

3M Advanced Materials Division

# 3M™ Electron Guns

## Introduction

In addition to a wide range of electron gun components, 3M Technical Ceramics, Inc. also designs and manufactures complete custom electron gun assemblies, used in specialized vacuum tube systems for communications, space and defense-related applications.

3M™ Electron Gun components include the cathode, mounting structures, ceramic high voltage standoffs, focus electrode, grids and other structures, all manufactured with high mechanical and vacuum integrity. With over sixty years of experience in this field, we have the technical expertise and precision manufacturing capacity required to support the accelerated development of custom-designed electron guns, built to your most exacting requirements. These manufacturing processes include precision machining and assembly; controlled induction and furnace brazing; resistance and laser welding; and high vacuum ( $<1 \times 10^{-9}$  torr) leak checking. Various geometries and sizes can be accommodated.

We manufacture electron gun components from a variety of structural materials, including metallized ceramics; refractory metals; iron and nickel based alloys such as Kovar® Fe-Ni alloy; stainless steel; Monel® Ni-Cu alloy; Cupronickel; and Hastelloy® super alloy. All suitable braze materials including refractory brazes, copper, gold, palladium, nickel, and cobalt are commonly used.

## Benefits

In addition to individual cathode components, we can manufacture complete electron gun assemblies, customized for your application. Building an electron gun is a highly technical and time-consuming process; we offer our expertise and our manufacturing services to help free up your technical resources.

Our customers also use us as a reliable “second source” manufacturer to meet unanticipated demand. Equally important, our precision-manufactured components and assemblies offer a number of productivity-enhancing benefits, including:

- Easy, next-step installation, to reduce cycle times
- Pre-tested, measured assemblies minimize device failures, help speed production
- Reduced inventory and concurrent engineering can contribute to lower labor and materials costs
- Ability to customize gun designs contributes to improved device performance and reliability



3M™ Electron Gun Components

## 3M™ Remote Access Data Acquisition and Recovery System (RADAR)

The manufacture of quality components for Vacuum Electron Devices (VEDs) used in the communications, space and defense industries requires precisely-controlled and traceable process steps. Based on 60 years of industry experience, we offer customers a proven software solution that can help automate and simplify their data collection, training and documentation requirements through 3M™ Remote Access Data Acquisition and Recovery System (RADAR).

The 3M remote access data acquisition and recovery system is a suite of software communications tools. Its purpose is to establish best practices for controlling the manufacture of cathodes and cathode assemblies, and to provide customers with all required backward and forward material and process traceability. The system acts as a “bridge,” allowing the exchange of data between multiple software platforms.

RADAR provides nearly instantaneous access to any combination of data, including:

- Employee Training and Task Qualification Records
- ISO Procedures and Revision Control System
- Engineering Drawings and Methods Sheets
- Materials Data Collection and Serialization
- Equipment Process Control and Monitoring System
- SCADA Notification System
- Plant Wide Environmental Controls System

Raw data can also be made available for manipulation in the Infinity QS SPC platform or can be delivered directly to the customer for analysis. This remote access system is fully integrated and provides the user with the power of information 24/7.

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