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Jörg Benndorf

Closed Loop Management in Mineral Resource Extraction

Turning Online Geo-Data into Mining
Intelligence

 Springer

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ISSN 2191-530X ISSN 2191-5318 (electronic)
SpringerBriefs in Applied Sciences and Technology
ISBN 978-3-030-40899-2 ISBN 978-3-030-40900-5 (eBook)
<https://doi.org/10.1007/978-3-030-40900-5>

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Preface

This book is written to summarize results from seven years of research in the field of closed-loop management of mineral resource extraction, in particular, applied to grade control and grade streaming.

Until 2012, the author has worked as a mine project engineer in different commodities and has been exposed to the tasks of grade control and raw materials quality management in different facets, including exploration, resource modelling, mine planning, and operational management. During his time in the industry, the first decade of the twenty-first century, a strong technical development in the application of modern sensor technology for production monitoring in mines could be observed.

Joining academia in 2012, the author's research focused on the question "How to turn production monitoring data quickly into mining intelligence?" At TU Delft, the Netherlands, the author worked together with Dr. Mike Buxton, an expert on sensor-based material characterization. Both initiated two large European projects, "Real-Time Mining" (Horizon 2020, Grant Agreement No 641989) and "RTRO-Coal" (the European Research Fund for Coal and Steel, Grant Agreement No RFCR-CT-2013-00003). During the time from 2012 to 2016, a research group lead by the author developed methods and the framework presented in this book. To acknowledge contributing researchers, Dr. Tom Wambeke, Dr. Masoud Soleymani-Shishvan, and Dr. Cansın Yüksel Pelk need to be named, who have been supported by B.Sc. and M.Sc. students Sil Roelen and Dirk-Jan Mollema. After joining TU Bergakademie Freiberg, Germany, in 2016, the research has been continued in a team around Angel Prior-Arce and supported by Paul Lorenz. The team worked on multiple industrial-scale case studies and provided implementations of the closed-loop approach on a level of proof of concept.

This book is written to summarize key results and illustrate these by examples. The text is designed neither to cover all aspects of mineral source management nor to provide a complete description of the theory. It provides an overview and a description of concepts used for an implementation of the *Closed Loop Management in Mineral Resource Extraction* approach on an introductory level. Selected technical details, new methods, examples, and some practical aspects of

operational implementation are discussed. With the referenced literature, summarized at the end of each chapter, the interested reader is provided with a starting point to dive deeper into the topic.

Freiberg, Germany
December 2019

Jörg Benndorf

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