

2009/SiC/15p PM BASED DISCONTINUOUSLY
REINFORCED ALUMINUM (DRA) CRITICAL ROTATING
PARTS FOR COMMERCIAL HELICOPTERS

Cory A. Smith
DWA Aluminum Composites
21130 Superior Street
Chatsworth, CA 91311

Jacques Tschofen
Forges de Bologne
52310 Bologne, France

ABSTRACT

2009/SiC/15p DRA blade sleeve forgings have been successfully introduced into service on Eurocopter commercial helicopters. The 2009 alloy DRA was selected for this critical rotating part because of its superior fatigue resistance compared to conventional aluminum and weight savings compared to titanium. The core of this presentation will consist of a description of primary billet fabrication, extrusion and forging secondary processing, and quality assurance requirements. With respect to quality assurance, the three primary areas of importance are 1) the selection and management of raw materials, 2) billet process control, and 3) material qualification for billet, extrusion, and forging. The static and dynamic mechanical properties of the various product forms will be presented. Additionally, physical properties in the form of micro and macro-structure as evaluated by metallography and ultrasonic inspection, electrical conductivity, and density will be discussed.

Introduction

Discontinuously reinforced aluminum composite (DRA) incorporating 2009 alloy aluminum is currently being used in critical rotating parts on commercial helicopters. The applications described are rotor sleeves used to attach the rotor blades to the hubs of two Eurocopter helicopters, the EC-155 Dolphin and the EC-120 B Colibri. The composite system benefits in this application from its attractive mechanical and physical material properties, including elevated strengths, enhanced stiffness and fatigue properties, and low density.

The nomenclature for this DRA composite system is 2009/SiC/15p, established by the American National Standards Institute (ANSI35.5). In this form, the first component of the four part