



(11) **EP 4 119 260 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.01.2023 Bulletin 2023/03

(51) International Patent Classification (IPC):
B22D 46/00 (2006.01)

(21) Application number: **22182829.6**

(52) Cooperative Patent Classification (CPC):
B22D 46/00

(22) Date of filing: **04.07.2022**

(84) Designated Contracting States:
**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 States:
BA ME
Designated Validation States:
KH MA MD TN

- **YILDIRIM, Halil Ibrahim**
IZMIR (TR)
- **ARMAKAN, Elvan**
IZMIR (TR)
- **AKDOGAN, Halil Yetkin**
IZMIR (TR)
- **OZMEN, Oguz**
IZMIR (TR)

(30) Priority: **12.07.2021 TR 202111312**

(71) Applicant: **Cevher Jant Sanayii A.S.**
35411 IZMIR (TR)

(74) Representative: **Cayli, Hülya**
Paragon Consultancy Incorporated
Koza Sokak No: 63/2
GOP 06540 Ankara (TR)

(72) Inventors:
• **YILDIRIM, Ilker**
IZMIR (TR)

(54) **A MARKING METHOD**

(57) The present invention discloses a marking method for collecting, tracking and storing data of a molten metal during melting and casting processes. Said marking method comprises the steps of: receiving at least one piece of metal to be melted; storing at least one information of the received metal ingot in a memory unit; melting said piece of metal; assigning at least one pseudo code to the melted piece of metal; storing the pseudo

code assigned to the molten metal in the memory unit; molding the melted piece of metal; storing at least one data related to the molten metal and/or environmental conditions during the melting and/or molding processes in the memory unit; assigning a visual code to the final demolded product; matching the visual code assigned to the final product with the pseudo code stored in the memory unit.

EP 4 119 260 A1

Description

Technical Field

[0001] The present invention relates to a marking method for collecting, tracking and storing data of a molten metal during melting and casting processes.

Background of the Invention

[0002] Metal materials are frequently used in both industrial applications and consumer products due to their durability and longevity. After the metal materials are obtained as a raw material, they are processed by various applications to take a desired shape and size. According to the prior art, different applications are provided for giving the desired shape to a metal raw material. These applications are basically divided into two groups as forging (cold or hot) and casting. In forging applications, the raw material takes the desired shape by delivering blows. In casting applications, on the other hand, the raw material is melted and poured into molds such that when it cools in the mold to solidify, it takes the shape of the mold. The mentioned applications can be used in accordance with the needs based on the desired product properties.

[0003] Various process parameters are used to give the desired shape to the metal. For example, if the metal is in the form of an alloy, parameters such as ratios and purity of the alloy components, or parameters such as temperature, environmental conditions or equipment of the casting or forging process, are used. Such parameters can affect different properties of the final product. For this reason, it is important to collect and store the data of said parameters.

[0004] Said data can be stored by engraving a visual code (such as a barcode, a serial number) on the metal material, especially in forging applications. However, in casting applications, since the metal material is melted, even if a code is added to the raw material, said code disappears during the melting process. Especially in high-volume production facilities, it becomes complicated to store this information in order to access the historical information of different products. For this reason, collection, tracking and storage of metals in casting processes cannot be performed to a desired extent with conventional applications.

Description of the Invention

[0005] The present invention discloses a marking method for collecting, tracking and storing data of a molten metal during melting and casting processes. Said marking method comprises the steps of: receiving at least one piece of metal to be melted; storing at least one information of the received metal ingot in a memory unit; melting said piece of metal; assigning at least one pseudo code to the melted piece of metal; storing the pseudo

code assigned to the molten metal in the memory unit; molding the melted piece of metal; storing at least one data related to the molten metal and/or environmental conditions during the melting and/or molding processes in the memory unit; assigning a visual code to the final demolded product; matching the visual code assigned to the final product with the pseudo code stored in the memory unit.

[0006] Since information about the piece of metal to be melted and data of the melting/casting processes are stored in the memory unit, together with a pseudo code, in the marking method of the present invention, all data related to the production process can be stored. Following completion of the production process and assignment of a visual code to the final product, this visual code is matched with the pseudo code, so that data of the final product before and during production can be easily accessed by means of the visual code.

Object of the Invention

[0007] An object of the present invention is to provide a marking method for collecting, tracking and storing data of a molten metal during melting and casting processes.

[0008] Another object of the present invention is to provide a practical and reliable marking method.

Description of the Invention

[0009] In order to shape metal materials by casting process, one or more metals must be melted to liquify. Here, since various parameters of the shaping process will determine the properties of the final product, it is necessary to collect, track and store the data of the mentioned parameters. However, since a barcode or a serial number engraved on the metal is lost during the melting process, data storage may not be possible especially in casting processes. For this reason, the present invention provides a marking method for collecting, tracking and storing data of a molten metal during melting and casting processes.

[0010] The marking method according to the invention comprises the steps of: receiving at least one piece of metal to be melted; storing at least one information of the received metal ingot in a memory unit; melting said piece of metal; assigning at least one pseudo code to the melted piece of metal; storing the pseudo code assigned to the molten metal in the memory unit; molding the melted piece of metal; storing at least one data related to the molten metal and/or environmental conditions during the melting and/or molding processes in the memory unit; assigning a visual code (e.g. a barcode, a serial number) to the final demolded product; matching the visual code assigned to the final product with the pseudo code stored in the memory unit.

[0011] In an exemplary embodiment of the invention, a piece of metal (for example, a metal ingot) to be shaped by casting is obtained, and various information about this

piece of metal is stored in a memory unit. Here, information of the piece of metal may include at least one of the information such as the type of the piece of metal (such as aluminum, iron, copper, chromium), total weight thereof, a temperature or a humidity value of the environment where the piece of metal is present. The metal obtained is then melted. During said melting process, various data regarding the melting process, such as melting temperature, melting period, properties of a melting furnace, are also stored in the memory unit. Here, a pseudo code is assigned to the molten metal, such that said pseudo code is stored in the memory unit together with other data. Thus, for example, when different melting and casting processes are carried out at the same time in a facility, data of different metals can be stored in the memory without interfering with each other. After the melting process, casting (for example, a low-pressure casting) process is carried out to produce a desired part. Here, different process parameters for the casting process are stored in the memory, as well as in the melting process. Parameters in the casting process may include temperature of a chamber, temperature of a die system, temperature of the molten metal in the chamber, temperature of a coolant (e.g. air/liquid temperature in air/liquid cooled cooler), pressure of the coolant (e.g. air/liquid pressure in air/liquid cooled cooler), flow rate of the coolant, ambient temperature, ambient humidity, ground vibration, tooling vibration, etc. A visual code assigned to the product is matched with the pseudo code in order to determine features of the part obtained by this production. In this way, it is easy to access the information regarding production conditions of said part, and even, preservation conditions before the production.

[0012] In a preferred embodiment of the invention, said marking method comprises the step of detecting at least one data of a melting and/or casting process by at least one sensor during the related process. Therefore, in the step of storing at least one data of the molten metal and/or environmental conditions during the melting and/or molding processes, data to be stored in the memory unit is obtained in a practical and reliable manner.

[0013] In another preferred embodiment of the invention, in the step of assigning a visual code to the demolded final product, said marking method comprises the step of engraving the visual code assigned to the final product on the product. Here, said engraving step can be performed, for example, by printing a shape (such as a QR code or barcode in bar form) and/or an alpha-numeric inscription on a surface of the product. In an alternative embodiment, in the step of assigning a visual code to the demolded final product, the marking method comprises the step of gluing the visual code assigned to the final product on the product.

[0014] In a further preferred embodiment of the invention, said marking method comprises the step of sending the data stored in the memory (information on the piece of metal, data on the melting/casting process, visual code matched with the pseudo code) to a remote server. Here,

said remote server is preferably a cloud server. In this embodiment, for example, even when the final product is completed and sold to an end user, the end user can access the information about the production of the product by inputting the visual code information into the cloud server.

[0015] Since information about the piece of metal to be melted and data of the melting/casting processes are stored in the memory unit, together with a pseudo code, in the marking method of the present invention, all data related to the production process can be stored. Following completion of the production process and assignment of a visual code to the final product, this visual code is matched with the pseudo code, so that data of the final product before and during production can be easily accessed by means of the visual code.

Claims

1. A marking method for collecting, tracking and storing data of a molten metal during melting and casting processes, **characterized by** comprising the steps of:
 - receiving at least one piece of metal to be melted;
 - storing at least one information of the received metal ingot in a memory unit;
 - melting said piece of metal;
 - assigning at least one pseudo code to the melted piece of metal;
 - storing the pseudo code assigned to the molten metal in the memory unit;
 - molding the melted piece of metal; storing at least one data related to the molten metal and/or environmental conditions during the melting and/or molding processes in the memory unit;
 - assigning a visual code to the final demolded product; matching the visual code assigned to the final product with the pseudo code stored in the memory unit.
2. A marking method according to claim 1, **characterized in that** in the step of storing at least one information of the received metal ingot in a memory unit, information of the piece of metal comprises at least one of the information such as the type of the piece of metal, total weight thereof, a temperature or a humidity value of the environment where the piece of metal is present.
3. A marking method according to claim 1 or 2, **characterized in that** at least one data of a melting and/or casting process is detected by at least one sensor during the related process.
4. A marking method according to any of the preceding

claims, **characterized in that** in the step of assigning a visual code to the demolded final product, the method comprises the step of engraving the visual code assigned to the final product on the product.

5

5. A marking method according to any of the preceding claims, **characterized in that** in the step of assigning a visual code to the demolded final product, the method comprises the step of gluing the visual code assigned to the final product on the product.

10

6. A marking method according to any of the preceding claims, **characterized in that** the method comprises the step of sending the data stored in the memory (information on the piece of metal, data on the melting/casting process, visual code matched with the pseudo code) to a remote server.

15

20

25

30

35

40

45

50

55



EUROPEAN SEARCH REPORT

Application Number

EP 22 18 2829

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2018/101061 A1 (SINTOKOGIO LTD [JP]) 7 June 2018 (2018-06-07) * Machine translation; paragraph [0020] - paragraph [0021] * * Machine translation; paragraph [0066] - paragraph [0088] * -----	1-6	INV. B22D46/00
X	US 2018/036928 A1 (FUNAKOSHI YUKIYOSHI [JP] ET AL) 8 February 2018 (2018-02-08) * paragraph [0066] - paragraph [0087] * * paragraph [0104] - paragraph [0115] * -----	1-6	
X	JP 2019 217506 A (SINTOKOGIO LTD) 26 December 2019 (2019-12-26) * Machine translation; paragraph [0908] - paragraph [0937] * -----	1-6	
X	EP 3 378 583 A1 (SINTOKOGIO LTD [JP]; FUJIWA DENKI CO LTD [JP]) 26 September 2018 (2018-09-26) * paragraph [0060] - paragraph [0083] * -----	1-6	TECHNICAL FIELDS SEARCHED (IPC)
X	US 6 779 583 B1 (FULTON ARNIE [US] ET AL) 24 August 2004 (2004-08-24) * column 9, line 45 - column 16, line 24 * -----	1-6	B22D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 November 2022	Examiner Desvignes, Rémi
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 22 18 2829

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-11-2022

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2018101061 A1		07-06-2018	CN 109153071 A	04-01-2019
			JP 6856077 B2	07-04-2021
			JP WO2018101061 A1	21-11-2019
			TW 201832900 A	16-09-2018
			WO 2018101061 A1	07-06-2018

US 2018036928 A1		08-02-2018	BR 112017017311 A2	03-04-2018
			CN 107107183 A	29-08-2017
			EP 3251775 A1	06-12-2017
			JP 5880761 B1	09-03-2016
			JP 2016203195 A	08-12-2016
			KR 20170137697 A	13-12-2017
			RU 2017134577 A	05-04-2019
			TW 201639643 A	16-11-2016
			US 2018036928 A1	08-02-2018
			WO 2016166906 A1	20-10-2016

JP 2019217506 A		26-12-2019	JP 6922854 B2	18-08-2021
			JP 2019217506 A	26-12-2019

EP 3378583 A1		26-09-2018	CN 108348997 A	31-07-2018
			EP 3378583 A1	26-09-2018
			JP 6472899 B2	20-02-2019
			JP WO2017085765 A1	31-05-2018
			KR 20180084791 A	25-07-2018
			US 2019247917 A1	15-08-2019
WO 2017085765 A1			WO 2017085765 A1	26-05-2017

US 6779583 B1		24-08-2004	NONE	
