



ENVIRONMENTALLY FRIENDLY METAL TREATMENT

## FDU FOUNDRY DEGASSING UNIT

EQUIPMENT & CONSUMABLES

Hydrogen removal

Oxide and inclusion removal

Controlled gassing

Highly efficient rotor designs

Reliable and consistent equipment



# FDU Foundry Degassing Unit

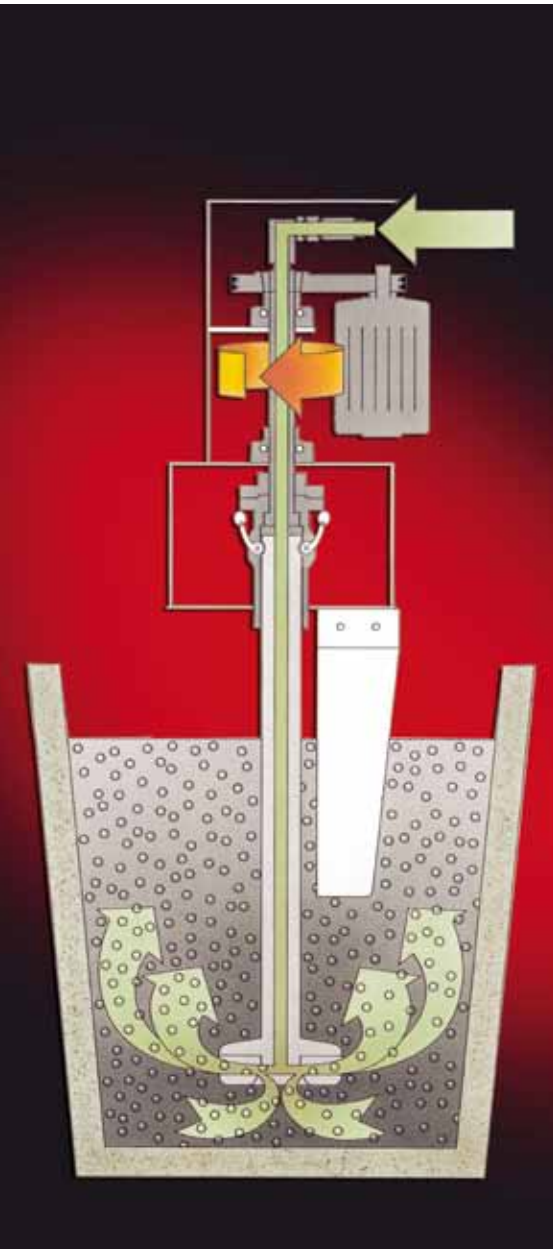
For the improvement of quality of non ferrous castings

FDU foundry degassing units are a metal treatment system for the degassing and cleaning of aluminium alloys in foundries.

All FDU units use the impeller principle with patented rotor designs which mixes fine inert gas (usually Nitrogen or Argon) with the melt. The gas bubbles are distributed widely through the melt whilst maintaining a smooth melt surface. This results in short treatment times, effective degassing and melt cleaning.

## The advantages

- Reproducible results
- Short treatment time
- Reduced gas porosity and hard inclusions in castings
- Reduced machining costs
- Consistent mechanical and physical properties
- Environmentally friendly



The FDU product range covers a number of machines for transport by crane or fork-lift truck, mobile and static units. The degassing equipment is used for transport ladles and free standing crucible furnaces. All machines are custom-made and adapted to foundry's requirements and needs. An advanced control system enables the operator to program various parameters; the degassing treatment runs automatically without any operator involvement once the process has been started. A team of Foseco specialists commissions the equipment and trains the operators.



**FDU ROTOSTATIV**  
Compact assembly on the ground; a manual arm swivel (optional) provides easy access to furnace or transport ladle.



**FDU ROTOSCHWENK**  
For assembly on the ground and electrically arm movement for process automation and multi-position use.

**FDU MINIDEGASSER**  
Compact design for placing on top of a crucible or ladle by means of crane or fork-lift truck.



**FDU MARK 10**  
For treatment in transport ladles or furnaces, easily pushed manually into position.



**FDU ROTODRIVE**  
Battery operated trolley for moving into treatment position and for long-distance movement.



# Degassing consumables

For the improvement of quality of non ferrous castings

## Graphite shafts

Graphite rotors are used in connection with the corresponding graphite shafts. Various rotor designs and diameters can be combined with shafts in different lengths and types. This procedure provides maximum flexibility to suit almost all crucible and transport ladle designs. Vacuum impregnation of the graphite consumables ensures a long life.

- Graphite shafts
  - Ø 45 mm, 700 mm long
  - Ø 75 mm, up to 1200 mm long
  - Ø 95 mm, up to 2300 mm long

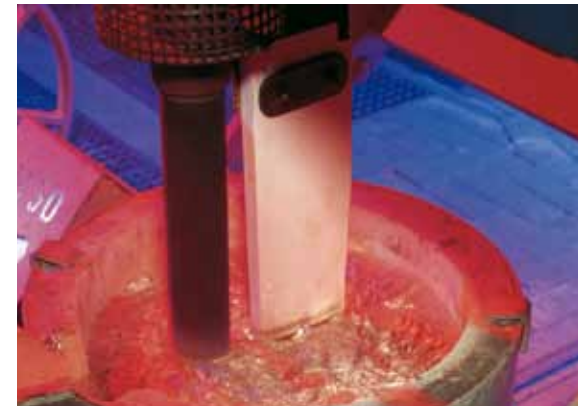
## INSURAL\* baffle plates

A baffle plate is placed near to the graphite shaft and guarantees a smooth melt surface during treatment. It is available in different shapes and lengths.

FDU BKF types of shaft



FDU graphite shaft and INSURAL baffle plate



### XSR high-performance rotor

Intensive investigations of the existing rotors, combined with theoretical studies, simulations, extensive modelling and practical tests have culminated in the development of the new XSR high-performance rotor.

The FDU XSR high-performance rotor is an advanced design with an enhanced pumping action.

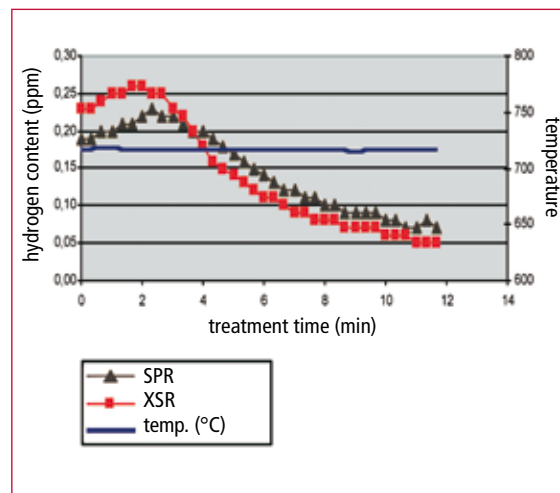
Turbo cuts in the upper section of the rotor further reduce the size of the inert gas bubbles thus maximising the surface area of the bubbles for a given volume of treatment gas.

Two different foundry requirements can be fulfilled by the new XSR high-performance rotor:

- Quicker degassing of molten metal and hence an increase in the effectiveness of the FDU degassing system and a reduction in temperature loss,
- Degassing at a reduced rotor speed in order to extend the service life of the graphite shaft and rotor because of the reduced abrasion and/or reduction in vortices on the shaft when operating without a baffle plate.

The degassing effect has been plotted online with Foseco's ALSPEK\* H hydrogen sensor. The diagram illustrates a typical curve for hydrogen concentrations in aluminium. The rate of degassing under consistent test conditions in achieving a target level of 0.08 ppm of hydrogen in the molten material was 0.03 ppm H<sub>2</sub>/min with the XSR rotor. The degassing rate for the SPR rotor was 0.02 ppm H<sub>2</sub>/min, 50% less.

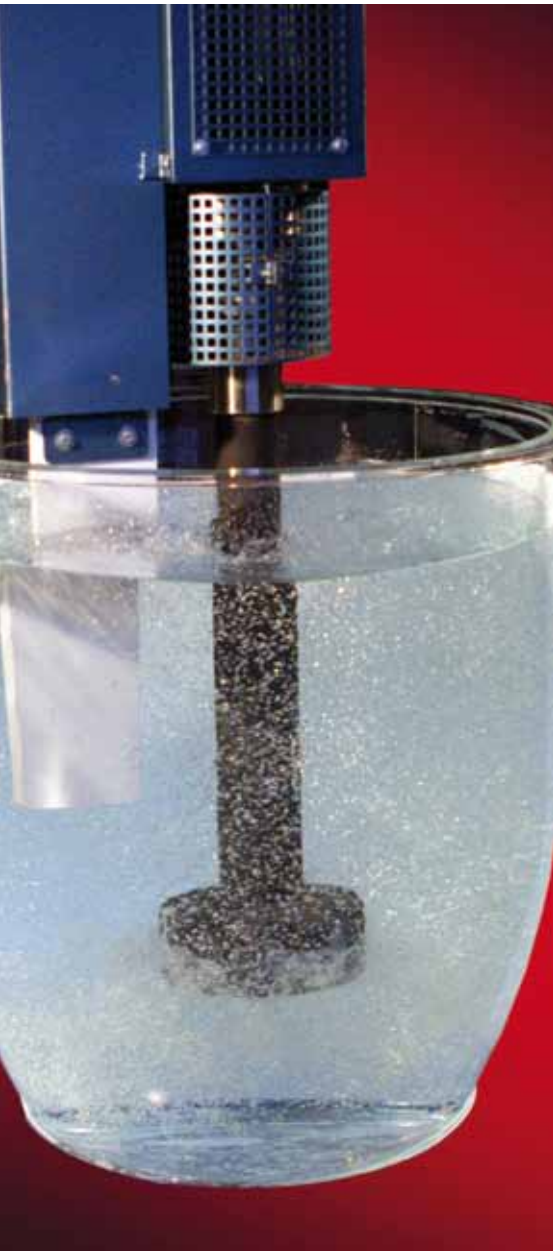
For detailed information refer to Foundry Practice 241 (2004).



Development tests using water modelling



XSR rotor



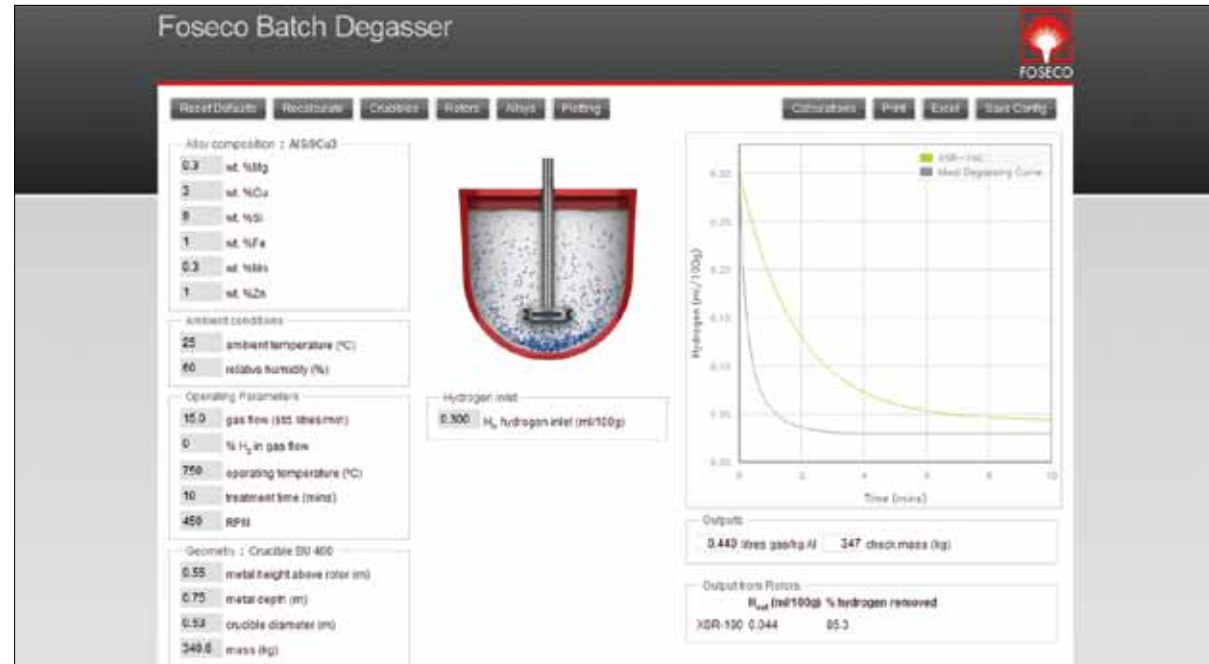
# Degassing simulation

Software to analyse batch degassing processes

Rotary degassing of liquid aluminium alloys is a widely used commercial process to control levels of hydrogen, alkali metals and inclusions in the melt, prior to casting. A comprehensive theoretical understanding of the kinetics of aluminium degassing has been established in the past twenty years.

A selection of different Foseco degassing rotors has been characterised in a comprehensive experimental program. Tests have been carried out in both water model and foundry trials. The study results in an Internet based simulation software for degassing processes in foundries.

Screen shot



The software enables the operator to characterise the degassing process with an extended parameter list for data input:

- Pre-set crucible and ladle sizes
- Pre-set alloy compositions
- Different ambient conditions
- Starting level of hydrogen
- Operating conditions like melt temperature, gas flow rate, rotor speed and diameter
- Treatment time

Based on input data the software calculates a degassing curve – hydrogen content vs. time. It is possible to draw degassing curves of different rotor design and rotor diameters in one diagram. The software compares the hydrogen removal efficiency and total consumption of inert gas for each rotor.

A full report about the batch degassing software is available in Foundry Practice Issue 256.

For more information and a demonstration please contact the local Foseco representative.

### Diagram 1

The curves in diagram 1 compare the degassing efficiency of different rotor designs.

### Diagram 2

The curves in diagram 2 compare the degassing efficiency of different FDU XSR rotor diameters.

### Diagram 3

Diagram 3 shows an upgassing process using an inert gas-hydrogen-mix.

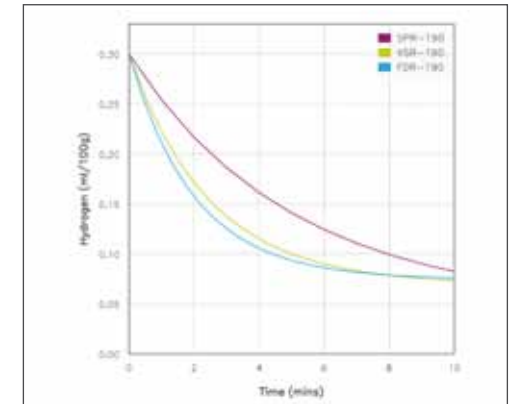


Diagram 1

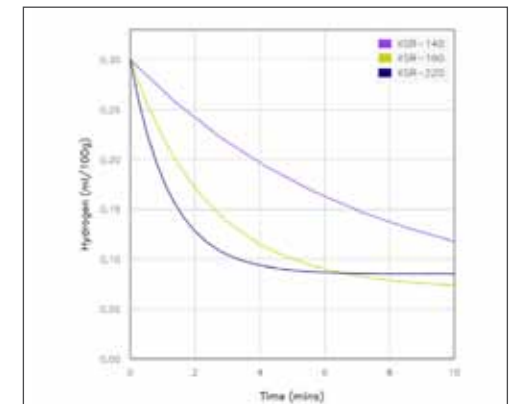


Diagram 2

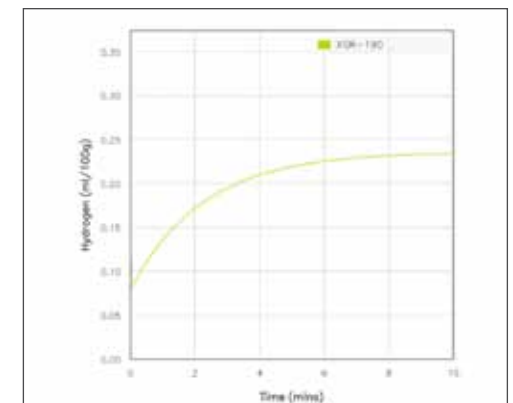


Diagram 3

# FDU

## Service and further options

MTS 1500 automated metal treatment process is an option for nearly all types of FDU.

Temperature measurement systems and ALSPEK\* H hydrogen sensors enable foundries to monitor and control the degassing process. In many cases it is therefore possible to save both time and energy.

With the assistance of a N<sub>2</sub>-H<sub>2</sub> mixed gas panel, all FDU machines can be equipped to add a controlled level of hydrogen to aluminium melts.

Foseco is continually developing new and improved products and services to boost melt treatment efficiency and effectiveness. Our service team would be pleased to answer any further questions you may have.

MTS 1500  
automated  
Metal  
Treatment  
Station



Melt quality  
measurement  
utilising  
ALSPEK H  
hydrogen  
sensor



Training and  
service



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