Title (en)

Method for determining the condition of a fire-resistant lining of a metallurgical melting vessel

Title (de)

Verfahren zur Bestimmung des Zustandes einer feuerfesten Auskleidung eines metallurgischen Schmelzgefässes

Title (fr)

Procédé destiné à déterminer l'état d'un revêtement réfractaire d'une cuve de fusion métallurgique

Publication

EP 2789960 B1 20181219 (DE)

Application

EP 13163565 A 20130412

Priority

EP 13163565 A 20130412

Abstract (en)

[origin: CA2901222A1] The invention relates to a method for determining the state of a fire-resistant lining of a vessel (10) containing molten metal in particular. In the process, maintenance data, production data, and wall thicknesses at least at locations with the highest degree of wear are measured or ascertained together with additional process parameters of a vessel (10) after the vessel (10) has been used. Said data is then collected and stored in a data structure. A calculating model is generated from at least some of the measured or ascertained data or parameters, and said data or parameters are evaluated by means of the calculating model using calculations and subsequent analyses. Thus, related or integral ascertaining processes and subsequent analyses can be carried out, on the basis of which optimizations relating to both the vessel lining as well as the complete process of the molten metal in the vessel are achieved.

IPC 8 full level

F27D 1/16 (2006.01); **F27D 21/00** (2006.01)

CPC (source: EP KR RU US)

C21C 5/445 (2013.01 - EP KR US); **F27D 1/16** (2013.01 - US); **F27D 1/1636** (2013.01 - EP KR US); **F27D 1/1642** (2013.01 - EP KR US); **F27D 3/1509** (2013.01 - US); **F27D 3/1518** (2013.01 - EP KR US); **F27D 21/00** (2013.01 - RU); **F27D 21/0014** (2013.01 - US); **F27D 21/0021** (2013.01 - EP KR US); **F27D 21/0035** (2013.01 - US); **C21C 2005/448** (2013.01 - EP KR US); F27D 2001/0046 (2013.01 - US)

Citation (opposition)

Opponent : VESUVIUS GROUP, SA

- EP 0632291 A2 19950104 - RAUTARUUKKI OY [FI]
- JP 2010156471 A 20100715 - KOBE STEEL LTD
- CHRISTOVA, N. ET AL.: "Estimation of the Insulation Deterioration of Metallurgical Ladle by Use of RBFNN Models", 2012 UKSIM-AMSS 6TH EUROPEAN MODELLING SYMPOSIUM, 14 January 2013 (2013-01-14), pages 27 - 32, XP032308069
- FORRER, M.: "Prediction of refractory wear with Machine Learning methods", MASTER THESIS (IGI) TU-GRAZ, 12 March 2012 (2012-03-12), XP055645334, Retrieved from the Internet <URL:https://diglib.tugraz.at/download.php?id=576a791fddf2f&location=browse>

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

DOCDB simple family (publication)

EP 2789960 A1 20141015; **EP 2789960 B1 20181219**; AU 2014252322 A1 20151029; AU 2014252323 A1 20151029; BR 112015024594 A2 20170718; BR 112015024597 A2 20170718; CA 2896916 A1 20141016; CA 2901222 A1 20141016; CA 2901222 C 20210803; CN 105074371 A 20151118; CN 105074371 B 20170728; CN 105102915 A 20151125; EP 2789961 A1 20141015; ES 2716222 T3 20190611; IL 239709 A0 20150831; IL 240485 A0 20150924; IL 240485 B 20191231; JP 2016519750 A 20160707; JP 2016519751 A 20160707; JP 2019039668 A 20190314; JP 2021119264 A 20210812; JP 2023145627 A 20231011; KR 102497401 B1 20230207; KR 20150140303 A 20151215; KR 20150143588 A 20151223; KR 20210044322 A 20210422; MX 2015010538 A 20151116; MX 2015011067 A 20160505; MX 365555 B 20190607; NZ 711079 A 20210430; PL 2789960 T3 20190628; RU 2015138120 A 20170517; RU 2015138120 A3 20180306; RU 2015141841 A 20170519; RU 2015141841 A3 20180314; RU 2674185 C2 20181205; SA 515360957 B1 20190212; UA 118553 C2 20190211; US 2016282049 A1 20160929; US 2016298907 A1 20161013; WO 2014166678 A1 20141016; WO 2014166679 A1 20141016; ZA 201505037 B 20160428; ZA 201506533 B 20171129

DOCDB simple family (application)

EP 13163565 A 20130412; AU 2014252322 A 20140307; AU 2014252323 A 20140307; BR 112015024594 A 20140307; BR 112015024597 A 20140307; CA 2896916 A 20140307; CA 2901222 A 20140307; CN 201480020507 A 20140307; CN 201480020917 A 20140307; EP 13184161 A 20130912; EP 2014054473 W 20140307; EP 2014054474 W 20140307; ES 13163565 T 20130412; IL 23970915 A 20150629; IL 24048515 A 20150810; JP 2016506819 A 20140307; JP 2016506820 A 20140307; JP 2018212008 A 20181112; JP 2021072326 A 20210422; JP 2023123181 A 20230728; KR 20157030576 A 20140307; KR 20157031887 A 20140307; KR 20217011221 A 20140307; MX 2015010538 A 20140307; MX 2015011067 A 20140307; NZ 71107914 A 20140307; PL 13163565 T 20130412; RU 2015138120 A 20140307; RU 2015141841 A 20140307; SA 515360957 A 20150827; UA A201509459 A 20140307; US 201414777770 A 20140307; US 201414777810 A 20140307; ZA 201505037 A 20150714; ZA 201506533 A 20150904