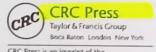


## Sustainable Manufacturing for Industry 4.0

An Augmented Approach

K. Jayakrishna, Vimal K.E.K., S. Aravind Raj, Asela K. Kulatunga, M.T.H. Sultan, and J. Paulo Davim



CRC Press is an imprint of the Taylor & Francis Group, an informa business



Dr.D.SENTHIL KUMARAN, M.E. Part., (803)
Principal
SSM Institute of Engineering and Technology
Kuttathupatti Village, Sindalagundu (Po),
Palani Road, Dindigul - 624 002.

First edition published 2020

6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742

and by CRC Press
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

© 2021 Taylor & Francis Group, LLC

CRC Press is an imprint of Taylor & Francis Group, LLC

Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, access www.copyright.com or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. For works that are not available on CCC please contact mpkbookspermissions@tandf.co.uk.

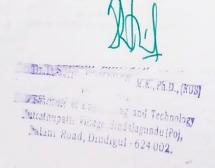
Trademark notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Library of Congress Cataloging-in-Publication Data Names: Jayakrishna, K., 1984- editor. Title: Sustainable manufacturing for industry 4.0: an augmented approach / edited by K. Jayakrishna, Vimal KEK, S. Aravind Raj, K.M.A.K. Kulatunga, Mohamed Thariq Bin Haji Hameed Sultan and J. Paulo Davim. Description: First edition. I Boca Raton: CRC Press, 2020. I Series: Manufacturing design & technology | Includes bibliographical references Identifiers: LCCN 2020015133 (print) LCCN 2020015134 (ebook) LISBN 9781138606845 (hbk) HSBN 9780429466298 (ebk) Subjects: LCSH: Manufacturing processes-Environmental aspects. I Engineering design-Environmental aspects. I Manufacturing industries-Technological innovations. I Manufacturing processes--Automation. Classification: LCC TS155.7 .S858 2020 (print) LCC TS155.7 (ebook) I DDC 670-dc23 LC record available at https://lccn.loc.gov/2020015133 LC ebook record available at https://lccn.loc.gov/2020015134

ISBN: 978-1-138-60684-5 (hbk) ISBN: 978-0-429-46629-8 (ebk)

Typeset in Times by Deanta Global Publishing Services, Chennai, India





			5.3.2.4 Composites	. 210
		5.3.3	Smart Materials for Industry 4.0	. 211
		5.3.4	AM for Rapid Tooling	. 211
		5.3.5	Conclusions	. 212
		Refere	nces	. 212
	_			
Chapter 6	Ensuring Sustainability in Industry 4.0: Implementation			
	Fram	ework		215
	6.1	Guidelines for Ensuring Sustainability in Industry 4.0 2 Sivakumar K., Deepak Mathivathanan, M. Nishal, and Vimal K.E.K.		
		6.1.1	Introduction	. 215
		6.1.2	Sustainability in Industry 4.0	. 216
		6.1.3	Guidelines for Ensuring Sustainability in	
			Industry 4.0.	. 217
		6.1.4	Impact of Sustainability in Industry 4.0	. 221
		6.1.5	Conclusion	
		Refere	ences	.222
	6.2	Case S	Studies - Sustaining Global Competitiveness with	
			ry 4.0	224
			<mark>haa, R. Sudh</mark> akara Pandian, Leos Safar, ikub Sopko	
		6.2.1	Introduction	224
		6.2.2	Challenges and Issues of Industry 4.0	
		6.2.3	Technologies of Industry 4.0	
		0.2.5	6.2.3.1 Internet of Things (I.o.T.)	225
			6.2.3.2 Cyber-Physical Systems (C.P.S.)	225
			6.2.3.3 Cloud Manufacturing	226
			6.2.3.4 Big Data Analytics	226
		6.2.4	Case Studies Based on Industry 4.0 Technologies	
		0.2.4	6.2.4.1 Cases on Neural Network Technologies	
			6.2.4.2 Case Studies on I.o.T. Technologies	
			6.2.4.3 Cases on Big Data Technologies	
			6.2.4.4 Cases on Industrial Wireless Network	
			(I.W.N.) Technologies	228
			6.2.4.5 Industrial Internet of Things (I.I.o.T.)	
			Technologies	229
			6.2.4.6 Logistics Optimisation Technologies	
		6.2.5	Summary and Final Remarks	
			ences	
	6.3		ling the Interrelationship of Factors Enabling	
	0.5	Agile-	Industry 4.0: A DEMATEL Approach	. 232
		631	Introduction	. 232



Dr.D.SENTHIL KUMARAN, M.E., Ph.D., (NUS)
Principal
SSM Institute of Engineering and Technology
Kuttathupatti Village, Sindalagundu (Po),
Palani Road, Dindigul - 624 002.