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Dirk Lowke
Niklas Freund
David Böhler
Friedrich Herding *Editors*

Fourth RILEM International Conference on Concrete and Digital Fabrication

Digital Concrete 2024



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**Fourth RILEM International Conference
on Concrete and Digital Fabrication**

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Dirk Lowke · Niklas Freund · David Böhler ·
Friedrich Herding
Editors

Fourth RILEM International Conference on Concrete and Digital Fabrication


Digital Concrete 2024

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Preface

What does the future hold for digital and sustainable concrete construction? This fundamental question takes center stage at the *RILEM 4th International Conference on Concrete and Digital Fabrication*, better known as *Digital Concrete 2024*.

Digital Concrete 2024 is held from September 4th to 6th in Munich, Germany. It is the 4th edition of a successful conference series that was initiated in Zurich, Switzerland in 2018, continued with an online conference in Eindhoven, Netherlands in 2020, and most recently took place in Loughborough, England in 2022. This year's conference continues to be a pivotal event for the concrete and digital fabrication community. It serves as a platform to explore and shape the future of this dynamic field.

Digital Concrete 2024 is hosted by the Technical University of Munich and the Technische Universität Braunschweig in collaboration with the Collaborative Research Centre—*TRR 277 Additive Manufacturing in Construction*. We received an impressive 224 papers from 41 countries, demonstrating the increasing global interest in this cutting-edge research field.

Digital Concrete 2024 presents a wide range of topics across 15 different areas, showcasing the vast scope of current research in this field. Key topics such as mixture proportions and material circularity will be addressed in the course of the numerous sessions, emphasizing their central role in sustainable construction practices. The conference further covers major advancements in process technology, printing strategies and quality control, addressing various types of printing technologies, such as extrusion 3D printing, material jetting, and particle-bed processes, among others. While sessions on rheology focus on material behavior before and during printing, other sessions focus on hardened material properties, such as load-bearing capacity, microstructure, and durability. In addition, innovative approaches in structural optimization and reinforcement integration in conjunction with numerical simulation promise to transform design and construction methods. The *Digital Concrete 2024* conference also highlights pioneering innovations beyond conventional 3D concrete printing, incorporating novel printing technologies as well as versatile materials such as earth and metals. Finally, industry speakers present some of the latest and most innovative 3D concrete printing applications in the global construction industry, bridging the gap between cutting-edge research and practical implementation.

In addition to these proceedings of the *Digital Concrete 2024* conference, a special issue of the journal *Cement and Concrete Research* will feature in-depth discussions on the most current topics of digital fabrication with concrete in 9 exciting scientific papers from distinguished experts.

We express our sincere gratitude to our esteemed keynote speakers, who are willing to share some of their insights and expertise in order to inspire and guide our discussions. We also acknowledge the invaluable support of RILEM and iTUBS, with special thanks to the Scientific and Organizing Committees for their outstanding efforts in making this conference a reality. We are also deeply grateful to our sponsors for their

generous contributions, which made it possible to offer reduced ticket prices for PhD students and participants from mid/low GDP countries. Our Gold Sponsors, VERTICO and BAYRISCHER BAUINDUSTRIEVERBAND, have provided crucial support, as have our Silver Sponsors, SIKA, PM 3D Tec, E.D. ZÜBLIN/STRABAG, COBOD, and ULTRATEST, as well as our Bronze Sponsors, KNIELE, MASTER BUILDERS SOLUTIONS, STO, SCHLEIBINGER GERÄTE, BOLLINGER+GROHMANN, consulting engineers SCHIESSL-GEHLEN-SODEIKAT, as well as LOWKE-SCHIESSL engineers. We would furthermore like to express our gratitude to the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation), which helped to realize this conference by funding projects no. 548116075 and 414265976. Finally, we would like to thank all the researchers and experts from the construction industry whose contributions have made this conference possible.

We look forward to meeting all conference participants in Munich for an enriching exchange of knowledge, innovative ideas, and collaborative opportunities. Let us take these opportunities to push the boundaries of what is possible in digital fabrication and contribute to the future of additive manufacturing in construction. Your contributions and participation are instrumental in shaping this future.

We hope you enjoy the conference and the proceedings.

Sincerely,

September 2024

Dirk Lowke
Niklas Freund
David Böhler
Friedrich Herding

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