

package boiler  
**TITAN M**

utility boiler  
**MVF**

radiant boiler  
**MRD**

**industrial boilers**

for oil & gas and petrochemical sectors

**MACCHI North American Operations are directly managed in offices based in Houston, TX.**

MACCHI range of products and services includes  
Industrial watertube boilers,  
gas, oil and crude oil fired

Heat recovery boilers

- HRSG (heat recovery steam generators) downstream Gas Turbine up to 260 MWe
- WHB (waste heat boilers) for industrial process heat recovery

Marine boilers

Turn key steam plants for platform and FPSO  
(boiler and steam turbine integrated plants)

Low NOx burners (gas and oil)

Rehabilitations, fuel conversions, retrofits of existing industrial boilers

Throughout its 55 years of experience **Macchi** has developed a fully shop prefabricated and skid modularized concept of delivering Boilers & HRSGs called **Plug&Play**.

Pressure parts, insulation, burners, piping, structures, instrumentation, valves are shop pre-mounted, wired and tested on a permanent frame and delivered as a single module, suitable either for RO/RO and LO/LO, minimizing dramatically the remaining site activities and all the relevant overhead costs.

**Macchi Plug&Play** module is the solution for Large Equipment Construction cost control avoiding delays deriving from Field Construction issues, such as remote areas, limited construction space, weather conditions, manpower shortage, tight Project schedule, by delivering to site a ready-to-go Boilers and HRSGs result of **Macchi** 55 years record in Large Oil, Gas and Petchem Projects Worldwide.

**modularization**



**MACCHI**<sup>®</sup>  
STEAM & POWER GENERATION  
A DIVISION OF SOFINTER S.p.a.

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**Sofinter**

**MACCHI**  
**industrial boilers**



bidrum type  
 | package boiler D type |  
 compact design |  
 natural circulation  
 | horizontal gas path |  
 bottom supported



boiler model suitable for  
 units of small-medium capacity  
 steam capacity  
 up to 600,000 lb/h  
 steam operating pressure  
 up to 1,600 psig  
 steam operating temperature  
 up to 970° F  
 gas, oil & crude oil fired

## TITAN M package boilers for oil & gas and petrochemical sectors

bidrum type  
 | natural circulation |  
 vertical gas path  
 | bottom supported



boiler model suitable for  
 units of medium-large capacity  
 steam capacity  
 up to 1,100,000 lb/h  
 steam operating pressure  
 up to 1,600 psig  
 steam operating temperature  
 up to 970° F  
 gas, oil & crude oil fired

## MVF utility boilers for oil & gas and petrochemical sectors

single drum type  
 | radiant boiler |  
 fully-welded  
 | natural circulation |  
 vertical gas path |  
 | bottom or top supported



boiler model suitable for  
 high operating pressure  
 and high operating temperature  
 steam capacity  
 up to 1,300,000 lb/h  
 steam operating pressure  
 up to 2,030 psig  
 steam operating temperature  
 up to 1,005° F  
 gas, oil & crude oil fired

## MRD radiant boilers for oil & gas and petrochemical sectors

### DESIGN PRESSURE/PRODUCTION RANGE

| BOILER FEATURES         | < 1300 psi and < 600'000 lb/h                             | >1300-1600 psi and < 600'000 lb/h | < 1300 psi and > 600'000 lb/h | >1300-1600 psi and > 600'000 lb/h | up to 2200 psi and 110'000-550'000 lb/h | up to 2200 psi and 440'000-880'000 lb/h |
|-------------------------|---|-----------------------------------|-------------------------------|-----------------------------------|---|---|
| EXPANDED                | TITAN M   |                                   | MVF                           |                                   |   |   |
| EXPANDED WITH SEAL WELD | MVF   | TITAN M                           |                               | MVF                               |   |   |
| WELDED                  |   | MVF                               |                               |                                   | MRD BOTTOM SUPPORTED                    | MRD TOP SUPPORTED                       |
|                         | REFINERY, LNG, FERTILIZER, PETROCHEMICAL, GTL APPLICATION |                                   |                               |                                   | ETHYLENE, STEAM, CRACKING APPLICATION   |   |

### SELECTION OF BOILER MODEL VS APPLICATION



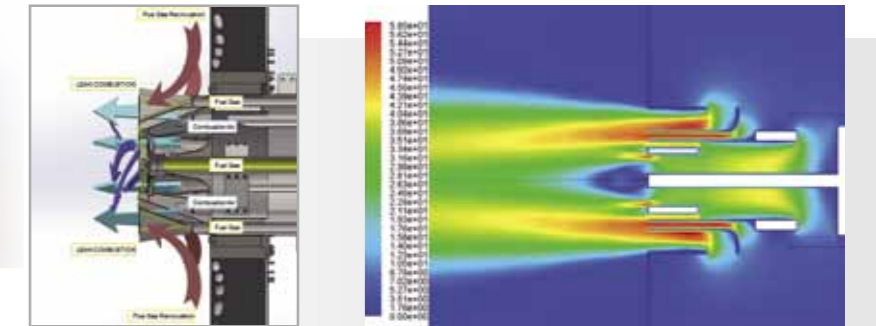
## Proprietary patented proven technology & design of Ultra Low NOx burners

MACCHI has developed reliable, safe and performing Burners for 60 years, ranging from combustion of simple hydrocarbons to multiple gaseous and liquid fuel combination coming from Process as a Waste, thus increasing the overall efficiency of the plant.

MACCHI last generation, MARS II Burner, self-recirculating without need of an external Recirculation Fan, was designed to minimize the OPEX and satisfy the most severe emissions limits.

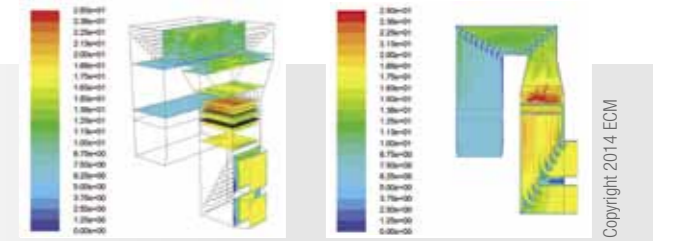
The MARS II Burner achieves single digit NOx emission value over a wide turn-down range by creating a lean oxygen combustion area at the hotter flame root and completing the combustion along the flame tip.

The design of Burners and Boilers is developed on full integrated basis, first simulated by CFD, then in-house construction, finally performances are validated in MACCHI owned full scale test rig facility where any fuel can be prepared according to field actual compositions.



## Single source, cost effective, fully modularized solutions for emission control

- SCR & CO catalyst system design fully integrated with Boilers for NOx/CO.
- Reagent selection to achieve the Best Break-Even of CAPEX vs OPEX.
- Reagent injection grid designed through CFD for optimum distribution.
- Catalyst selection and position to optimize emission abatement efficiency vs geometry.



- Complete skid mounted ancillaries, such as reagent tank, pumps, vaporization unit and relevant interconnecting piping and access structures.
- Fully automated control system designed to cope with any load variation.
- **Achieving single digit NOx/CO guaranteed result.**

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