International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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Pressure slip casting of complex shapes of Advanced Ceramics

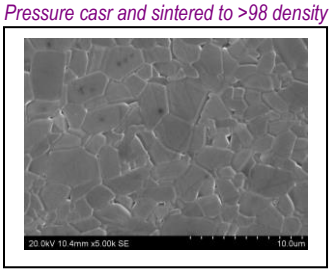
Overview

Pressure slip casting, a well known technique in practice for the table ware production has not yet been considered as a potential and productive method production for Advanced Ceramics. The PCS 100N (SAMA GmbH) has been worked upon to produce Advanced Ceramics products, initially that of Al_2O_3. The machine parameters have been stabilized and the optimization of slip preparation with local brands of Al_2O_3 has been successfully done to produce dense discs of sintered densities greater than 98%. The sintered discs of dia 70 mm and thickness >5 mm with above densities have been reproducibly produced on PCM to gain confidence. Reasonable expertise to prepare required polymer moulds suitable to be used on PCM to pressure cast desired shapes and dimensions has also been acquired during these trials. Polymer moulds prepared to pressure cast shapes like spools, solid spheres, one end closed tubes and successfully used on the PCM with Al_2O_3 slips. The work to make more complicated advanced ceramics like channelled (b/b) slabs, long cones, large slabs etc is in progress. Pressure casting of full solid spheres of Al_2O_3 with 60 mm dia and 60% green density is achieved successfully.

Key Features

- Highly productive with a possibility of almost 30 cycles/hr depending on the slip and product
- Yields 58%-60% green density and consistency is assured
- Easily up scalable to meet the industrial/commercial requirements
- Many complex shapes and structures can be easily pressure cast using aqueous slips
- Polymer moulds can be used to produce at least 15000-20000 cast cycles
- Eco-friendly with minimum rejection (3% max.)
- Polymer mould fabrication can be a part of the PC technology
- Requires min man power. Can be automated if required

Pressure casr and sintered to >98 density



Microstructure of the pressure Cast Al_2O_3 disc representing its fully dense nature

Potential Applications

- Manufacturing of advanced ceramics with complicated shapes, one end closed tubes, grinding media etc. with high productivity for commercialization

Intellectual Property Development Indices (IPDI)

- Technology for wear resistance alumina grinding balls demonstrated and undergoing field trials
- Polymer mould fabrication for required shapes established
- Pressure casting of alumina ceramic established for various shapes and dimensions
- IPDI level: 6

Status	1	2	3	4	5	6	7	8	9	10

Major Patents / Publications

1. Inter Ceram **62** 2013 (3) 221-223

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