

## BOOK REVIEW

**Atomization of Melts for Powder Production and Spray Deposition**, by Andrew J. Yule and John J. Dunkley. *Oxford Series on Advanced Manufacturing*. Oxford University Press, Inc., New York. ISBN 019 856258G, 1994.

*Reviewed by Norman Chigier, Carnegie Mellon University.*

The book by Yule and Dunkley deals with the atomization of molten materials (melts), especially molten metals, but also molten ceramic, glass and polymers.

Atomization is carried out for the production of metal powders and also in spray deposition for coating, or the spray forming of shapes such as billets or tubes. The book provides a comprehensive discussion, including the fundamentals of the breakup of molten materials and measurement techniques for particle sizing. It is interesting to find that most of the standardized methods for atomizing liquids have been applied to molten metal atomization; these include pressure jet, twin fluid, rotary and ultrasonic atomization. The most commonly used form of atomizer is based on high speed (sonic) gas jets that impinge directly on the molten liquid jet or sheet. Inert gases are generally used to prevent oxidation of the melt. A unique form of atomization is the use of water—the molten material falls 100–500 mm before being hit by water jets. The largest atomization systems in the world are for the granulation of blast furnace slag. Flow rates of slag can exceed 5000 kg/min., with water flows of 50 m<sup>3</sup>/min., to produce particle sizes of around 1 mm. Liquid nitrogen, argon and hydrocarbons have been used for some specialist applications. The special problems associated with atomizing molten materials are the exceptionally high surface tension—up to 1800 N/m for molten platinum, the high melting points up to 2047 K for plutonium and the need to avoid oxidation by using inert gas environments. The authors describe a wide range of techniques for atomizing liquid materials, including water, liquid gas, vacuum, centrifugal, pressure jet, ultrasonic, vibrating orifice, electromagnetic and electrostatic atomization. Impinging gas and water jets are the most common form of atomization used in industrial applications.

The book by Yule and Dunkley is the first major textbook in the field of atomization of metals and other materials. It is of special interest to those working in the powder metallurgy and spray deposition industries. It is also of general interest to those working in other fields of atomization.