In dredging, trenching, (deep sea) mining, drilling, tunnel boring and many other applications, sand, clay or rock has to be excavated. This book gives an overview of cutting theories. It starts with a generic model, which is valid for all types of soil (sand, clay and rock) after which the specifics of dry sand, water saturated sand, clay, atmospheric rock and hyperbaric rock are covered. For each soil type small blade angles and large blade angles, resulting in a wedge in front of the blade, are discussed. For each case considered, the equations/model for the cutting forces, power and specific energy are given. The models are verified with laboratory research, mainly at the Delft University of Technology, but also with data from literature.
1: Introduction

- 2: Basic Soil Mechanics

- 3: The General Cutting Process

- 4: Which Cutting Mechanism for Which Kind of Soil?
5: Dry Sand Cutting

6: Saturated Sand Cutting

7: Clay Cutting

8: Rock Cutting - Atmospheric Conditions
9: Rock Cutting - Hyperbaric Conditions

10: The Occurrence of a Wedge

11: A Wedge in Dry Sand Cutting

12: A Wedge in Saturated Sand Cutting
13: A Wedge in Clay Cutting

14: A Wedge in Atmospheric Rock Cutting

15: A Wedge in Hyperbaric Rock Cutting

16: Exercises
17: Appendices

Back Matter

Thumbnail: A tunnel boring machine that was used at Yucca Mountain nuclear waste repository. (Public Domain; via Wikipedia)