



Non-Oxidizing Debinding for 3D-Printed Ceramics

Enables defect-free binder removal from 3D-printed ceramic and metal parts up to 3× thicker than conventional air debinding.

Institution



**CEITEC – Central European
Institute of Technology,**

Brno University of Technology

Development Status

TRL 6–7 (Technology
Readiness Level).

IP Protection Status

Know-how and process
parameters developed by
CEITEC, Brno University of
Technology, and licensed for
commercial use to
Spin-off VUT – Ceraprint s. r. o.

Partnering Strategy

Available as a contract
debinding / heat-treatment
service through Spin-off VUT –
Ceraprint s. r. o. with the
possibility of joint process
development and optimization
for customer-specific
requirements.

The Problem

If binder removal is not properly controlled, even a defect-free green body may crack, delaminate, or distort during heat treatment – defects that cannot be healed later and tend to grow during sintering. In air, oxidative degradation proceeds from the surface inward, sealing the outer structure and trapping gas released by ongoing thermal degradation inside the part. The resulting pressure cracks the body along its printed layers. Defect-free air debinding is therefore reliable only for thin-walled parts (up to ~5 mm), limiting the industrial use of ceramic 3D printing for larger components.

Technology Description

The technology targets 3D-printed ceramic and metal parts made by vat photopolymerization (SLA – Stereolithography/DLP – Digital Light Processing), where organic polymers form the crosslinked binder network. Debinding in non-oxidizing atmosphere instead of air allows only thermal (non-oxidative) degradation, preventing the formation of oxidation layers that trap gas and causes cracking. In alumina test bodies, the method achieved defect-free debinding of parts up to 15 mm in diameter – three times the ~5 mm limit in air – while also reducing the required heating time.

Commercial Opportunity

By cutting scrap rates in binder removal – the highest-risk step in ceramic and metal additive manufacturing – the technology improves process profitability and enables thick-walled, complex parts that fail with conventional air debinding. It is directly relevant to manufacturers of technical ceramics and providers of ceramic 3D printing services. Offered as a contract debinding/heat-treatment service via Spin off VUT – Ceraprint s. r. o. under license from CEITEC, Brno University of Technology.

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