Technology Offer

High performance specialty ceramic product manufacturing technology

Summary

A Dutch SME is active in the development and manufacturing of technical ceramic products and components, mainly based on Ceramic Injection Moulding (CIM) technology. Technical ceramics offer the possibility to produce highly wear-resistant, temperature-resistant, biological- and chemical-resistant products. Fields of application can be found in the design and jewellery sector, healthcare, electronics and technical sector. Partners are sought for product development and manufacturing orders.

Creation Date	15 May 2014
Last Update	06 June 2014
Expiration Date	06 June 2015
Reference	TONL20140515001

Details

Description

Advanced ceramic materials have some outstanding features that fit well to strong requirements in extreme conditions. The Ceramic Injection Moulding (CIM) production technology used for ceramic material applications enable new shapes and forms of complex products. Strength, durability, chemical resistance, appearance are some of the outstanding qualities of products made in ceramic materials. Thanks to the latest techniques, ceramics are increasingly on the radar of leading product designers. In the polished form, ceramic takes on a very exclusive look. It can be combined with precious metals, diamonds, rubies and other gemstones, to create the most exclusive an desirable products. Ceramic is the hardest material on earth after diamond, so it is highly scratch-resistant and durable, lasting for years and years. What's more it does not cause any allergic reactions and is therefore particularly good to wear on the skin. Technical ceramics are frequently used in the medical and dental world. That's because it is completely chemically and biologically inert, and to date has showed no signs of rejection or allergic reactions in the human body. By injection moulding, products with complex details can be very accurately produced. This increases the number of applications in the medical and dental world substantially. In addition, the high temperature-resistance makes technical ceramics easy to sterilize, which is also advantageous in the medical world. In extreme conditions, for example sensors must perform in most extreme conditions such as corrosive environments with chemical liquids or vapours, sometimes in combination with high temperatures – of up to 600 °C – together with large temperature fluctuations. To protect them, the company manufactures special components and housings, with their injection moulding techniques almost any geometry is possible.

Advantages and Innovations

Depending on the field of applications specific features of ceramic materials show their positive effect: • for the chemical industry, where there is a high demand on wear-, temperature-, corrosion- and chemical resistance. • for medical and dental applications: advanced ceramics offer biocompatibility and therefore suit dental components and medical devices. • Ceramics in technical applications: as it comes to lifetime performance related to wear, temperature shock, dimension stability, chemical environments, technical ceramics are the solution. • Electrical applications, advanced ceramics can perform as either an electrical insulator or as a conductor and are non magnetic. • Design and jewellery industry: grinding and polishing ceramic shapes results in ultra-smooth, high-gloss surfaces with deep-black, bright white or any other available colour. Combined with the material's extreme hardness, technical ceramics provides a durability that outlasts that of precious metals many times over. Depending on the specific request several manufacturing technologies are developed for an optimised and cost-effective production for new products, like ceramic injection moulding or additive manufacturing (3D printing) technology.

Stage of Development

Already on the market

Comments Regarding Stage of Development

The technology has been developped up to a high level of skills, and the innovation value will come from the new product development with clients.

IPR Status

Secret Know-how

Profile Origin

Private (in-house) research

Keywords

Technology

002002020	Moulding, injection moulding, sintering
002007003	Ceramic Materials and Powders

Market

008001009	Speciality/performance materials: producers and fabricators
008001013	Ceramics

NACE

C.32.1.2	Manufacture of jewellery and related articles
C.32.5.0	Manufacture of medical and dental instruments and supplies

Client

Type and Size of Organisation Behind the Profile

Industry SME 11-49

Year Established

1996

Turnover

1 - 10M

Already Engaged in Trans-National Cooperation

Yes

Langages Spoken

English
Dutch

Client Country

Netherlands

Partner Sought

Type and Role of Partner Sought

For a fruitful co-operation early contacts for joined product development with technical ceramic materials are useful. The partner should have a thorough understanding of the requests to the product to be produced in order to come to the right product design and choice for the needed material. The company is looking for industrial partners in joint high quality product and parts development. The company is expert on realisation of parts and products made of ceramic materials for various applications.

Type and Size of Partner Sought

SME 51-250

Type of Partnership Considered

Manufacturing agreement
Commercial agreement with technical assistance
Technical cooperation agreement
Joint venture agreement
Research cooperation agreement

Technology Offer

Smart dynamic casting of complex shaped concrete structures

Summary

The overall concept of smart and dynamic casting is to produce geometrically complex concrete structures without the need of a custom made formwork. It does so by using a flexible or a rigid formwork, attached to a 6- axis robotic arm which forms the concrete during the time when it changes from a soft to a hard material. The Swiss university seeks industrial partners for: license agreement and/or joint further development.

Creation Date	21 May 2014
Last Update	11 June 2014
Expiration Date	11 June 2015
Reference	TOCH20140516001

Details

Description

How to produce geometrically complex concrete structures without the need of a custom made formwork? The smart dynamic casting system does so by using a flexible or a rigid formwork, attached to a 6- axis robotic arm which forms the concrete during the time when it changes from a soft to a hard material. Background Reinforced concrete is one of the preferred materials for realizing complex structures, since almost any shape can be achieved when poured into a formwork, for which purpose alone 3.4 billion tonnes of cement were produced in 2011 for making concrete. Yet concrete itself is only half the picture, since formwork itself represents 35–60% of the overall costs of concrete structures. This ultimately represents a significant source of waste, as all formwork is discarded sooner or later, contributing to a generally increasing production of waste worldwide (!). Matching the hardening kinetics of concrete The smart dynamic casting system explores the well-known construction method of slipforming, in which concrete is poured into a delimited formwork, which moves by the use of hydraulic jacks at a speed set according to the hardening rate of concrete. In the system typical hydraulic jacks are replaced by a 6-axis robotic arm. The robotic arm enables to dynamically form the concrete during the time when it changes from a soft to a hard material, which radically expands the architectural design space for slipforming. Concrete is being subsequently placed into a formwork with a specific geometrical cross section, flexible or rigid. The robot moves in a predefined trajectory at a rate that is adjusted to the hardening kinetics of the concrete through a feedback system (figure 1). Fig. 1: Scheme: Material Properties (A) are measured (B) the data is sent to (C) which controls the slip velocity of a predefined trajectory in regards to the material properties, (D) generating non-standard concrete structures. Picture: The smart and dynamic casting robot (E). Field of application - Pre-fabrication of non-standard and/or geometrically complex concrete structures - On-site fabrication of non-standard concrete structures /

elements (long term perspective) The innovation just got a prize beginning of 2014.

Advantages and Innovations

- Flexible production system to produce a large variation of architectural structures - No requirement for custom made formwork / additional scaffolding - Sustainable and waste-free construction technique - Efficient initial setup and fully automated and digitally controlled process

Stage of Development

Available for demonstration

IPR Status

Patent(s) applied for but not yet granted

Comment Regarding IPR status

PCT since Feb. 4, 2014

Profile Origin

Other

Keywords

Technology

002006014	Construction engineering (design, simulation)
002006015	Management of construction process & life
002006016	Materials, components and systems for construction
002007002	Building materials

Market

009003001	Engineering services
009007007	Engineering and consulting services related to construction
009007008	Manufacture of construction materials, components and systems
009007009	Construction companies

NACE

M.74.9.0	Other professional, scientific and technical activities n.e.c.

Dissemination

Send to Sector Group

Sustainable Construction

Client

Type and Size of Organisation Behind the Profile

University

Year Established

0

Already Engaged in Trans-National Cooperation

Yes

Langages Spoken

English
Dutch
German

Client Country

Switzerland

Partner Sought

Type and Role of Partner Sought

The specific area of activity of the partner: Manufacturer or designers of concrete structures The tasks to be performed by the partner sought: Tasks are related to License agreement and/or Technical Co-operation: 1. Feasibility: First step is to analyse together the possibilities and opportunities of the offered technology for the application of the partner. 2. Prototyping and testing: Second step would be testing of the technology in prototypes - or functional models - of the application of the partner. Other steps to be defined.

Type and Size of Partner Sought

>500

Type of Partnership Considered

License agreement
Technical cooperation agreement