

Specialty Materials Used to Fabricate or Repair Heavy Duty Industrial Welded Fan Rotors

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Abstract

Materials selected for fabrication of welded fan rotors are chosen after consideration of requirements for physical and mechanical properties, corrosion resistance, maximum or minimum design temperature, fatigue life, creep rupture and erosion/abrasion resistance. Manufacturing requirements such as welding, fabrication processes and quality assurance are important considerations.

This paper discusses options for material selection and guidelines for welding processes and techniques that will help in the development of a welded fan rotor suitable for its designed application.

Introduction

Fans have been an important part of various industries for over 100 years. The variation in fan applications has increased and the need for material consideration for welded rotating elements for the various applications is continuing to increase. Success of the fan application depends greatly on the material selection of the rotating elements. The selection process can be made by using past history of an application, knowing the design requirements and by selecting materials by evaluating the following material characterizes:

1. Mechanical properties – yield and tensile strength and impact toughness
1. Corrosion resistance
2. Maximum or minimum design temperature
3. Fatigue life
4. Creep rupture
5. Erosion/Abrasion resistance

Welding Specification for Rotating Elements

The American Welding Society published AWS D14.6, which is the Specification of Welded Elements for Rotating Equipment. The specification does not address design, but does provide the necessary requirements to develop and certify welding procedures, procedure qualifications and welder performance qualifications. This weld specification is commonly used to develop weld procedures and welder performance qualifications and other requirements specified by the AWS D14.6. Weld procedures for repair welding can also be certified to AWS D14.6. The specification also provides guidelines for non-destructive test methods.

Summary

Fan rotors can be fabricated using all new parts or existing rotors can be repaired or modified to improve the original design to extend the life of the rotor.

The existing materials of rotors for repair must be clearly identified so that the best material can be selected for the repair and so that the weld procedure is certified to a weld specification that meets the requirements of the application. Operating conditions of applications sometimes change. The application conditions can be evaluated and by selecting the best materials available, the maximum life of the fan rotor can be provided