

# 10

## Introduction

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**THE GOAL FOR ANY METALLOGRAPHIC/MATERIALOGRAPHIC PREPARATION** is a true microstructure, or at least a structure that makes a correct analysis of a structure detail possible. It should be stressed that an examination with a subsequent interpretation, using a light microscope or other method, is of no use if the prepared microstructure is not correct.

This part of the book is made to guide the reader directly towards the correct preparation of the microstructure for most materials and material groups. To obtain more information on the true structure, a more detailed description of the total preparation process and the theories behind it, see Part I of this book.

Before starting a preparation process, two facts must be considered: Specimen Material and Purpose of Examination.

### 10.1 Specimen Material

The specimen material, in the following *material*, is decisive for the choice of a preparation process. It is evident that soft, hard, ductile, brittle, homogenous, heterogeneous, etc., materials cannot be treated the same way to obtain a correct result.

To find the correct preparation method for a given material, the reader shall review Table 11.1 and find the material or group of materials corresponding to the given material (see below).

### 10.2 Purpose of Examination

Before a preparation method is selected, the purpose of examination, in the following the *purpose*, should be considered. A given material can be prepared often electrolytically in a relatively short time for one purpose, and for another purpose, a longer mechanical preparation sequence should be performed. An example is medium carbon steel. If the purpose of examination is the study of grain size, the electrolytic polishing method El-01, Section 13.3.6, can be used, having a total preparation time of approximately 3 min, including grinding (less than 3 min) and polishing/etching (10–12 s). If the purpose is examination of inclusions, the mechanical methods, C-28 and T-28, Section 13.2.3, are recommended with a total preparation time of 10–12 min.

Based on the purpose, the user will select the correct process/method stated in the Material/Preparation Tables. Other information connected to the purpose, such as etchants, will be stated also.

### 10.3 Specimen Preparation

Modern specimen preparation is based on a systematic approach, and in this way securing the reproducibility that is a must in both research and quality control. In the Material/Preparation Tables, Section 13.2.3, the total preparation process is stated, in-

cluding sectioning, mounting, grinding/polishing methods (mechanical and electrolytical), and etching. Mechanical polishing can be done by hand and is also described in this part of the book, but for the indicated methods, a semiautomatic grinder/polisher is recommended.

A section covering “trouble shooting” of all stages of the preparation process, and how to analyze the used preparation method to avoid or overcome artifacts is also included in Part II.