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Nota di contenuto	Drilling in Extreme Environments: Penetration and Sampling on Earth and other Planets; Foreword; Contents; Preface; List of Contributors; Acknowledgments; Color Plates; 1 Drills as Tools for Media Penetration and Sampling; 1.1 Introduction and Historical Perspective; 1.2 Methods of Drilling and Penetration of Objects; 1.2.1 Mechanical Techniques; 1.2.2 Thermal Techniques; 1.2.3 Chemical Techniques; 1.3 Types of Mechanical Drills; 1.3.1 Rotary Drill; 1.3.2 Hammer Drill; 1.3.3 Rotary-Hammer Drill; 1.4 Bits - the End-Effector of Drills; 1.4.1 Twist Drill Bits; 1.4.2 Gun Drill

1.4.3 Centering and Spotting Drill Bits 1.4.4 Material Makeup of Bits; 1.5 Application of Drilling Techniques; 1.5.1 Geological Studies and Search for Resources; 1.5.2 Mining and Tunneling; 1.5.3 Petroleum and Gas Drilling and Exploration; 1.5.4 Ocean and Seafloor Drilling; 1.5.5 Planetary Drilling and Sampling; 1.5.6 Ice Drilling; 1.5.7 Dental Drills; 1.6 Conclusion; References; 2 Principles of Drilling and Excavation; 2.1 Introduction; 2.2 Physical Properties of Rocks; 2.2.1 Terrestrial Rocks; 2.2.2 Extraterrestrial Rocks; 2.2.3 Influence Factors for Rock Mechanical Properties 2.3 Stresses and Energy in Drilling 2.3.1 Stress in Sedimentary Basins; 2.3.2 Stresses Around a Borehole; 2.4 Theories of Rock Breakage; 2.4.1 Percussion Drilling; 2.4.2 Rotary Drilling; 2.4.3 Percussion-Rotary; 2.4.4 Other Drilling Methods; 2.4.5 Drilling Efficiency; 2.5 Conclusion; 2.5.1 Underground Rocks and Stresses; 2.5.2 Drilling Theories; 2.5.3 Effect of Environment on Drilling; References; 3 Ground Drilling and Excavation; 3.1 Background; 3.1.1 Three Requirements for Any Drilling System; 3.1.2 Types of Earth Boreholes; 3.2 Drilling Rigs; 3.2.1 Percussion Drilling Rigs 3.2.2 Rotary Drilling Rigs 3.3 Penetrating the Material; 3.3.1 Basic Rock Destruction Mechanism; 3.3.2 Specific Energy Comparison of Different Drilling Methods; 3.4 Cuttings Transport and Disposal; 3.4.1 Cuttings Transport from Under a Bit in Terrestrial Operations; 3.4.2 Cuttings Transport Beyond the Bit; 3.4.3 Cuttings Removal In Situ; 3.4.4 Recomposition of Cuttings; 3.4.5 Creation of Disposal Volume; 3.5 Directional Drilling; 3.5.1 Reference Systems; 3.5.2 Directional Control Factors; 3.5.3 Bit Design; 3.5.4 Bottom Hole Assemblies; 3.5.5 Directional Mechanics; 3.5.6 BHA Modeling 3.5.7 Planning 3.5.8 Survey Techniques; 3.5.9 Survey Calculations; 3.6 Sidewall Friction and Unconsolidated Drilling Issues; 3.6.1 Soil Penetration by Cones; 3.6.2 Pile Driving Formulas; 3.6.3 Methods of Cone Resistance Determination; 3.6.4 Pressure Bubble; 3.6.5 Permafrost Piling; 3.6.6 Vibratory Pile Driving; 3.6.7 Impact on Penetration Resistance; 3.7 Conclusion; References; 4 Ice Drilling and Coring; 4.1 Introduction; 4.2 Coring Drills; 4.2.1 Surface-Driven Rotary Drills; 4.2.2 Wireline Drill; 4.2.3 Cable-Suspended Electromechanical Drills; 4.2.4 Cable-Suspended Electrothermal Drills 4.2.5 Hand Augers

Sommario/riassunto

Uniquely comprehensive and up to date, this book covers terrestrial as well as extraterrestrial drilling and excavation, combining the technology of drilling with the state of the art in robotics. The authors come from industry and top ranking public and corporate research institutions and provide here real-life examples, problems, solutions and case studies, backed by color photographs throughout. The result is a must-have for oil companies and all scientists involved in planetary research with robotic probes. With a foreword by Harrison "Jack" Schmitt -- the first geologist to drill