P20 - Ultrasonic Particle Detector

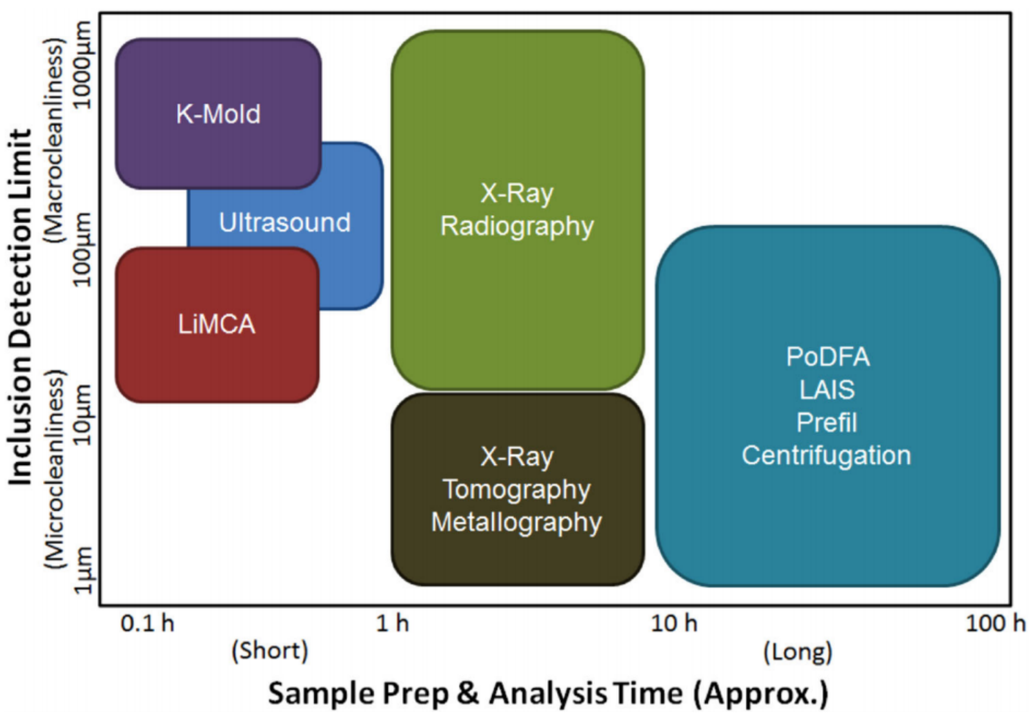
AMAP Advanced Metals and Processes

MOTIVATION

To produce high quality castings it is necessary to determine the melt quality. Common measurement technologies such as LiMCA, PoDFA and MetalVision, etc. can determine non-metallic inclusions in aluminum melts. But there is no fast, affordable and accurate measurement technique for the industrial use.

Liquid Metal Inclusion Measurement Techniques

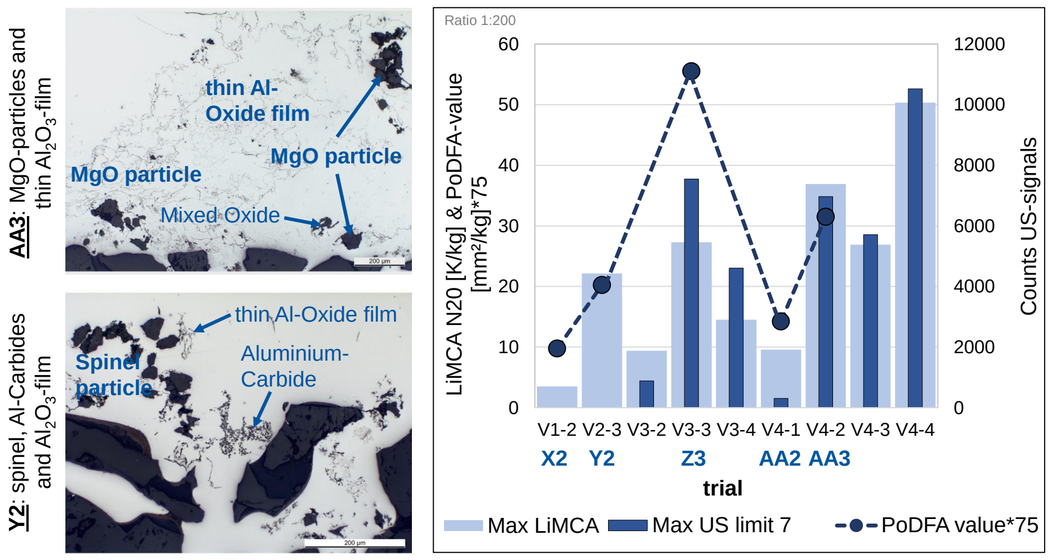
- Most measurement techniques are cost-prohibitive and/or unable to effectively probe large quantities of melt with high enough resolution
- There are only few methods by which a large spectrum of inclusion sizes can be quickly detected



Qualitative comparison of inclusion detection methods [1]

Benchmark Trials

- Good coupling of ultrasound into Al99.8 melt
- The ultrasound set-up is capable to monitor changes of the particle concentration with a good correlation to LiMCA and PoDFA results
- The system is able to detect particles in Al melts over a wide concentration range
- Detection of inclusions with a size >20µm is possible

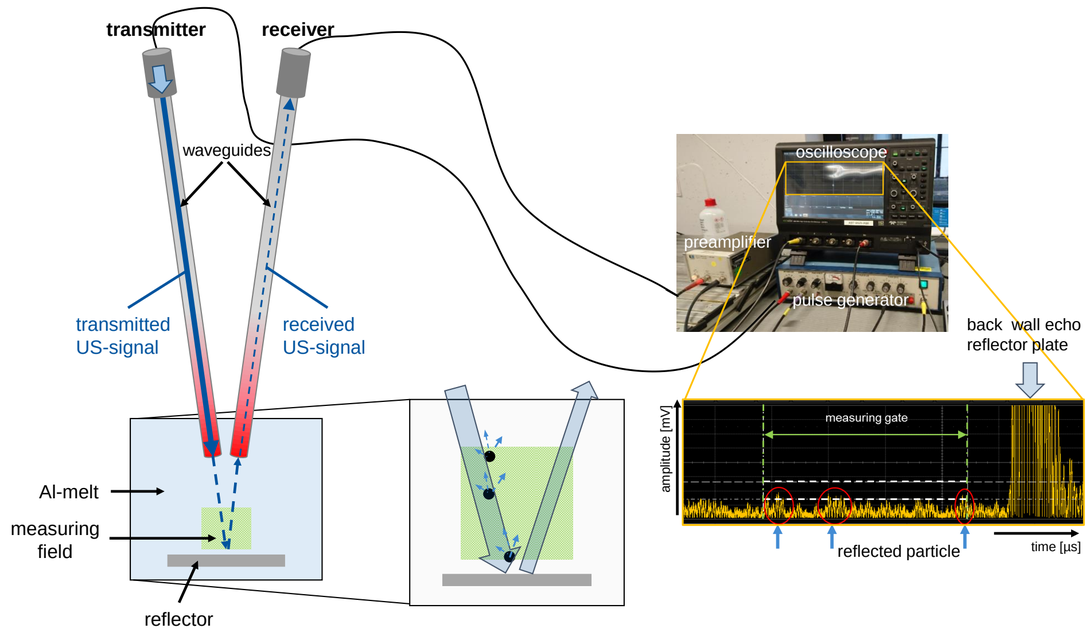


Benchmark Trials – Comparison to LiMCA- and PoDFA Analysis [2]

DEVELOPMENT GOAL

Main objective of this project is to develop an ultrasonic detector for non-metallic inclusions in aluminum melts. The method should fulfill the following attributes:

- accurate
- reliable
- fast
- affordable



Schematic Prototype of an Ultrasonic Particle Detector

MAJOR WORK PACKAGES

- Determine and define the requirements regarding for an industrial applicable prototype
- Build-up of prototypes (based on results of the previous AiF-project “IGF 18061 N”)
- Technical testing of the prototype in aluminum melts
- Optimization ultrasound analyzing software and waveguides
- Systematic examination of alloying element influence on US-signal
- Experimental trials and validation in industrial melts

TIMELINE

- The AMAP project P20 is scheduled between April 01, 2018 and March 31, 2020.

PROJECT CONSORTIUM

Fraunhofer IZFP
Foundry Institute
RWTH AACHEN UNIVERSITY
Nemak Innovative Lightweighting
HYDRO
OHM&HÄNER METALLWERK
trimet

For further information contact: info@amap.de

[1] International Journal of Metalcasting/Volume 10, Issue 3, 2016, 289-305
[2] Workshop 4L Alloys, Aachen, 26th January 2018