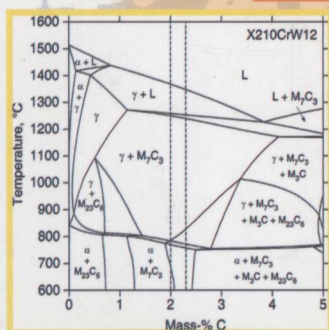
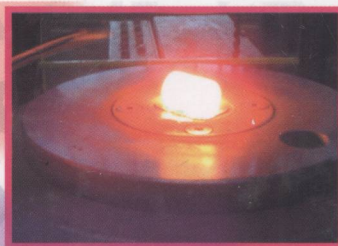
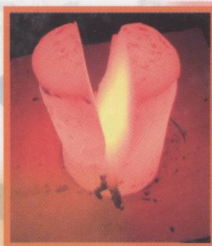


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Thixoforming

Semi-solid Metal Processing



TG3.
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Gerhard Hirt and Reiner Kopp



E2009002849

WILEY-VCH Verlag GmbH & Co. KGaA

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Library of Congress Card No.: applied for

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

**Bibliographic information published by
the Deutsche Nationalbibliothek**

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at <http://dnb.d-nb.de>.

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Typesetting Thomson Digital, Noida, India

Printing Strauss GmbH, Mörlenbach

Binding Litges & Dopf GmbH, Heppenheim

Printed in the Federal Republic of Germany

Printed on acid-free paper

ISBN: 978-3-527-32204-6

Thixoforming

Edited by

Gerhard Hirt and Reiner Kopp

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Preface

Semi-solid forming of metals is a fascinating technology offering the opportunity to manufacture net-shaped metal components of complex geometry in a single forming operation. At the same time, high mechanical properties can be achieved due to the unique microstructure and flow behaviour. Successful semi-solid forming processes require narrow tolerances in all process steps, including feedstock generation, reheating and the forming process. It is this strong and highly nonlinear interrelation between the parameters of each process step on the one hand and the material microstructure and flow behaviour on the other which still causes a challenge for scientific understanding and economic mass production.

This book first gives a substantial general overview of worldwide achievements of semi-solid metal (SSM) technology to date. The main part then presents latest research results concerning the material fundamentals and process technology and material and process modelling. In addition to contributions from internationally recognized scientists elsewhere, most of the results presented were obtained within the activities of the collaborative research centre SFB289, 'Forming of metals in the semi-solid state and their properties', at RWTH Aachen University. This research centre was funded at RWTH from 1996 to 2007 by the Deutsche Forschungsgemeinschaft (DFG) involving nine institutes and with a total budget of about €19.2 million. The centre has contributed more than 250 publications in various international journals and conferences. Even though this book briefly covers the whole period, it is especially intended to make the results of the most recent activities, dating from 2004 to 2007, available as a whole to the international community.

The book covers semi-solid forming of aluminium alloys and steels from feedstock generation to part properties and also process control and die technologies. It is intended for engineers and scientists in industry and academia who want to achieve a general overview of the technology involved and a deeper understanding of the fundamental basics of this innovative technology.

Aachen, November 2008

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