APRIL 2017

08

MORE HIGHLIGHTS

NEWS FROM THE STEELMAKING WORLD

EAF UPGRADE

SAFETY PRODUCTIVITY

AT

UNITED STEEL

KUWAIT

PROJECT HISTORY

United Steel Industrial Company is a private Kuwaiti Closed Shareholding Industrial and Commercial Joint Venture Company that was established in 1996 through a joint partnership between Kuwaiti investors and ASCOTEC of Germany. United Steel Industrial Company is the sole producer of steel rebar and billets in Kuwait.

2011

Since 2011, their 150t EAF has been operating with a complete MORE sidewall injection system (oxygen, carbon and lime injection) with excellent results with 100% DRI/HBI charge.

EAF TECHNICAL DATA

EAF Type	Danieli EAF EBT
Heat steel capacity	125 t / 138 st
Shell diameter	6,9 m / 22 ft
Transformer	163 MVA +10%
Charge mix	from 100% DRI to 100% scrap
Hot heel	40 t / 44 st

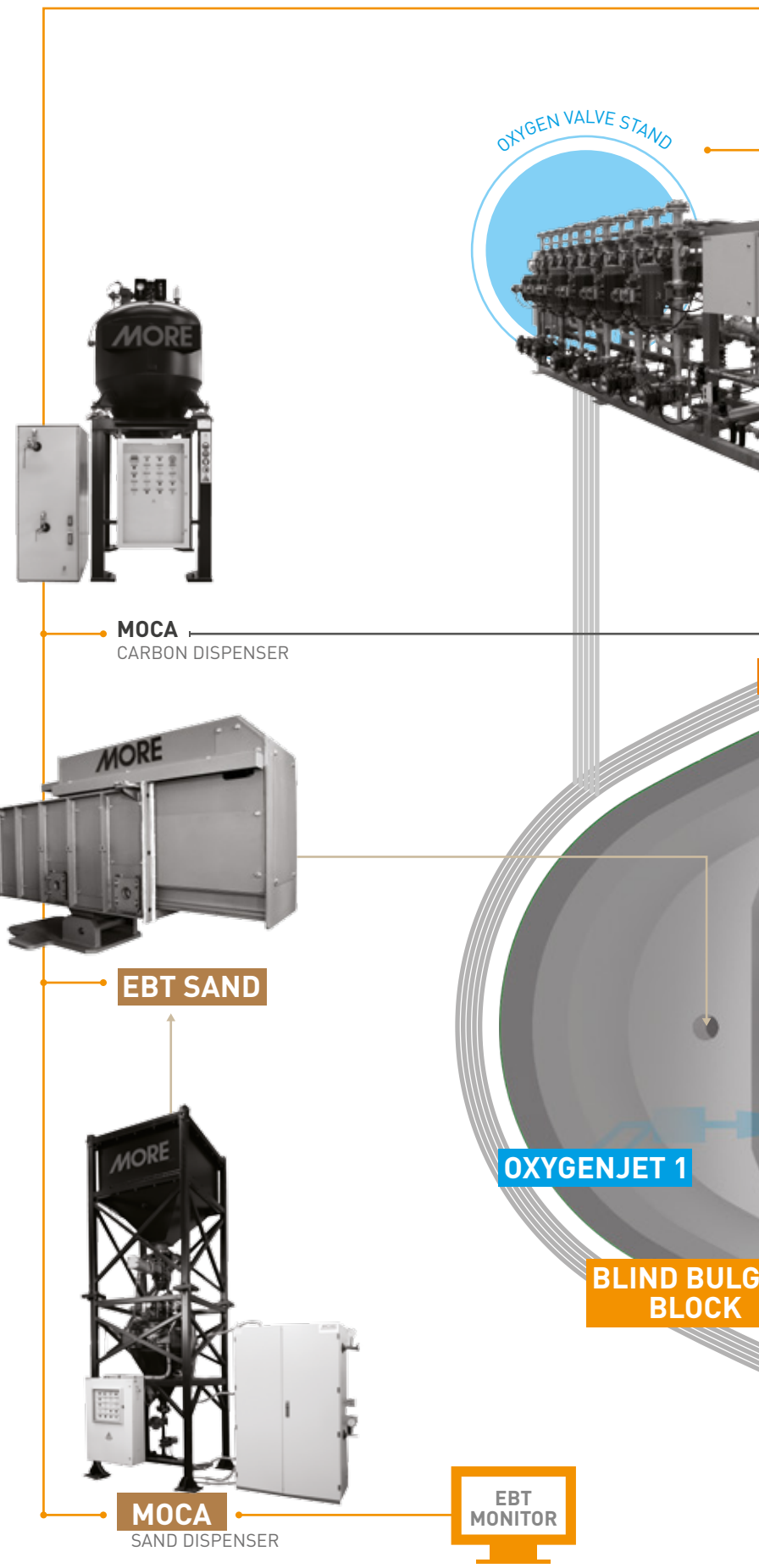
2015

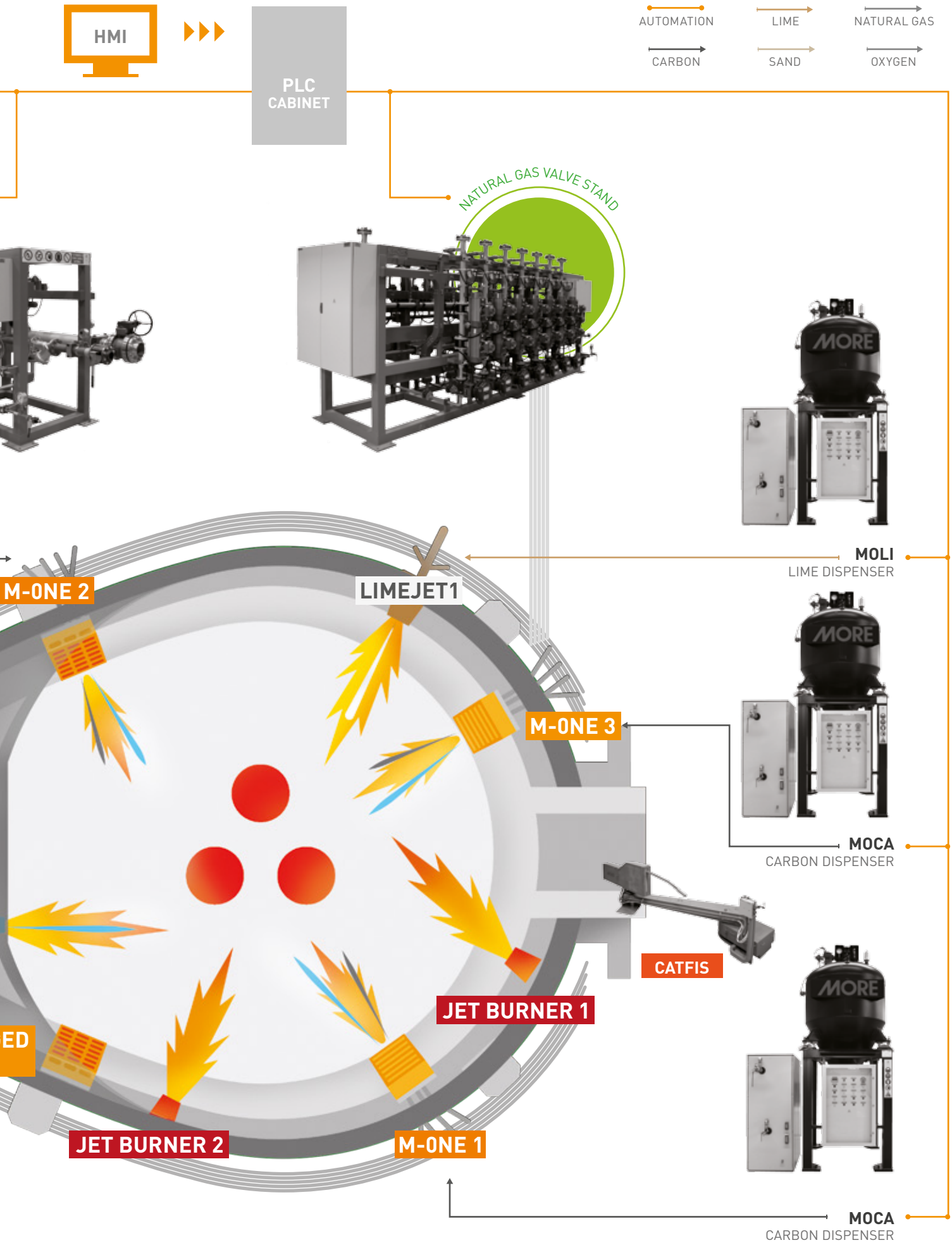
In 2015, United Steel contacted MORE to upgrade the sidewall injection system in order to have the possibility to charge more scrap on the basis of market conditions. As operators' safety was been always one of the top priorities of the company, installing an automatic system to sand and inspect the EBT tap hole after tapping was requested. This would then avoiding any manual operation on the EBT sump panel.

2016

During the beginning of 2016, both companies agreed on the final layout design of injectors in order to run the EAF charging from 100% DRI/HBI to 100% scrap.

2017 EAF LAYOUT



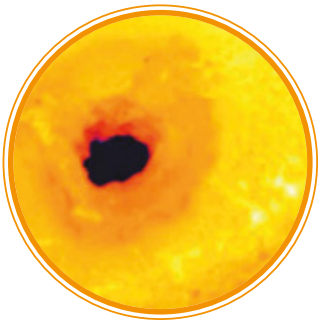

HMI
PLC
CABINET
AUTOMATION
LIME
NATURAL GAS
CARBON
SAND
OXYGEN
NATURAL GAS VALVE STAND
MORE
MOLI
LIME DISPENSER
M-ONE 2
LIMEJET1
M-ONE 3
MOCA
CARBON DISPENSER
CATFIS
JET BURNER 1
JET BURNER 2
M-ONE 1
MOCA
CARBON DISPENSER

EBT SAND: REMOTE VISUAL INSPECTION AND SAFETY IMPROVEMENT

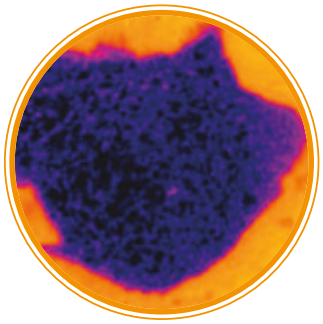
As operators' safety has always been a major concern for United Steel, the CATFIS T&S manipulator was used to avoid any manual sampling in front of the slag door. To further increase its commitment, United Steel also decided to install the EBT SAND system to avoid any manual operations from the top of the EBT sump panel, after tapping. The EBT SAND assembly includes an internal hopper, filled with sand from a pneumatic dispenser and a on board high resolution camera to inspect the EBT tap hole directly from the control desk to manage the sand charging operations remotely.

ZERO MEN AROUND

EBT SAND ON-BOARD



EBT SAND CAMERA IMAGE AFTER TAPPING



EBT SAND CAMERA IMAGE AFTER SANDING

EBT SAND BENEFITS

1_IMPROVED OPERATORS HEALTH AND SAFETY

2_REMOTE OPERATION FROM FURNACE CONTROL ROOM OR TAPPING PULPIT IN A SAFE POSITION

5_AUTOMATIC AND REMOTE SAND CHARGING OPERATIONS

4_REDUCED OPERATING COSTS

3_DIRECT PRODUCTIVITY IMPROVEMENTS

UNITED STEEL EAF WITH CATFIS

Since October 2016, excellent results have been achieved. Better injection tools have ensured improved EAF operations both in terms of productivity and overall process control.

EAF OPERATIONAL RESULTS & BENEFITS

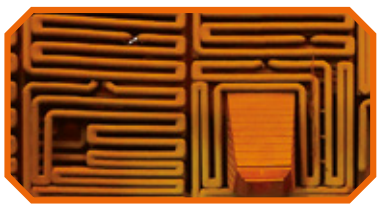
Moreover, better distribution of the supersonic oxygen injection with highly coherent supersonic streams has generated better bacth penetration for C oxidation and other oxidizing reactions in the steel/slag interface.

PARAMETER	BEFORE	AFTER	DIFFERENCE
Power-on time	43 min	37 min	6 min*
Tap-to-Tap	60 min	51,5	8,5 min
Power off	17	14,5	2,5
Electrical energy consumption	530 kwh/t	510 kwh/t	20 kwh/t*
Number of heats per day	24	28	4

*with the injectors upgrade the customer replaced also the EAF transformer with a bigger one

With the installation of the EBT SAND, just by replacing the manual inspection and sanding operation with an automatic cycle, the power-off time was reduced by **1,5 minutes per heat.** Consequently it was possible to gain **1 heat per day.**

NEW INJECTORS CONFIGURATION



INSTALLED LIMEJET AND M-ONE

M-ONE	3 x 1800 Nm3/h / 1120 scfm	(Supersonic/coherent oxygen injection mode)
	3 x 4 MW	(Mixed Swirl Flame burner mode)
	3 x 40 Kg/min / 88 lb/min	(Carbon injection mode)
OXYGENJET	1 x 1300 Nm3/h / 800 scfm	(Supersonic/coherent oxygen injection mode)
	1 x 4 MW	(Mixed Swirl Flame burner mode)
LIMEJET	1 x 200 Kg/min / 440 lb/min	(Lime injection mode)
	1 x 4 MW	(Mixed Swirl Flame burner mode)
JET	2 x 4 MW	(Mixed Swirl Flame burner mode)

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