

Aluminium Brazing

Lectures of the 8th International Congress
taking place in Düsseldorf on 3rd to 5th June 2014

Organiser:
DVS – German Welding Society, Düsseldorf

Bibliographic information published by the Deutsche Nationalbibliothek

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

DVS-Berichte Band 305

ISBN 978-3-945023-02-0

The lectures are printed in form of manuscripts.

All rights, also for translation, are reserved. The reproduction of this volume or of parts of it only with approval of the DVS Media GmbH, Düsseldorf.

© DVS Media GmbH, Düsseldorf · 2014

Printing: Griebisch & Rochol Druck GmbH & Co. KG, Hamm

Welcome to the 8th International Congress Aluminium Brazing

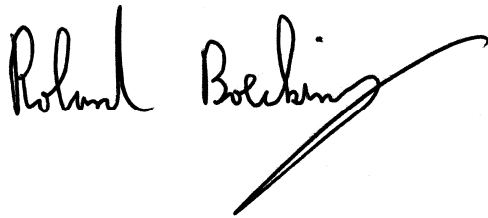
On the occasion of the 8th International Congress “Aluminium Brazing” – hosted in Düsseldorf, Germany, on 3rd to 5th June 2014 – we are looking forward to meet participants from all over the world gathered here to exchange information about current processes and innovation in the brazing sector.

We deeply thank all authors and session chairs for their valuable contributions to the congress and we welcome all participants. We are sure to have an interesting programme to initiate intense discussions that can be resumed when visiting the fully booked exhibition.

The International Congress Aluminium Brazing, organized this year for the second time by the German Welding Society (DVS), has developed from its inception in the year 2000 to an internationally acknowledged meeting place for the brazing industry.

DVS is proud to support this congress – which is in fact one of the best ways to transfer knowledge in different directions. Joining and brazing are complex technologies, applications of those technologies must be based on continuous activities in research, development, guidelines, rules, standards and training – the DVS concept of joining and brazing combines all those activities, thus we are ready to contribute to the further success of this congress.

Again, welcome to Düsseldorf, welcome to the international community of brazing!

A handwritten signature in black ink, reading "Roland Boecking". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

Roland Boecking
General Manager of DVS
German Welding Society

Table of contents

Preface

Opening Presentation

R. Sicking, Kleve/DE

Innovations in aluminium heat exchanger brazing – current drivers and inspirations 1

Materials

S. Kahl and H.-E. Ekström, Finspång/SE

Tensile, fatigue, and creep properties of aluminium heat exchanger tube alloys for temperatures from 20 to 300 °C 11

M. Perrier, L. Peguet, A. Arbab, A. Daniélou, Voreppe/FR, and H. Ribes, Biesheim/FR

Multiclad innovation 27

M. Günyüz, C. Işiksacan and C. Konya, Istanbul/TR

Effect process flow on material properties of modified 3003 aluminium alloy developed for brazing applications 34

S. Baumann, B. Ren and N. Sun, Lancaster/US

Interliners – an enabling component for advanced brazing sheet designs 38

M. Melander, A. Oskarsson, Finspång/SE, and S. Haller, Virginia/US

Next generation multilayer – MULTICLAD: Material for brazed heat exchanger applications 45

Application

S. Jahn, S. Dahms, F. Gemse, S. Sändig, Jena/DE, P. Köhring and H. Voigt, Leipzig/DE

Cooling system for electric power trains – diffusion bonded heat sinks 49

Equipment

K. Eckhard and H. Janssen, Bonn/DE

CleanBraz: fluxless brazing of aluminium heat exchangers 50

P. Skarbiński and A. Bielewicz, Świebodzin/PL

Vacuum purging: a progressive innovation for CAB equipment and processes 52

Process and Quality Control I

E. Hofmann, J. Zschetzsche and U. Füssel, Dresden/DE

Influence of atmospheric conditions during transport and storage on the brazeability of aluminium 56

L. Orman and H. W. Swidersky, Hannover/DE

Considerations for selective pre-fluxing binder technologies / paint fluxing 59

E. El Choueiry, Cambridge/UK

The Datapaq profiling system, an optimisation and process control tool 63

Research and Development

T. Kremmer, H. Antrekowitsch, G. Mori, Leoben/AT, G. Hanko, P. Oberhauser and A. Hajek, Ranshofen/AT

High strength brazing sheet with improved corrosion resistance 67

D. Steiner, Tønder/DK, J. Insalaco, Rockledge/US, and J. H. Nordlien, Karmøy/NO

Pre-coated tubes for brazed heat exchanger – experience with Zn containing fluxes 75

M. Türpe, B. Grünenwald and A. Wald, Stuttgart/DE

Contribution about minor elements in aluminium brazing alloys 81

D. K. Hawksworth, R. Westergård and P. Nilsson, Finspång/SE

Brazing properties of Trillium composite 84

U. Seseke-Koyro, H. W. Swidersky, L. Orman, A. Becker and A. Ottmann, Hannover/DE

Approach to non-corrosive fluxes for further reduced residue solubility and improved magnesium tolerance 89

A. Gray, C. Butler and A. C. Nadin, Banbury/UK

The influence of thermo-mechanical processing (TMP) of clad sheet on the brazeability of heat exchanger materials 93

N. W. Sucke , L. Löchte, and I. Boyraz, Velbert/DE

CO₂: Turning the world of automotive climate control upside down 94

Process and Quality Control II

J. Borkhart, Stuttgart/DE

Customer designed selective paintfluxing and brazing alloy application – A service for the aluminium brazing industry 100

List of authors 103