

SURVEY OF JOINING, CUTTING, AND ALLIED PROCESSES



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CHAPTER 1

SURVEY OF JOINING, CUTTING, AND ALLIED PROCESSES

INTRODUCTION

This chapter introduces the conventional and more widely known joining, cutting, and thermal spraying processes. The distinguishing features of the various processes are summarized and compared to one another. Among the joining processes reviewed are the arc, resistance, and solid-state welding processes as well as brazing, soldering, and adhesive bonding. The cutting processes examined include thermal and non-thermal methods. The thermal spraying processes considered include flame and plasma arc spraying as well as arc and detonation flame spraying.

With respect to process selection, as several processes may be applicable for a particular job, the challenge lies in selecting the process that is most suitable in terms of fitness for service and cost. However, these factors may not be compatible, thus forcing a compromise. The selection of a process ultimately depends on several criteria. These include the number of components to be fabricated, capital equipment costs, joint location, structural mass, and the desired performance of the product. The adaptability of the process to the location of the operation, the type of shop, and the experience and skill levels of the employees may also have an impact on the final selection. These criteria are examined as they relate to the various joining, cutting, and thermal spraying processes.

As this chapter is intended to serve merely as a survey of the most common joining, cutting, and thermal

spraying processes,¹ the reader is encouraged to conduct a thorough investigation of the processes that appear to have the best potential for the intended applications. This investigation should take into account safety and health considerations such as those presented in the American National Standard *Safety in Welding, Cutting, and Allied Processes*, ANSI Z49.1,^{2, 3} and the information provided in the manufacturers' material safety data sheets (MSDSs). Additional sources of information about the joining, cutting, and allied processes are listed in the Bibliography and Supplementary Reading List at the end of this chapter. In particular, *Welding Processes*,⁴ Volume 2 of the American Welding Society's *Welding Handbook*, 8th edition, presents in-

1. For further information on the categorization of the welding, joining, cutting, and allied processes, see Appendix A.

2. At the time of the preparation of this chapter, the referenced codes and other standards were valid. If a code or other standard is cited without a date of publication, it is understood that the latest edition of the document referred to applies. If a code or other standard is cited with the date of publication, the citation refers to that edition only, and it is understood that any future revisions or amendments to the code or standard are not included; however, as codes and standards undergo frequent revision, the reader is encouraged to consult the most recent edition.

3. American National Standards Institute (ANSI) Committee Z49 on Safety in Welding and Cutting, *Safety in Welding, Cutting, and Allied Processes*, ANSI Z49.1, Miami: American Welding Society.

4. O'Brien, R. L., ed., 1991, *Welding Processes*, Vol. 2 of *Welding Handbook*, 8th ed., Miami: American Welding Society.