# Contents

**Acknowledgements**  
page vii

1 **Introduction**  
1.1 History and Development of the STCR Approach  
1.2 Strengths and Weaknesses of the STCR Approach  
1.3 Analysis and Classification Framework  
1.4 Analysis of Composition of STCRs  
1.4.1 Basics of Robot Composition  
1.4.2 Robot Composition and STCRs  
1.4.3 Symbols and Representations of Kinematic Structure of STCRs  
1.4.4 Comparison of Kinematic Structures of STCRs  
1.4.5 Future Research Tasks Related to STCR Robot Composition  

2 **Single-Task Construction Robots by Category**  
2.1 Automated Site-Measuring and Construction Progress Monitoring  
2.1.1 Mobile Robots  
2.1.2 Aerial Robots  
2.2 Earth and Foundation Work Robots  
2.3 Robotized Conventional Construction Machines  
2.4 Reinforcement Production and Positioning Robots  
2.5 Automated/Robotic 3D Concrete Structure Production on the Site  
2.6 Automated/Robotic 3D Truss/Steel Structure Assembly on the Site  
2.7 Bricklaying Robots  
2.8 Concrete Distribution Robots  
2.9 Concrete Levelling and Compaction Robots  
2.10 Concrete Finishing Robots  
2.11 Site Logistics Robots
## Contents

2.12 Aerial Robots for Building Structure Assembly  
2.13 Swarm Robotics and Self-Assembling Building Structures  
2.14 Robots for Positioning of Components (Crane End-Effectors)  
2.15 Steel Welding Robots  
2.16 Facade Installation Robots  
2.17 Tile Setting and Floor Finishing Robots  
2.18 Facade Coating and Painting Robots  
2.19 Humanoid Construction Robots  
2.20 Exoskeletons, Wearable Robots, and Assistive Devices  
2.21 Interior Finishing Robots  
2.22 Fireproof Coating Robots  
2.23 Service, Maintenance, and Inspection Robots  
2.24 Renovation and Recycling Robots

3 Transition and Technological Reorientation towards Integrated On-Site Manufacturing ........................................... 291

3.1 Development and Refinement of Automated On-Site Logistics  
3.2 Development of Climbing Robots  
3.3 Refinement of Site-Cover Technology  
3.4 Introduction of Simulation and Real-Time Monitoring Technology in Construction  
3.5 Introduction of Robot-Oriented Design Strategies in Construction  
3.6 First Concepts for Integrated Sites: Cooperating STCRs  
3.7 First Concepts for Integrated Sites: Factory Approach

4 From Stand-Alone Solutions to Systems Integrated by Structured Environments ......................................................... 302

References  
Glossary  
Index