

CURRENT TRENDS IN WELDING PROCESSES AND MATERIALS: IMPROVE IN EFFECTIVENESS

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Abstract. Demands for improved productivity, efficiency, and quality pose challenges to the welding industry. As materials become ever more sophisticated in their chemical composition to provide ever-better functionally specific properties, a more complete and precise understanding of how such materials can be joined for optimal effectiveness and efficiency will become essential. Traditional options for welding will surely evolve, sometimes to provide unimagined capabilities. In addition, totally new methods will almost certainly emerge as evolution of materials gives way to revolution to meet unimagined new designs and design demands. The paper considers process systematization and corresponding advances of constituent technologies, discusses some of the role and future direction of welding technology, welding materials, productivity and efficiency, education and safety having an impact on future growth in welding technology. Analysis of drivers and the key needs of some manufacturing industries have been researched, giving general trends and strong indications as to expected trends in technology that will be seen in the future. It also provides a good foundation for future research and creates awareness of the developmental direction of welding processes and materials in manufacturing industries.

1. INTRODUCTION

Metal industries use a variety of methods to join different components and the joining methods can be either permanent or temporary depending on the type and design of the product. The latter methods use parts like bolts, screws, and rivets, whereas permanent joining usually involves welding. Welding is one of the most common joining processes in the metal industry, applied in facilities from job shop outfits to highly-automated computer-controlled factories. The involvement of interdependent factors in the process, such as human resources, market conditions and welding machinery, which varies with the type of metals to be welded and the needs of the customer, demand the use of advanced and comprehensive system design and inspection. Designers and manufacturing engineers need to

know the full potential of all available welding and joining processes so they can make the best selection of potential manufacturing methods. Scientific knowledge, engineering, and training must be more closely integrated into the welding process if it is to compete with other technologies and fulfil its potential. Another important determinant of the future of welding is the drive to improve efficiency and productivity. For manufactured products to be able to compete, they must be made faster, cheaper, and better than those of competitors.

Continuing growth in welding equipment purchases shows that worldwide utilization of welding is still increasing and its use is expected to grow further due to its economic advantages. For the foreseeable future, intelligently designed weldments will always be less expensive for similar applications than will products made by other

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