



Get set... go!

A new rapid production method for ceramic moulds used in investment casting, that dramatically reduces the cumulative shell build time.

# Rapid production method for ceramic moulds for investment casting

## What is it?

A new rapid shell build method, using super-absorbent polymers, that dramatically reduces the cumulative shell build time.

## How does it help?

The reduction in energy and associated manufacturing costs will present new product opportunities allowing the industry to successfully compete with other high volume forming methods such as forging, machining and welding.

- Reduces energy requirements for shell production
- Reduces time requirements for shell build by 95%
- Reduces material usage due to reduction in ceramic coats
- Improves slurry lifetime
- No capital cost or equipment replacement required

## Background

The drying and strength-development of individual coats in the shell mould production is the most significant rate-limiting factor in the reduction of lead times and production costs for the industry.

The addition of superabsorbent polymers to the stucco material rapidly gels the previous slurry coat instead of the air-drying technique currently used. The polymer removes moisture from the preceding slurry coat, gels the colloidal binder, and thereby greatly reduces the time needed for controlled drying to achieve the same effect. Instead of drying the mould in essence the binder/slurry moisture is trapped within the polymer until 300°C and above. This allows ceramic shell systems to be produced in an environment where only the wax temperature is controlled and the expensive humidity and air speed control is not required.

Superabsorbent polymers can hold up to 800 times their own weight in water, so the correct amount of additive removes the need for moisture removal entirely and gives the possibility of wax to de-wax in less than 60

minutes and reduces production costs by an estimated 75%. Laboratory trials have demonstrated that aluminium casting shell production times can be reduced from 45 hours to 22 minutes. Full scale industrial trials have proved that complex form superalloy casting moulds can be produced in 2.5 hours, as opposed to 7 days, producing a casting with identical dimensions to the components produced by the standard shell production method.

## Why the University of Birmingham?

- The Casting Research Group at the University of Birmingham carries out research and development of interest to a wide range of foundries, particularly investment casting foundries
- Its unique facilities for practical casting research are complemented by an extensive computer modelling capability in the Process Modelling group

## Who's behind it?

Dr Samantha Jones is an internationally renowned specialist in the area of investment casting and has been recognised with an award from the World Foundrymen Organisation.

## What's next?

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