

Titanium USA Conference 2015

Orlando, Florida, USA
4-7 October 2015

ISBN: 978-1-5108-1722-7

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2015) by International Titanium Association (ITA)
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact International Titanium Association (ITA)
at the address below.

International Titanium Association (ITA)
11674 Huron Street, Suite 100
Northglenn, CO 80234 USA

Phone: 1-303-404-2221
Fax: 1-303-404-9111

www.titanium.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

3D ADDITIVE MANUFACTURING

IN-SITU PROCESS MONITORING AND BIG DATA ANALYSIS FOR ADDITIVE MANUFACTURING OF TI-6AL4V	1
<i>R. Dehoff, B. Peter, V. Paquit, R. Dinwiddie, L. Love, B. Richardson, P. Nandwana, D. Lados, H. Galarraga, E. Schwalbach, M. Groeber, F. Medina, U. Ljungblad, U. Akelid, C. Tallman</i>	
SMART COLLABORATION - LEVERAGE A RICH KNOWLEDGE BASE TO GAIN COMPETITIVE ADVANTAGE IN THE ADDITIVE MANUFACTURING INDUSTRY	12
<i>R. Gorham</i>	

ADVANCED MANUFACTURING

ADVANCEMENTS IN TITANIUM CONDITIONING	24
<i>P. Cross, D. Sullivan, B. Vanasse</i>	
THE SHIFT TO MATERIAL-CENTERED MANUFACTURING	32
<i>B. Erdel</i>	
THE LARGEST COST REDUCTION OPPORTUNITY FOR TITANIUM IN A QUARTER CENTURY: ELECTROCHEMICAL CONDITIONING AND FINISHING	40
<i>K. Faller</i>	
TECHNOLOGIES FOR RELIABLE TITANIUM ALLOY FORGINGS FOCUSING ON ULTRASONIC INSPECTION IN AEROSPACE INDUSTRY	45
<i>Y. Ito, H. Takamatsu, K. Kinoshita</i>	

AUTOMOTIVE

TITANIUM AND THE AUTO RACING INDUSTRY	55
<i>J. Hostetler</i>	
VDM TIX - TITANIUM ALLOY FOR EXHAUST APPLICATIONS	63
<i>J. Kiese, C. Schmidt, C. Siemers</i>	
ULTALITE AL-TI MMC NEW EMISSIONS PARADIGM	70
<i>G. Withers, G. Cole</i>	

COMMAEROSPACE

KEY STRATEGIC ENABLERS FOR A SUCCESSFUL AIRBUS MATERIAL SUPPLY CHAIN COMMUNITY	78
<i>T. Cochelin</i>	
EMBRAER TITANIUM OUTLOOK	83
<i>W. Goncalves</i>	
OUTLOOK FOR TITANIUM IN THE COMMERCIAL AIRPLANE MARKET	103
<i>W. Shaffer</i>	

DISTINGUISHED SPEAKERS

U.S. DEPARTMENT OF ENERGY OFFICE OF FOSSIL ENERGY ADVANCED ENERGY SYSTEMS PROGRAM OVERVIEW	108
<i>R. Conrad</i>	
A LIFE-CYCLE APPROACH TO CAPITAL PROJECTS	146
<i>G. Hays</i>	

DISTRIBUTION TRENDS

THE WORLD'S LARGEST INDEPENDENT DISTRIBUTOR OF TITANIUM.....	150
<i>G. Himstead</i>	

ECONOMICS

LEADING OURSELVES STRATEGICALLY TO COMMODITIZATION.....	151
<i>M. Ensley</i>	
A LESSOR'S VIEW OF AIRCRAFT MARKETS AND GLOBAL ECONOMICS.....	159
<i>N. Pastushan</i>	
AEROSPACE PRODUCTION & SUPPLY CHAIN OUTLOOK.....	168
<i>P. Zimm</i>	

INDUSTRIAL MARKETS

WEAR RESISTANT OPTIONS FOR HIGH PRESSURE ACID LEACHING (HPAL) APPLICATIONS.....	181
<i>G. Lantzke</i>	
ADVANCES IN THE DEVELOPMENT OF SURFACES FUNCTIONALITIES OF TITANIUM.....	198
<i>M. Pedefferri</i>	
CASE STUDIES SUPPORTING A TITANIUM-TUBED HEAT EXCHANGER UPGRADE FROM COPPER NICKEL.....	208
<i>D. Schumerth</i>	

MACHINING

ADVANCEMENTS IN INSERT CUTTING EDGES AND COATINGS.....	219
<i>K. Maples</i>	
CRYOGENIC MACHINING.....	228
<i>W. Radtke</i>	
HIGH VOLUME TITANIUM CUTTING CHALLENGE, TECHNOLOGY AND SOLUTIONS.....	239
<i>R. Fitz</i>	

MELTING

SHELL MATERIALS AND CASTING METHODS FOR CASTING TITANIUM ALLOYS WITH MINIMUM ALPHA CASE.....	250
<i>T. Branscomb</i>	
RECENT DEVELOPMENTS IN MELTING TECHNOLOGIES FOR TITANIUM ALLOYS.....	257
<i>S. Fox</i>	
γ-PAM: CASTING OF NEAR NET SHAPE TITANIUM ALUMINIDE ALLOY INGOTS.....	267
<i>C. Jackson, R. Haun, P. Voigt</i>	
INCREASED PRODUCTIVITY USING FLEXIBLE HEARTH MELTING CONFIGURATIONS.....	279
<i>N. Slinkert</i>	

POWER METALLURGY

MANUFACTURING OF HYDROGENATED TITANIUM POWDERS AND TITANIUM COMPONENTS FOR CRITICAL APPLICATIONS.....	286
<i>V. Duz, V. Moxson, M. Matviychuk, A. Klevtsov</i>	
ELECTROLYTIC TI POWDER PRODUCTION FROM ORE SOURCES.....	306
<i>J. Withers</i>	

RECYCLING

RECYCLING SPHERICAL POWDERS	313
<i>R. Dolbec</i>	
RECYCLING TITANIUM - THE ROLE OF THE TITANIUM SCRAP PROCESSOR	323
<i>S. Stone</i>	
HAZARDOUS TITANIUM DOES NOT BELONG IN LANDFILL	334
<i>R. Lee</i>	
SCRAP TRENDS	338
<i>E. Newman</i>	

U.S. GOVERNMENT FUNDED PROJECTS

INNOVATING THE FUTURE OF TITANIUM PRODUCTION AT THE U.S. DEPARTMENT OF ENERGY ADVANCED RESEARCH PROJECTS AGENCY-ENERGY (ARPA-E)	355
<i>J. Klausner</i>	
FLUIDIZED BED PROCESSES FOR PRODUCTION OF METAL ALLOYS AND COMPOSITES	371
<i>J. Perez, E. Alvarez, F. Tanzella, A. Sanjurjo</i>	

WORLD DEMAND TRENDS

OUTLOOK ON CURRENT TITANIUM TRENDS IN JAPAN	381
<i>K. Kazuo</i>	
INDUSTRIAL TITANIUM DEMAND FORECAST 2015	391
<i>K. Cain</i>	
TITANIUM DEMAND AND TRENDS IN THE AIRFRAME MARKET	406
<i>W. Leach</i>	
RUSSIAN TITANIUM MARKET UPDATE	415
<i>M. Metz</i>	
TITANIUM IN THE DEFENSE MARKET: DRIVING GROWTH THROUGH INNOVATION	420
<i>E. Roegner</i>	
THE EVOLUTION OF JET ENGINES	427
<i>H. Seiner</i>	

WORLD SUPPLY TRENDS

RUTILE ECONOMICS - THE OUTLOOK FOR A RAW MATERIAL CRITICAL TO MANUFACTURING HIGH QUALITY SPONGE	438
<i>D. Folmer</i>	
FERROTITANIUM DEMAND TRENDS	446
<i>M. Schmink</i>	
Author Index	