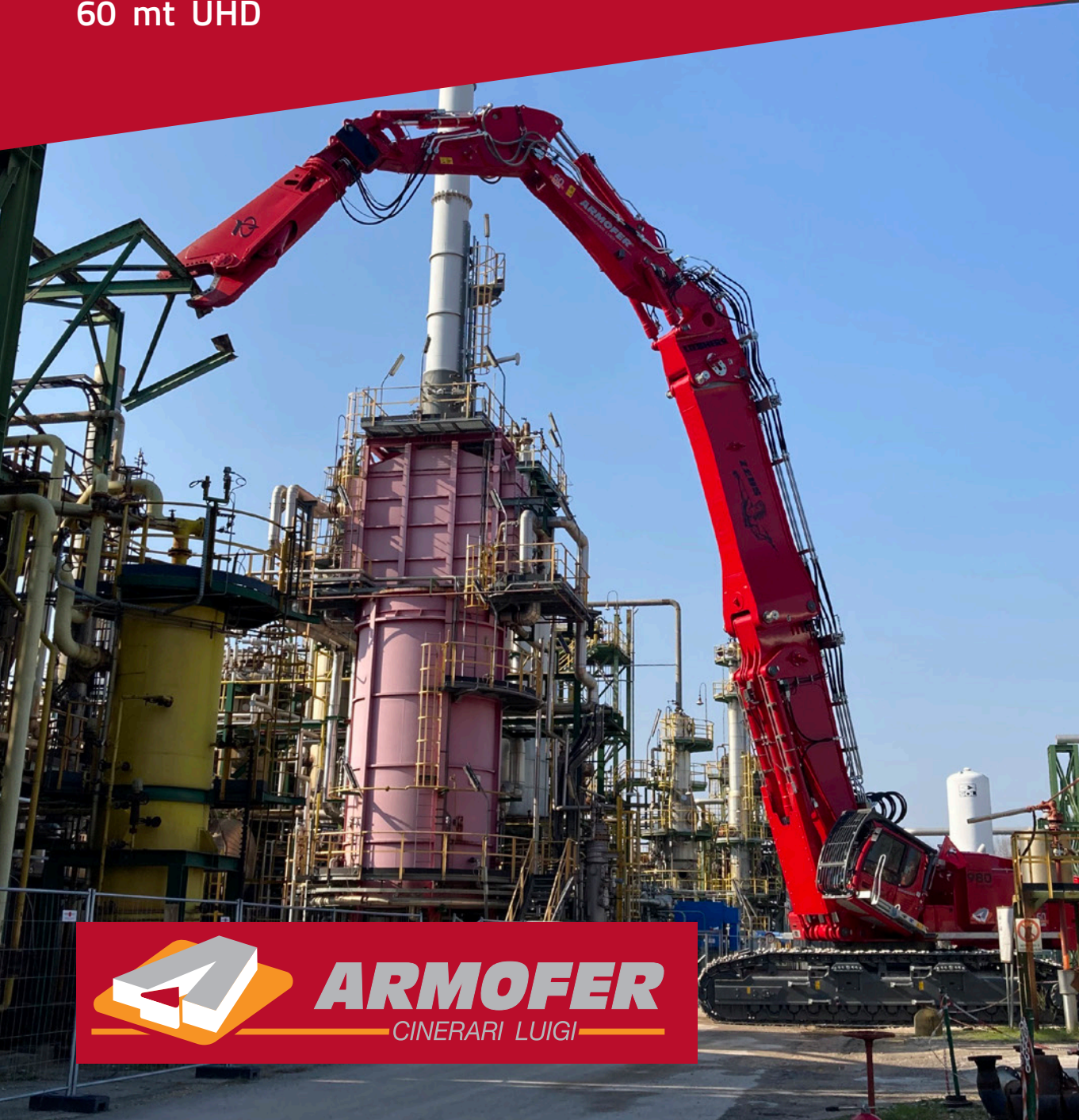


ZEUS  
LIEBHERR  
R 980 demolition

200 tons  
60 mt UHD



**ARMOFER**  
CINERARI LUIGI

## Focus: Lowering boilers

**The boiler lowering procedure in the power plant in Vado Ligure (SV Italy) is, for Tirreno Power an intervention with great attention to detail, carried out with new technologies configured ad hoc to guarantee safety and sustainability.**

Armofer Cinerari Luigi srl, the Italian decommissioning leader, based in Siziano (PV) and operating in Italy since 1961, took over the Tirreno Power site in Vado Ligure in July 2021 to undertake the complete decommissioning of the two decommissioned VL3 and VL4 thermoelectric groups.

After the decommissioning of the plant's insulating materials and the preliminary stages of demolition, having completed all the structural studies and executive details of the steam generators demolition project, Armofer is tackling the work at the heart of the plants: the boilers lowering, completed in January 2023.

Armofer employed state of the art technology, configuring its own hydraulic system.

Drawing on the experience gained in a long series of similar interventions (seven boilers in the last two or three years, all over Italy), Armofer's Lowering System 2500 is a modular system, consisting of hydraulic jacks and dywidag bars, configured according to the needs of Armofer's technicians, with the most up-to-date technology, in synergy with Enerpac.

The hydraulic lowering system has now become the standard required by the market for the high safety guarantees it offers. In fact, this technology drastically reduces the presence of operating personnel at height, in situations of potential risk due to the height and the use of oxyhydrogen flame for sectioning.

The particular flexibility of the configuration of the Armofer system makes it unique and capable of adapting to the static scheme of the structures, according to the needs of the engineers who, prior to the intervention, study the static scheme of the structure and prepare the methods for taking charge and operating

the system.

The hydraulic rappelling system, conceptually, is quite simple. Its application, on the contrary, is extremely complex. The huge boiler is housed inside an imposing 60 metre high steel girder structure, which supports the actual boiler. It is suspended from the castle by tie rods anchored in the roof. Due to the thermal expansion of the metals of which the boilers are made, they need to be suspended and not rest on the ground. The sophisticated modular hydraulic system consisting of several hydraulic jacks and very high-strength threaded rods is housed in the roof of the plant yoke and the rods anchored to the boiler body. The system conceptually replaces the original fixed rods.

At this point the structure in charge of the progressive lowering hydraulic system, physically sectioned into each of its accessory parts of piping and installations, is lowered into the castle itself in successive cycles.

It is a matter of monitoring the planned descent, being able to intervene punctually in each part and appropriately alternating the rappelling cycles with the demolition phases of the building from the ground, for the part that remains correctly exposed and accessible to the mechanical demolition excavators.

In the field of demolition from the ground, the biggest machines of the 'red fleet' are the Liebherr 960 demolition and the Liebherr 974 demolition.

For the demolition to succeed safely, it is a matter of correctly orchestrating the procedure by calculating every action down to the last detail. There are many variables, and the work begins with analysing the existing static scheme in order to configure the new static scheme with the jacks, calculating their number (which must always be suitably redundant), position, individual calibration, etc. The access to the base created to be able to work with the mechanical excavator is also studied in advance and dimensioned.

Once in place, the hydraulic system remains in

operation for the entire duration of the overall demolition of the 60 metre high building.

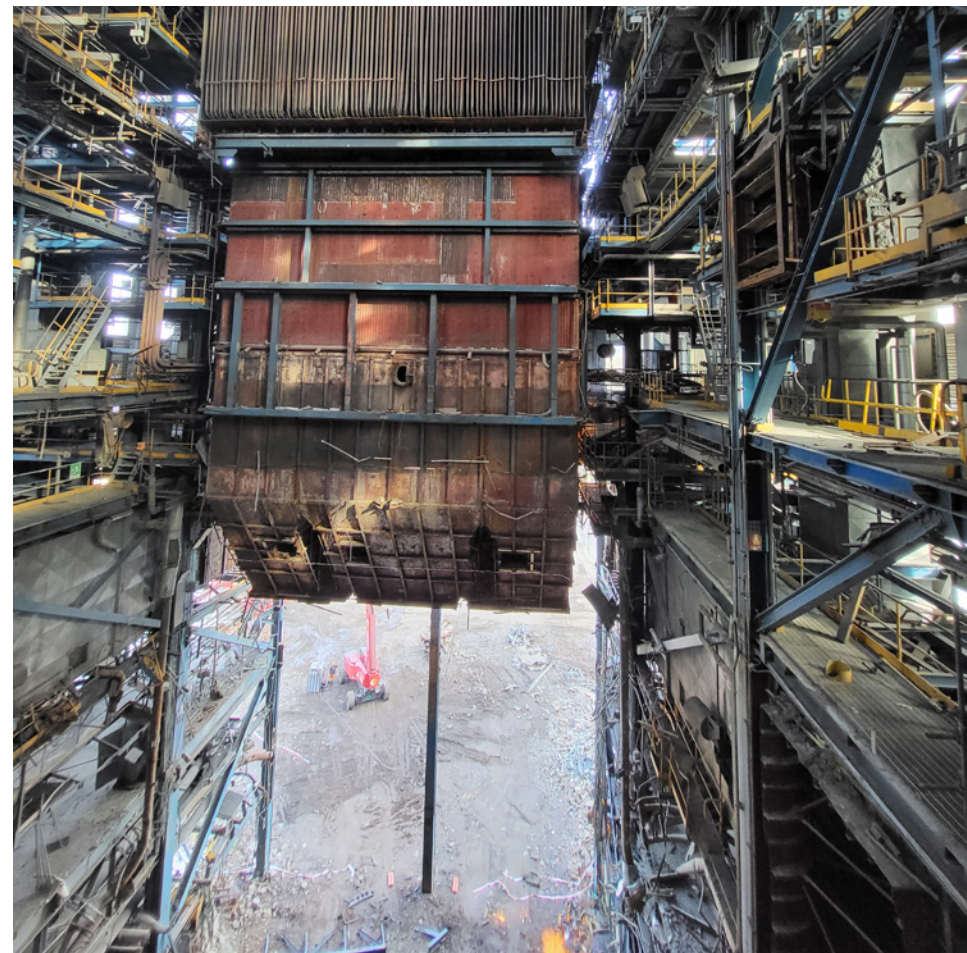
Each basic rappelling cycle, corresponding to a vertical movement of 70 cm, takes around 20 minutes, with a team of nine people on site. The abseiling phase requires lowering the artefact by approximately 15 metres. The 'lowering' therefore takes a couple of days each time, then the part that has become accessible (about 15 metres) is demolished by the excavator on the ground. A new lowering phase is repeated, and so on until the entire artefact is brought to the ground.

The modularity of the Armofer Lowering System can count on 36 hydraulic jacks capable of carrying around 103 tons each, and leaves the designers with the greatest flexibility in configuration and ease of set-up. There are therefore no limits to the weights to be handled, nor to the heights that can be covered with the modular dywidag bar system.

The Armofer Lowering System 2500 places great emphasis on completely safe operation. The system is semi-automatic and requires explicit manual confirmation by the technicians in charge that they have carefully carried out all the necessary verification procedures to be repeated every time a partial lowering takes place. In addition, the automatic control system constantly displays the load distribution at each point in real time. An automatic safety lockout system comes into operation should it detect an unforeseen drop in pressure at any point.

#### **Scheme of operation**

On the right is the lowering system used on the Vado Ligure units, for each phase. The unit to be moved, totalling 1950 tons, was divided into two blocks for safety reasons, thanks to the configuration of the object consisting of the actual combustion chamber and the economiser, which can be "easily" separated from each other with appropriate service sections.



#### **Phase 1: Lowering VL3 combustion chamber**

Weight: 867 tons

Employed: 18 jacks, capacity 103 ton/each.

Lowering cycles: 4 cycles x 15 m each.

Status: 24/05-16/06 2022

#### **Phase 2: Lowering VL3 economiser**

Weight: 1,585 tons

Employed: 24 jacks, capacity 103 ton/cad.

Lowering cycles: 4 cycles x 15 m c ad.

Status: 7/09-6/10 2022

#### **Phase 3: Lowering VL4 combustion chamber**

Weight: 903 tons

Employed: 18 jacks, capacity 103 tons/cad.

Lowering cycles: 4 cycles x 15 m each

Status: 09/11-01/12 2022

#### **Phase 4: Lowering VL4 economiser**

Weight: 1,480 tons

Employed: 24 jacks, capacity 103 tons/each.

Lowering cycles: 4 cycles x 15 m c ad.

Status: 16/12/ 2022 - 20/01/2023