**ABSTRACT**

A major requirement of the modern manufacturing process is improved efficiency. Conventional alloys have limitations in enhancing the performance of components beyond a certain level. Hard particulates (ceramic particulate) reinforced Metal Matrix Composites (MMCs) have acquired the attention of the recent era. MMC’s have created an enormous impact on engineering materials due to their superior mechanical properties and wear behaviour over the conventional materials. The selection of specific particulate that is suitable for a given application is an essential factor in the development of the composite. MMCs find application in military, space shuttles, aircraft structures and shipbuilding.

In many applications, the surface properties of the component are most important rather than the bulk material properties. Surface modification technique plays a major role in enhancing the properties of conventional materials. Some of the surface modification processes require pre and post-processing techniques. On the other hand, some of the processes like electro-electroless process and thermal spray technique are limited by the adhesion effect. Surface modification methods provide a promising way for the development of engineering components, to overcome the limitations of the conventional materials.

Cupronickel (also known as copper-nickel (CuNi)) is an alloy of copper that contains nickel as major alloying elements. A major application of Cupronickel alloys is in marine applications, seawater pipework, automotive applications and Integrated Circuit (IC) sealing materials. High corrosion resistance, electrical properties with enhanced thermal conductivity of Cupro-nickel alloys have made these alloys perfect candidates for several

applications. However, the conventional alloy applications were limited due to low wear resistance and limited mechanical strength.

Most researchers have investigated liquid state process (Thermal spray, plasma arc surface alloying and laser surface technique) and solid processing like ball milling. These processing methods lead to chemical reactions between the base metal and incorporated materials at high temperatures. Coating thickness also limited to a few micrometres. Non uniform distribution of the reinforced ceramic particles significantly affects the desired properties in the surface composite.

To overcome the above difficulties in liquid processing technique, an emerging green fabrication solid-state technique called Friction Stir Processing (FSP) was developed based on the working principle of Friction Stir Welding (FSW). The microstructural refinement and mechanical properties can be controlled by proper selection of process parameters along with elimination of the casting defects. Incorporation of carbide/oxides particles during FSP produces modified surface composite has been attempted extensively.