



## **TECHNOLOGY AVAILABLE FOR LICENSING**

### **Process of Forming a Composite Coating on a Substrate**

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#### **Invention Details:**

The invention describes a method of fabrication of composite (metal-matrix) coatings on substrates such as steel or aluminum. The process uses new layered precursor materials in combination with in-situ thermal welding to the base. Wire and surface precursors are deposited on the substrate by controlled thermal processing using plasma-arc, laser and high-density infrared radiation. The temperature distribution during the formation for coating is controlled by a real time adaptive control method.

This invention improves upon alternative methods such as cladding or electroplating. The invention design, pre-fabrication methods, use of layered composite precursors for deposition of composite coatings, thermal control system, and welded coating deposition all contribute to the invention's unique characteristics. Coating properties include improved wear, corrosion and oxidation resistance.

#### **Benefits of the Invention:**

##### Advantages

- Simple to implement
- Elimination of chamber enclosures
- High material deposition yield
- Low cost
- No porosity or cracks
- Superior hardness and mechanical properties
- Uniform and continuous structure with perfect adhesion to the substrate

##### Applications

- Aerospace and aviation industry
  - Frames, shells, satellite support structures
- Automotive and railroad industry
  - Engine cylinder jackets, brake rotors, etc.
- Power and chemical industry
  - Reactor shells and structures, piping, etc.
- Coatings market
  - Bridge coatings, corrosion control coatings

#### **The Bottom Line:**

This invention overcomes many limitations that exist in techniques currently in use for production of metal matrix composite coatings. As described, the composite coatings show no porosity or cracks, uniform and continuous structure with perfect adhesion to the substrate, and desirable microstructures such as monolithic nickel aluminide layers, yielding superior hardness and mechanical properties.

#### **For More Information:**

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