CONCLUSION

Aluminium matrix composite reinforced with uniformly distributed zircon particles have been fabricated successfully using the vortex method followed by casting in permanent moulds. The addition of the particles in spray form has resulted in uniform distribution of the reinforcement. Al 6061 MMC reinforced with zircon of weight percentage from 3 - 7% were produced by liquid melt metallurgy technique.

Based on the static weight loss corrosion studies of the Al 6061/zircon MMCs, the following conclusions are drawn:

- Corrosion rate of the MMCs are found to be less than that of the matrix alloy.
- Corrosion rate of the composites decrease with duration of exposure time and increasing weight percentage of reinforcement.
- Micro structural modifications of the matrix may probably be responsible for the lesser corrosion rate.

Corrosion behaviour of Al 6061/zircon MMCs were tested by OCP method. The observations made from the OCP tests are as follows:

- With the increase in the percentage of zircon, there is a significant reduction in the corrosion potential and corrosion rate.
- The corrosion rates of both the alloy and composites decrease with increase in exposure time. However, the corrosion potential developed for the composites is less than that of the corresponding matrix alloy.
- The extent of corrosion damage decreases with increase in reinforcement from 0 -7% in MMCs.
Conclusion

Galvanic corrosion studies of Al 6061/zircon MMCs reveal that:

♦ Corrosion rate decreases with decrease in concentration of corrosion media

♦ Corrosion rate decreases with increase in zircon content, and it is attributed to the fact that the ceramic zircon particulates remain inert in aggressive corrosion media.

Stress corrosion studies indicate that:

♦ The rate of stress corrosion of both the matrix alloy and reinforced composites increase with exposure time, concentration and temperature.

♦ However, the increase in corrosion rate is lower for the zircon reinforced composite compared to base Al-alloy under all conditions.

The results gathered from the mechanical tests suggest the following facts:

➢ Hardness improves satisfactorily and it is attributed to the dispersion of zircon in the matrix.

➢ Fabricated composites possess considerably higher compressive strength over that of the unreinforced matrix alloys. The compressive strength of these composites increase with increase in the content of zircon particles.

➢ The increase in percentage of the zircon particles impart strength to the matrix alloy thereby providing improved resistance to tensile stress.

➢ The ability to resist impact loads is not enhanced appreciably as a result of an increase in the dispersoid content.

➢ Al composites reinforced with the zircon particle show greater wear resistance than that of Al alloys. Increasing the reinforcement increases the hardness of the composites, which in turn increases the wear resistance.

Salt spray analysis also confirms that the resistance to corrosion increases with increase in the percentage of the reinforcement from 3% to 7%.
5.1 Suggestions for further work

- Hot worked and mechanically processed materials may be used.
- Fabrication of aluminium/zircon MMCs with finer reinforcements may provide much improved properties.
- Squeeze casting and compocasting methods followed by hipping and die forging may also be tried.
- Other alloys of aluminium like 2024, 7071, 8090 and 8091 can be used as the matrix materials with traces of zirconia, beryllium and silicon for crystal reinforcement.