



Measurement & Analytics | Measurement made easy

PoDFA

The complete solution for inclusion measurement
Inclusion identification and quantification analysis

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Inclusion identification and quantification analysis

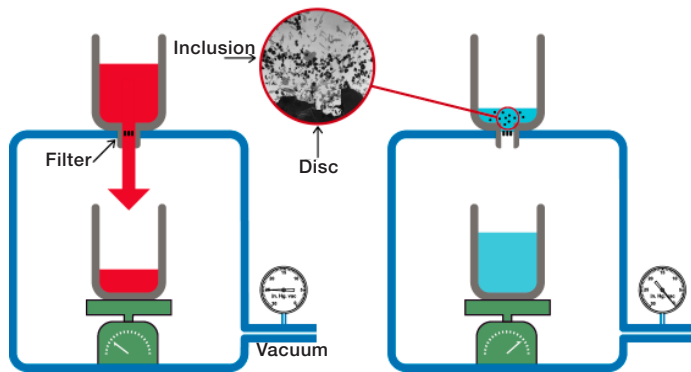


Today's global marketplace has compelled aluminum producers and aluminum foundries to produce the highest quality aluminum and shape castings. The most effective means of attaining superior levels of quality is expertise in process coupled with systematic measurement for controlling the melt quality at all stages of manufacturing.

PoDFA is a proprietary technology for melt cleanliness evaluation that provides information on the composition and concentration of the inclusions in molten aluminum. PoDFA has already demonstrated its great potential for process characterization and optimization, as well as product improvement. For example, you can quickly and accurately assess the effects of various operating practices on metal cleanliness or identify filtration efficiency. Using PoDFA is an essential key to producing high quality castings.

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PoDFA technology

Two simple steps: sampling and metallographic analysis

A predetermined quantity of liquid aluminum is filtered under controlled conditions using a very fine porosity filter. Inclusions in the melt are concentrated at the filter surface by a factor of about 10,000. The filter, along with the residual metal, is then cut, mounted and polished before being analyzed under an optical microscope by a trained PoDFA metallographer.

The PoDFA technology has never been so accessible! All you have to do is take metal samples using the PoDFA-f system and then choose between two analysis options. You can either obtain a PoDFA license and perform your own metallographic analysis in house, or you can employ ABB's Metallographic Analysis Service on a per-sample basis with no license fee. The second option enables you to access the PoDFA technology at your own pace and capacity.



PoDFA-f System

PoDFA-f system

Portable low-cost equipment for molten aluminum sampling. The PoDFA-f system includes all the equipment required for PoDFA sampling in molten aluminum: a PoDFA-f sampling station, crucible heater, crucibles and filters as well as other facilitating tools described below. The equipment is compact, portable and economical. It can be easily installed where the sampling is conducted.

Sampling is straightforward: the operator pours some metal in a crucible, presses the start button and that's it! A vacuum forces the metal to flow through the porous filter. After the test, typically after five minutes, the metal sample is allowed to solidify and saved for metallographic analysis.

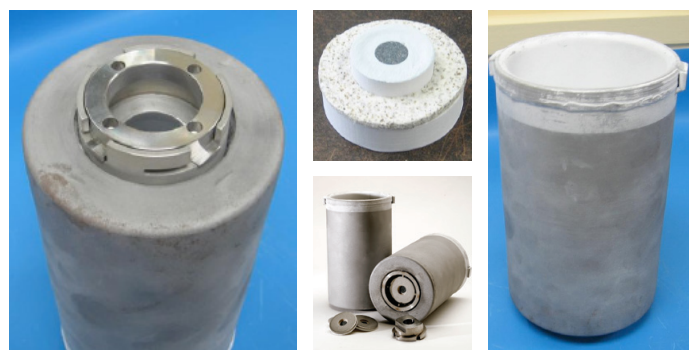
PoDFA reusable crucibles and filters

The PoDFA reusable crucible is designed to better respond to the needs of cast houses and foundries by decreasing operational costs and labor time.

Filter on ceramic disk:

We now offer filters mounted on ceramic disk. They can reduce preheating time of 10 minutes and the use of an expendable material as gasket greatly reduces the risk of leak when pouring molten metal in the crucible.

The patented reusable crucible can last for up to 100 samples. It employs a ready-to-use filter for every test and can be installed in seconds. Thanks to this leading-edge design, the filter detachment problem has been virtually eliminated as the filter is literally cast into the aluminum.

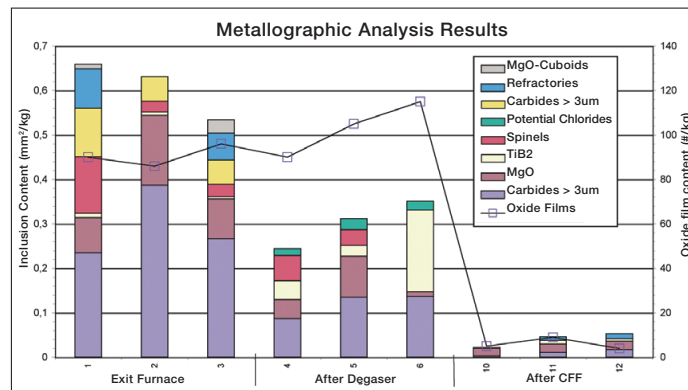


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Metallographic analysis



Trolley



Metal sample holder

PoDFA metallographic analysis

ABB metallographic analysis service

You do the sampling; we take care of the analysis.

Take samples quickly and easily using the PoDFA-f system. Identify each metal residue indicating the sampling information and then send all samples by express mail to our PoDFA metallographic analysis service. You will receive a report with the key residue pictures and a breakdown of each inclusion type expressed in mm²/kg of aluminum. All information is strictly confidential and reports are produced in less than two weeks. There is no license fee; you pay on a per-sample basis.

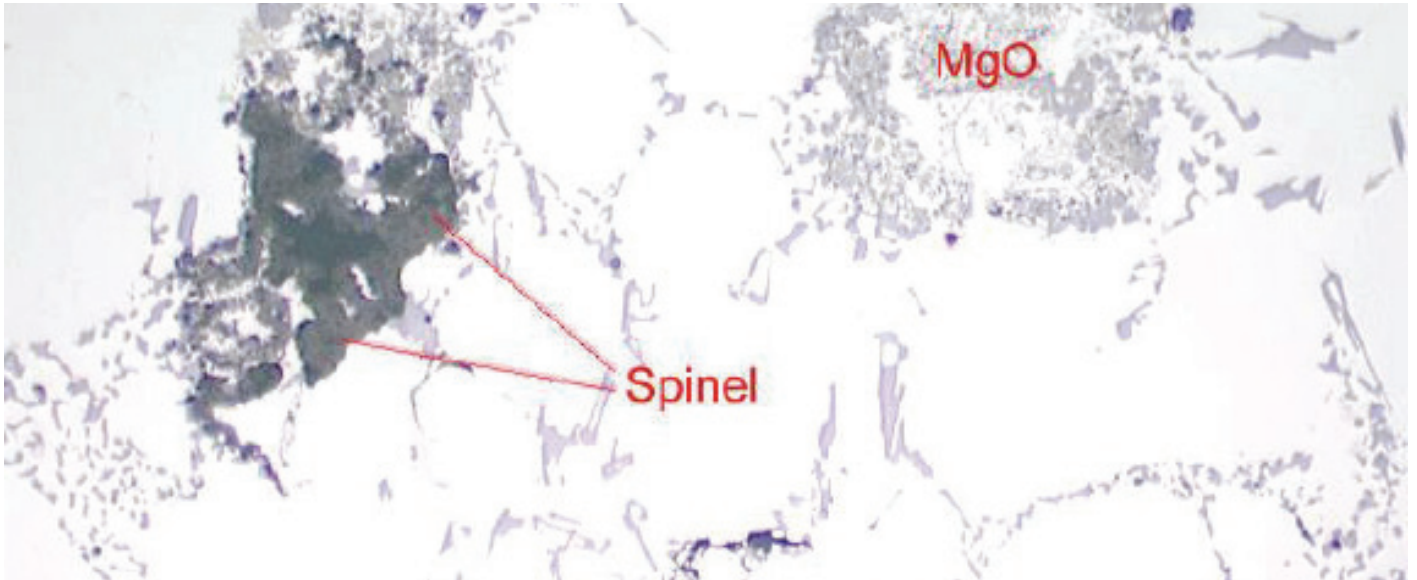
PoDFA can effectively assess the effects of various operating practices and melt treatments on metal cleanliness. The histogram shown at left is a good example of PoDFA results during the different stages of a process. The samples taken at the furnace exit contain a high level of carbides, magnesium oxides, refractory materials and oxide films. After degasser, the concentration of inclusions decreased while the oxide films increased, most probably due to an excess of turbulence in the degassing chamber. Finally, the results demonstrate that the ceramic foam filter is effective in removing both inclusions and oxide films. Inclusions concentration decreased from about 0.3 mm²/kg to less than 0.1 mm²/kg and oxide films from about 100 per kg to less than 10 per kg.

Practical accessories

- Reusable crucible trolley for safe cooling and easy carrying
- Metal sample holder for safe aluminum residue cutting on a band saw

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Magnification of inclusion

Annual contracts for volume users

Volume customers who regularly employ ABB's PoDFA metallographic analysis services can take advantage of significant price reductions by signing an annual contract. Savings vary depending on the quantity, report content and sample preparation required. Annual contracts also offer an excellent alternative to licensed PoDFA users. As PoDFA metallographic analysis calls for expertise, time and accuracy, outsourcing to a highly specialized laboratory is the ideal solution for many aluminum plants.

Rio Tinto Alcan metallographic analysis technology transfer

Over 30 years of knowledge at your fingertips

PoDFA technology transfer and analysis training are available from ABB. For those who prefer to do more than just the sampling, the vast body of knowledge of Rio Tinto Alcan is readily transferable to your organization. It includes metallographic training and a CD-ROM that contains a catalog of inclusions as well as methods. This valuable information has been optimized for over 30 years by Rio Tinto Alcan on a wide variety of alloys.

Additional PoDFA training Standard and advanced training sessions are available for PoDFA registered users.

The PoDFA technology is the property of Rio Tinto Alcan International Limited, and is licensed for manufacturing to ABB. Patent 5,827,982.

Reusable Crucible RTA Patent 7,472,613 

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Photos are courtesy of Alcan Inc.

PoDFA-f sampling station

Mass measurement

- Mass 0 to 5 kg \pm 0.02 kg
- Important: Mass over 8 kg can damage the load cell
- Target mass Selectable to 1.50, 1.25, and 1.00 kg
- Display 3 1/2 digits, 12.7 mm (0.56 in.) high LEDs

Electrical

- Rated line voltage 100 to 240 VAC (self adjusting)
- Rated line frequency 50/60 Hz
- Rated line power 11 VA at 100V
34 VA at 240V
- Fuse type T2A/250V

Compressed air requirements

- Inlet pressure 5.5 to 8.25 bar (80 to 120 psig)
- Important: To avoid damaging the solenoid valve, do not exceed 10 bars (150 psig)
- Air purity Dry air, minimum dew point -40°C (-40°F)
Air should be cleaned and uncontaminated
Filtered to 40 microns or better
- Air temperature Below 35°C (95°F)
- Air fitting 1/4 NPT female
- Air consumption (at 100 PSI) Vacuum: 340 l/min (12 SCFM)
Cooling: 665 l/min (23.5 SCFM)

Physical

- Overall dimensions (WxDxH) 33 cm x 29.5 cm x 39.4 cm (13 in. x 11.63 in. x 15.53 in.)
- Weight 18.0 kg (39.5 lb.)

Environmental

- Storage temperature range -10°C to 75°C (14°F to 167°F)
- Operating temperature range 10°C to 50°C (50°F to 122°F)
- Storage humidity range Up to 60% (non condensing)
- Operating humidity range Up to 90% (non condensing)

Sound pressure level

- Distance from the instrument Approximate sound instrument pressure level in vacuum mode
- at the instrument 118 dBA
- at 1 m (39 in) 100.1 dBA
- at 5.1 m (17 feet) 85 dBA

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PoDFA reusable crucible and filter

General

- Crucible heating time on the crucible heater
 - When crucible heater is hot: Typically 20-25 minutes
 - When crucible heater is cold: Typically 30 minutes
- **Important:** Typical times are based on normal room temperature, no forced convection around the equipment and the use of an insulation blanket over the crucible.
- Crucible lifetime
 - Up to 100 tests when following the proper preparation and manipulation procedure described in the PoDFA-f System User's Guide
 - Crucible protective coating
 - Needs to be redone every 15 to 20 tests
 - Important: Crucible lifetime is dependent on the protective coating. Carefully follow the procedure described in the User's Guide.

Physical

- Crucible Filter
- Overall dimensions
- OD: 13.3 cm (5-1/4 in.)
- Height: 20.3 cm (8 in.)
- Weight
- 1.36 kg (3 lb)
- Materials
- Outer shell: Carbon steel Aluminum and silica
- Inner shell: Stainless steel
- Insulation: Synthetic Vitreous Fiber (SVF) blanket
- Packaging information
- 3 crucibles per box 24 filters per box

Environmental

- Storage temperature range -10°C to 75°C (14°F to 167°F)
- Storage humidity range Up to 60% (non condensing)

Crucible Heater

Heating time

- 0 to 6 hours (adjustable timer)

Electrical requirements

- Rated input voltage 100-120 / 220-240 VAC (factory set)
- Rated input frequency 50 / 60 Hz
- Earth leakage Less than 50mA
- Rated input current 4A at 230 VAC, 7A at 115 VAC
- Fuse type T4A/250V at 230 VAC, T7A/250V at 110 VAC

Environmental

- Operating temperature 10°C to 50°C (50°F to 122°F)
- Storage temperature -10°C to 75°C (14°F to 167°F)
- Operating humidity Up to 90% (non condensing)
- Storage humidity Up to 60% (non condensing)

Physical

- Overall Dimensions (H x W x D) 35 cm x 29 cm x 21 cm (13-1/2 in. x 11-1/2 in. x 8-1/4 in.)
- Weight 5.6 kg (12 lb.)



PoDFA reusable crucible and filter



Crucible Heater

Contact us

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