Title (en)

PLASTIC FORMING AND TOUGHENING PROCESS METHOD AND APPARATUS BASED ON ULTRASONIC VIBRATION

Title (de)

KUNSTSTOFFFORMUNGS- UND HÄRTEVERFAHREN UND -VORRICHTUNG AUF DER BASIS VON ULTRASCHALLVIBRATION

Title (fr)

PROCÉDÉ ET APPAREIL DE FORMAGE PAR DÉFORMATION PLASTIQUE ET DE RENFORCEMENT À BASE DE VIBRATIONS ULTRASONORES

Publication

EP 3530772 A1 20190828 (EN)

Application

EP 17916449 A 20171219

Priority

- CN 201711304450 A 20171211
- CN 2017117069 W 20171219

Abstract (en)

The present invention belongs to the field of amorphous alloy thermoplastic forming, and discloses a plastic forming and gradient toughening method and a device based on ultrasonic vibration. The method includes: (a) dividing one or more portions to be toughened on an amorphous alloy part to be formed, the portion being used for generating a nanocrystalline toughening phase; (b) designing a toughening device for forming, wherein the toughening device comprises one or more inserts connected to an ultrasonic vibration amplitude transformer and one or more heating rods, the insert is disposed corresponding to the portion to be toughened and used for applying ultrasonic vibration to the portion to be toughened, and the heating rod is used for heating raw material blank to be processed to a forming temperature, and (c) placing the raw material blank in the device, heating it by the heating rod, and performing mold closing of the device to form a required amorphous alloy part, ultrasonic vibration being started in the mold closing process and stopped when mold opening is performed. Meanwhile, the invention further discloses the utilized device. With the method of the present invention, toughening and thermoplastic forming can be performed at the same time, so that integration of forming and toughening is achieved, which simplifies production processes, shortens the processing time and improves the dimensional accuracy.

IPC 8 full level

B21D 37/10 (2006.01); **C21D 10/00** (2006.01); **C22F 3/00** (2006.01)

CPC (source: CN EP)

B21D 37/10 (2013.01 - CN); **B21D 37/16** (2013.01 - CN); **C21D 1/09** (2013.01 - EP); **C21D 10/00** (2013.01 - CN EP); **C22F 3/00** (2013.01 - CN EP); C21D 2201/03 (2013.01 - EP)

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

EP 3530772 A1 20190828; **EP 3530772 A4 20191218**; **EP 3530772 B1 20210616**; CN 108085632 A 20180529; CN 108085632 B 20190723; WO 2019113995 A1 20190620

DOCDB simple family (application)

EP 17916449 A 20171219; CN 201711304450 A 20171211; CN 2017117069 W 20171219