Fibre Metal Laminates: An Introduction

Fibre metal laminates (FMLs) are a type of composite material made up of thin layers of metal and fibre. They are typically manufactured by bonding together multiple layers of metal and fibre with an adhesive. The resulting material is strong, lightweight, and corrosion resistant, making it ideal for a variety of applications in the aerospace, automotive, and marine industries.

The properties of FMLs depend on the type of metal and fibre used, as well as the manufacturing process. However, in general, FMLs offer the following advantages over traditional materials:

- **High strength:** FMLs are very strong, even when compared to traditional metals. This is due to the fact that the metal and fibre layers are bonded together in a way that creates a synergistic effect, resulting in a material that is stronger than either of its constituent parts.
- **Lightweight:** FMLs are also very lightweight, which makes them ideal for applications where weight is a critical factor. For example, FMLs are used in the construction of aircraft and racing cars.
- **Corrosion resistance:** FMLs are highly resistant to corrosion, even in harsh environments. This is due to the fact that the metal layers are protected by the fibre layers.
- **Other properties** In addition to the above properties, FMLs also offer a number of other advantages, including:

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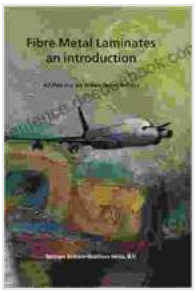
by Kazuki Takahashi



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- High stiffness
- Good thermal conductivity
- Low electrical conductivity
- Non-flammability

FMLs are typically manufactured by bonding together multiple layers of metal and fibre with an adhesive. The manufacturing process can be divided into the following steps:

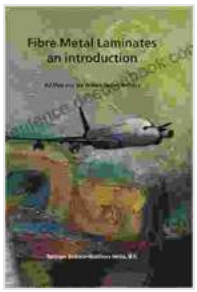
1. **Preparation of the metal and fibre layers:** The first step is to prepare the metal and fibre layers. The metal layers are typically made of aluminum, titanium, or steel, while the fibre layers are typically made of carbon fibre, glass fibre, or aramid fibre.
2. **Bonding the layers together:** The next step is to bond the metal and fibre layers together. This is typically done using an adhesive. The adhesive is applied to the surface of the metal layers, and the fibre layers are then placed on top of the adhesive. The adhesive is then cured, resulting in a strong bond between the metal and fibre layers.

3. **Finishing:** The final step is to finish the FML. This may involve trimming the edges of the FML, or applying a protective coating to the surface.

FMLs are used in a variety of applications, including:

- **Aerospace:** FMLs are used in the construction of aircraft, including commercial airliners, military aircraft, and spacecraft.
- **Automotive:** FMLs are used in the construction of racing cars and high-performance vehicles.
- **Marine:** FMLs are used in the construction of ships, boats, and submarines.
- **Other applications:** FMLs are also used in a variety of other applications, including:
    - Medical devices
    - Sporting goods
    - Construction materials

FMLs are a versatile and high-performance material with a wide range of applications. They offer a number of advantages over traditional materials, including high strength, lightweight, and corrosion resistance. As research and development continues, FMLs are expected to find even more applications in the future.



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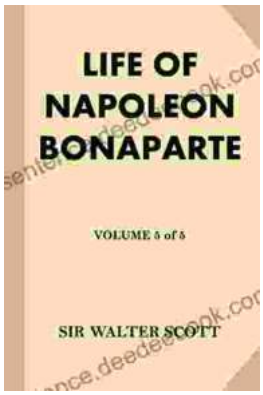

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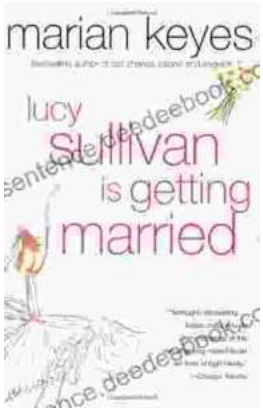

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