

1. Record Nr.	UNINA9910829834503321
Autore	Demoly Frederic
Titolo	4d printing 1 : between disruptive research and industrial applications / / Frederic Demoly, Jean-Claude Andre
Pubbl/distr/stampa	Hoboken, New Jersey : , : John Wiley & Sons, Incorporated, , [2022] ©2022
ISBN	1-394-16378-9 1-394-16376-2
Descrizione fisica	1 online resource (367 pages)
Collana	Systems and industrial engineering series
Disciplina	514.742
Soggetti	Additive manufacturing Three-dimensional printing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Half-Title Page -- Title Page -- Copyright Page -- Contents -- Foreword -- Preface -- Preamble: 4D Printing, Between the Why(s) and the How(s) -- P.1. Introduction -- P.2. Toward a more "total" integration of autonomy and matter -- P.3. From research to product(s) -- P.4. References -- Introduction -- I.1. Attempt to define 3D printing -- I.2. What about 4D printing? -- I.3. An "explosion" of complexities in 4D printing -- I.3.1. Stimulation process -- I.3.2. Materials -- I.3.3. Controlling deformations -- I.4. Conclusion -- I.5. References -- Chapter 1. Is 4D Printing Disruptive or Incremental, or a Bit of Both? -- 1.1. Introduction -- 1.2. Prospective approach -- 1.3. A tectonics of paradigms -- 1.3.1. 3D printing -- 1.3.2. 4D printing -- 1.3.3. The potential development of 4D innovations -- 1.3.4. Note: example of 4D printing in structural electronics (SE) -- 1.3.5. Partial conclusion -- 1.4. 4D printing: breakthrough or increment? -- 1.4.1. Creativity and 4D printing -- 1.4.2. Getting out of blindly following? Where to go? -- 1.4.3. Application to additive manufacturing -- 1.4.4. Application to 4D printing -- 1.5. Financial and organizational aspects -- 1.5.1. Research funding and direction -- 1.5.2. Constraints/opportunities related to research orientation -- 1.6. A hopeful conclusion within an organization that learns -- 1.6.1. General framework -- 1.6.2. Organizing research in 4D printing -- 1.7. Appendix 1: Processing an

external file -- 1.8. Appendix 2: Going a step further (working document) -- 1.8.1. Can we break the deadlock? -- 1.8.2. So what? -- 1.9. References -- Chapter 2. Is There External Creativity to Support 4D Printing? -- 2.1. Introduction -- 2.2. A survey for the general public -- 2.2.1. The survey -- 2.2.2. Items not transmitted -- 2.2.3. Some general survey results -- 2.2.4. Note: English language survey. 2.3. Results of the survey -- 2.3.1. Specific ideas and proposals (open questions) -- 2.3.2. Presentation and analysis of the quantified results of the survey -- 2.4. Discussion -- 2.4.1. Non-response (voluntary) -- 2.4.2. Survey responses -- 2.5. Conclusion -- 2.6. Appendix 1: The blank survey -- 2.6.1 What is 4D printing? -- 2.7. Appendix 2: Answers as of February 16, 2021 -- 2.8. References of scientific articles with "4D printing" or "applications" in their titles -- 2.9. References -- 3. Who Would Prevail Today from Lamarck or Darwin to Help the Controlled Evolution of 4D Printing? -- Preamble -- 3.1. Introduction -- 3.2. General considerations -- 3.2.1. The 4D fabrications concerned by this chapter -- 3.2.2. Toward a transposition between theories of nature and 4D printing -- 3.3. General considerations -- 3.3.1. The question of arrangements and the control of the arrow of time -- 3.3.2. Complexity induced by the stimulation -- 3.3.3. Toward a principle of parsimony? -- 3.3.4. To go a little further -- 3.3.5. A partial fallback situation -- 3.3.6. The reverse problem -- 3.4. A view from thermodynamics -- 3.5. Darwin, Lamarck and others... -- 3.5.1. Between Lamarck and Darwin -- 3.5.2. Evolutions -- 3.5.3. Notion of morphogenetic field -- 3.5.3.1. General considerations -- 3.5.3.2. From a more practical point of view -- 3.5.3.3. 4D printing? -- 3.6. Conclusion -- 3.7. References -- Chapter 4. Toward a Possibly Programmable Self-organization? -- 4.1. Introduction -- 4.2. A look at the technology -- 4.3. Natural (spontaneous) self-organization -- 4.3.1. Nonlinearities -- 4.3.2. Achieving the desired shape? -- 4.4. Self-organization and 3D/4D printing -- 4.4.1. General considerations -- 4.4.2. Creation of 3D artifacts -- 4.4.3. What about 4D printing? Stimulated self-organizing systems: bottom-up coupling -- 4.4.3.1. Chemical robots. 4.4.3.2. Some results of stimulated or constrained self-organization -- 4.4.4. Can we envisage a "learning" 4D system? -- 4.4.4.1. Information gathering -- 4.4.4.2. The act of learning -- 4.4.4.2.1. First example -- 4.4.4.2.2. Second example -- 4.4.4.3. Toward an operating manual -- 4.4.5. Removal of a blocking element -- 4.5. Conclusion -- 4.6. References -- Index -- Other titles from iSTE in Systems and Industrial Engineering - Robotics -- EULA.

Sommario/riassunto

Any time objects and their (self-)organization are to be put into use, their models and methods of thinking as well as their designing and manufacturing need to be reinvented. 4D printing is a future technology that is capable of bringing 3D objects to life. This ability, which gives objects the power to change shape or properties over time through energy stimulation from active materials and additive manufacturing, makes it possible to envisage technological breakthroughs while challenging the relationship between people and objects. 4D Printing 1 presents the different facets of this technology, providing an objective, critical and even disruptive viewpoint to enable its existence and development, and to stimulate the creative drive that industry, society and humanity need in the perpetual quest for evolution and transformation.
