TO STUDY THE FRACTURE BEHAVIOUR OF PEWTER ALLOYS

A project report presented in partial fulfillment of the requirements for the award of Advanced Diploma in Mechanical Engineering of MARA Institute of Technology.

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MAY 1989

SUMMARY

Two pewter alloys of different compositions which are similar to common pewter alloys in use for decorative items have been prepared for the study of their tensile and plane strain fracture toughness properties as well as microstructure examination.

The melting was carried out in an electrical furnance using graphite crucible and were gravity die-cast in preheated steel mould .

Two different casting procedure were carried out for different compositions. One alloy was normally cast (air-cooled) and the other alloy was chilled-cast (water spray). This produced differences in the types of phases present under microscopic examination and their mechanical properties.

The results and finding of this study are not only useful for academic literature on pewter alloys but also for the casting of decorative items from pewter alloys.

ACKNOWLEDGMENT

The success of this project is the result of the supervision and help of the Project Advisor Dr. Faqir Gul who guided us through out the work.

We are also grateful to all those who have contributed directly or indirectly in the completion of this project. Special thanks are due to the workshop staff who prepared the specimens for tensile and fracture toughness tests, Mr. Hayub Ta who helped in the casting of pewter alloys and specimen preparation for mocrostructure examination and Mr.Abu Kassim for his help in the tensile and fracture toughness testing on the Instron Machine.

Last but not the least we are greatly indebted to I.T.M for giving us the opportunity to study for our Advance Diploma without which this work would have not been possible.

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LITERATURE REVIEW

1.1 PEWTER ALLOYS

Originally the term 'pewter' was applied to any metal with a high proportion of tin, particularly a tin-lead alloy. The history of pewter can be traced, mainly from ecclesiastical artefacts, up to the fourteenth century when pewter began to replace wooden and pottery items for tableware and other household purposes.

A new version of pewter known as Britannia metal was developed in the eighteenth century. This pewter had a bright finish and contained a small amount of antimony but no lead. Britannia metal was harder than other 'common pewter' and since it contained no lead it did not tarnish with age.

Modern pewter is composed of about 92 per cent of tin with normally about six to seven per cent of antimony and one to two per cent copper is simillar to Britannia metal as it is not alloyed with lead. But in commercial alloys some bismuth, silver or other elements may also be present.