Preface

Lector amice salve

Quid mundus, quae causa Deo, ratioque creandi,

Unde Deo numeri, quae tantae regula moli,

Quid faciat ser circuitus, quo quaelibet orbe

Intervalla cadant, cur tanto Jupiter et Mars,

Orbibus haud primis, interstinguantur hiatu

Hic te Pythagoras docet omnia quinque figuris.

Scilicet exemplo docuit, nos posse renasci,

Bis mille erratis, dum fit Copernicus annis,

Hoc, melior mundi speculator, nominis.

Riemannus et Poincarеus possunt continuere,

Etiam Hausdorffus et Mandelbrotus

At tu glandibus inventas noli postponere fruges.

Post Mysterium Cosmographicum

Joannis Keplerus

An emerging universe of networkable objects is about to lead Manufacturing into another fascinating phase of development. As the number of smart devices is already counted in trillions, we actually witness their broad introduction into

factories. Manufacturing emerges as a set of loosely coupled, smart, autonomous units, which is restructuring configurations and gravitating towards optimising processes and efficient output. Satellites and triangulating transponders are continuously positioning and localising for best transformation steps that are at the centre of interest rather than fixed technological units. Cyber Physical Production Systems, context-aware equipment and networkable manufacturing units become the key assets for industrial value creation. Their agility is orchestrated via intensive aspect motivated interactions, which occur on well-defined orbits with corresponding granularities.

Distributed Manufacturing establishes efficient versatile constellations of skills, advanced technologies and effective processes. It exceeds the simple revising of processes and functions; it incorporates entirely new ways of producing that completely reshape all manufacturing sectors right from the base of collaboration for all involved persons, machines and resources. Attached Cyber Physical Production spaces, Cloud Manufacturing and Smart Objects will evolve to the point where manufacturing needs little prearrangement; it will just happen. Distributed automation has already anticipated the geometry of manufacturing networks in a nutshell; due to pattern similarities, it is now expanding into manufacturing in total. Digital dimensions, which unify virtual worlds with real worlds via interconnected smart mobile devices, make manufacturing once again profit from a number of novelties in the ways we interact with both, the physical and the digital world. Convergence of technologies keeps adding improvements in equipment abilities, in manufacturing productivity and in quality of work life, so networked intelligent units will make Distributed Manufacturing a common way to produce. This book proposes a first solid theory base by outlining overall principles and by detailing the complex nature of smartness of units in Distributed Manufacturing. Especially, the coalescence of people and machines' smartness, now invading manufacturing, is strongly promoted. Outside disciplines are given more credit and easier access to manufacturing. Interdisciplinary work, properly embedded and put together in the right way, paves smooth ways for more and better research results. The outline highlights key outcomes of a number of IMS and ERA Projects, national and regional activities as well as from cutting-edge industrial implementations of Distributed Manufacturing. The results have been consolidated with global engineering communities involving renowned researchers as well as leading manufacturing, telecommunications and software companies. Our thanks go to many university colleagues as well as to a large number of practitioners in different industries from many regions of the world, especially the pilot companies, for their support and insights into recent developments and up-coming concepts.

Stuttgart
Spring 2015

Hermann Kühnle
Günter Bitsch

http://www.springer.com/978-3-319-18077-9

Foundations & Principles of Distributed Manufacturing
Elements of Manufacturing Networks, Cyber-Physical Production Systems and Smart Automation
Kühnle, H.; Bitsch, G.
2015, XVII, 121 p. 35 illus., 14 illus. in color., Hardcover
ISBN: 978-3-319-18077-9