

# Engineering Materials. An Introduction to Properties, Applications and Design

## Chapter 1 - Engineering materials and their properties

### 1.1 Introduction

### 1.2 Examples of materials selection

## 1.1 Introduction

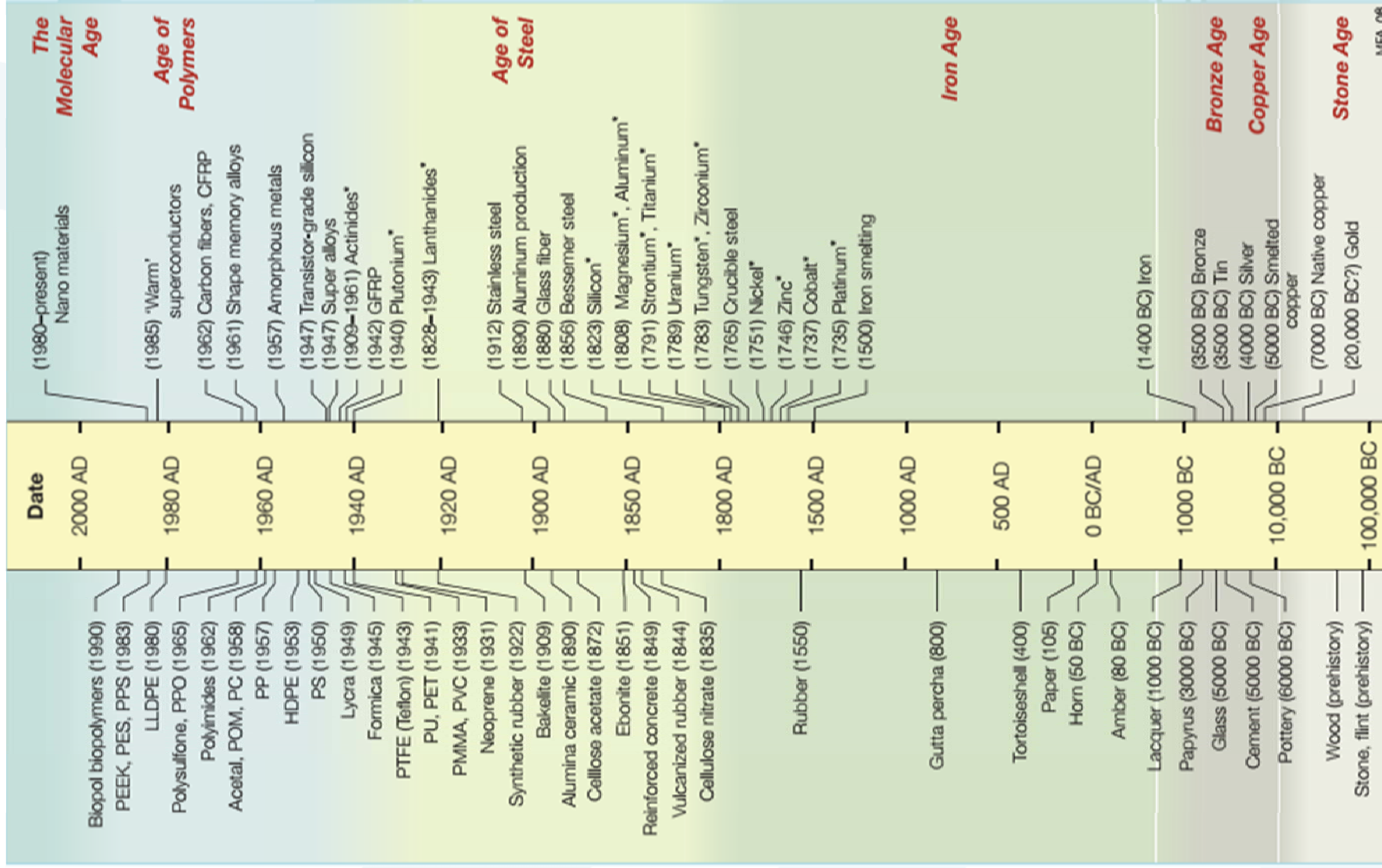
There are, it is said, more than 50,000 materials available to the engineer. In designing a structure, machine or device. how an engineer choose from this vast menu the material which best suits the purpose? Mistakes can cause disasters.

During World War II, one class of welded merchant ship suffered heavy losses, not by enemy attack, but by breaking in half at sea: the *fracture toughness* of the steel was too low.



Shortly after, three Comet aircraft were lost before it was realized that the design called for a *fatigue strength* was greater than that possessed by the material.





A materials timeline. Scale is nonlinear, with big steps at the right, small ones at the left. An asterisk (\*) indicates the date at which an element was first identified. Labels without asterisks note the time at which the material became of practical importance.