

Analysis of Mechanical Properties of Aluminium Alloy 7075 Welded by MIG Welding Process in Various Filler Rod (AL 4043,AL 5352)

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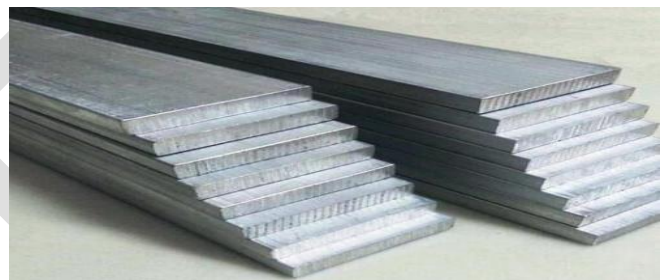
Abstract: *The investigation of the mechanical properties of Al-7075 material is welded by Metal Inert Gas welding process. A 6mm thick base metal of Al7075 Alloy plate welded by a filler rod of Al-4043, Al-53652 was used. However the welding for Al-7075 find the suitable parameters range and mechanical properties of welded material by use of Metal Insert Gas welding method. The aim of this study is to analysis the mechanical properties like Tensile test, compression test, Impact test & Rockwell hardness test.*

Keywords: *MIG welding, Aluminium 7075, Aluminium 4043, Aluminium 5352*

1.1 INTRODUCTION TO AL-7075, AL-4043,AL-5352

One of the strongest aluminium alloys in the aerospace industry is Aluminium alloy AA 7075 due to its strength to weight ratio. 7XXX series alloys are heat treatable with ultimate tensile strength of 572 MPa, although they are difficult to weld by conventional fusion welding processes. AA 7075 has been extensively used in the following industries, aluminium alloy aircraft and aviation space shuttle, rocket propulsion for missiles, automobile industries (alloy wheel), marine engine components, and external throwaway tanks for military aircrafts. The initial strength of AA 7075 is enhanced by the addition of alloying elements such as copper, magnesium, zinc and silicon. Since these elements singly or in various combinations show increasing solid solubility in aluminium with increasing temperature. Alloy selection is important for extrusion projects, and in the aerospace industry, the 7075 aluminum alloy is commonly used. With zinc as its primary alloying element, it is exceptionally strong. A member of the 7000

series, it is one of the strongest alloys available and is comparable to many types of steel. Although it has high strength, it has lower corrosion resistance than other common aluminum alloys and does not offer the same levels of machinability or weldability. Due to its high strength, it is often used in applications where it will come under high stress such as aircraft wing spar and ground support equipment.



Aluminium 7075



Aluminium4043



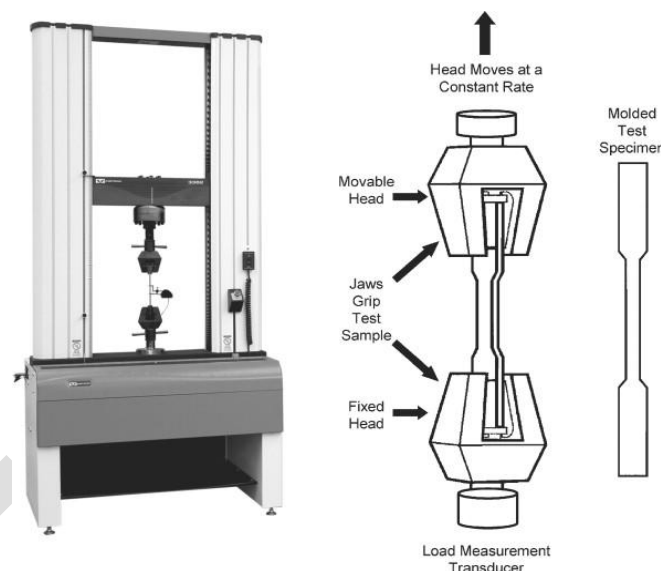
Aluminium 5352

II.LITERARURE REVIEW

- Bekir Cevik“Gas tungsten arc welding of 7075 aluminum alloy microstructure properties, impact strength, and weld defects”, 27 June 2018.
- L H Shah and M N Mat Salleh, “Feasibility study of welding Al 7075 aluminum alloys with metal inert gas welding (MIG)” October 06-08, 2014.
- U.K.Ghodwade, “Experimental study of MIG welding and solid state welding for age hardenable AA 7075 aluminium alloy”. August 2015.
- P.Sakthivel, V.Manobala, T.Manikandan, Z.Mohammed Arman Salik,G.Rajkamal, “Investigation of mechanical properties of dissimilar metals using MIG welding”. 1 July 2020.
- Zhang Yin, Song Xiping, Chang Liyan, WuShengchuan, “Fatigue Lifetime of Laser-MIG Hybrid Welded Joint of 7075-T6 Aluminum Alloy by in-situ Observation”. September 2017.

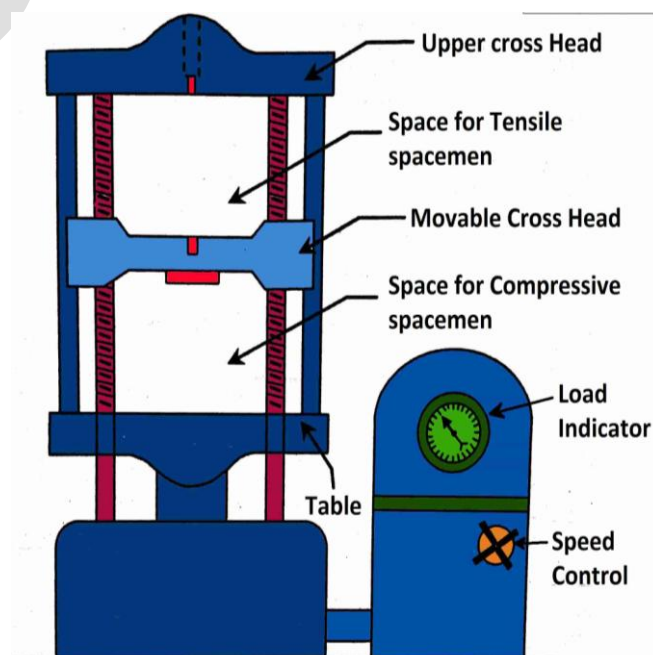
1. Tensile test

Tensile testing involves applying a force on opposite ends of the specimen and pulling outwardly until the metal breaks to determine the strain, stress, yield deformation and other properties unique to the specimen.

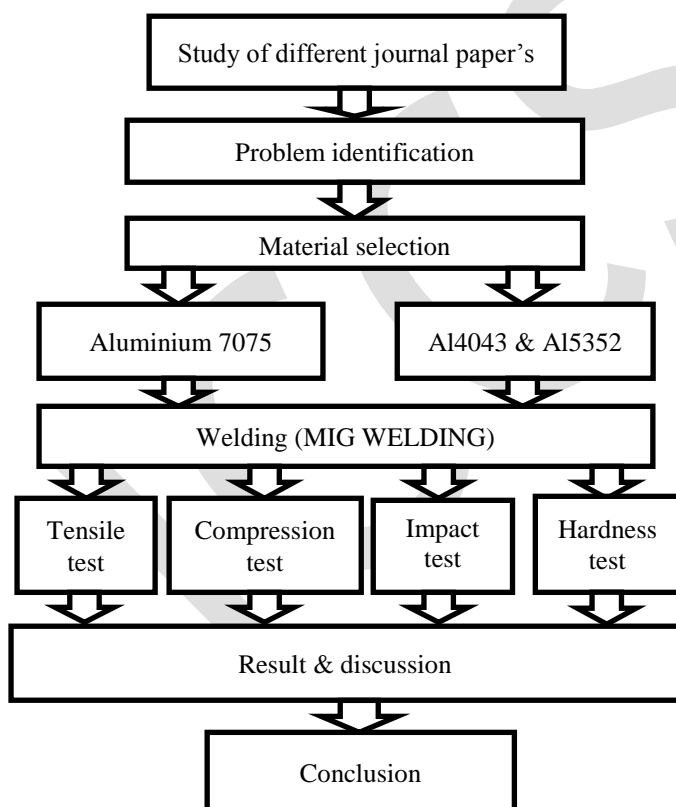


2. Compression test

Compression tests are used to determine a material's behavior under applied crushing loads, and are typically conducted by applying compressive pressure to a test specimen of platens or specialized fixtures on a universal testing machine.



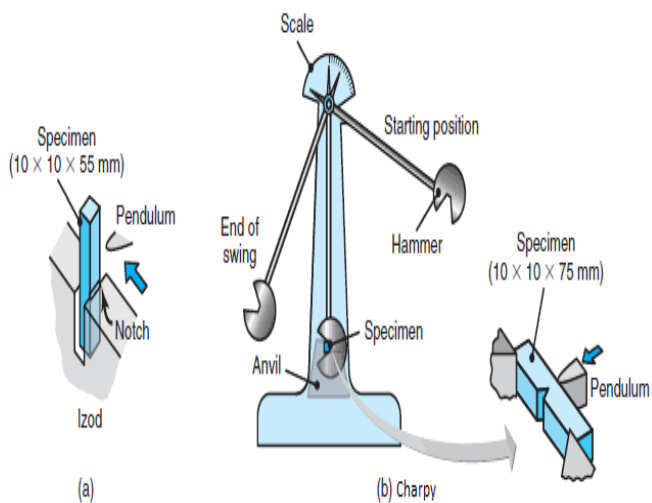
III.METHODOLOGY



IV.TESTING

3. IMPACT TEST

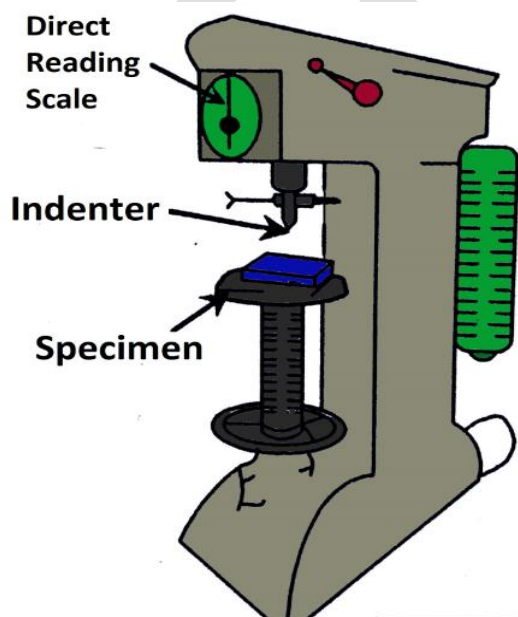
Impact testing is used to determine material behavior at higher deformation speeds. Classical pendulum impact testers determine the impact energy absorbed by a standardized specimen up to break by measuring the height of rise of the pendulum hammer after impact.



SI.NO.	MATERIAL	T.T	C.T	I.T	H.T
1.	Base metal Al7075	Base metal Al7075	Base metal Al7075	Base metal Al7075	Base metal Al7075
2.	Al4043	89.48, 162.70, 0.49	129.88	36.22	203.3
3.	Al5352	88.77, 169.10, 0.59	126.54	8.19	183.05

4. ROCKWELL HARDNESS TEST

The Rockwell scale is a hardness scale based on indentation hardness of a material. The Rockwell test measuring the depth of penetration of an indenter under a large load (major load) compared to the penetration made by a preload (minor load). There are different scales, denoted by a single letter, that use different loads or indenters. The result is a dimensionless number noted as HRA, HRB, HRC, etc., where the last letter is the respective Rockwell scale (see below). When testing metals, indentation hardness correlates linearly with tensile strength.



V.RESULT & DISCUSSION

VI. CONCLUSION

It is used in various applications these material having light weight along with high hardness. It with stand high load compare the existing material. It is most applicable in Auto mobile parts, Aero space parts & Missile parts, Engineering parts. Finally we conclude that the Al5352 have only strength in tensile test but decrease in other mechanical properties and Al4043 has good mechanical properties in Hardness, Compression, Impact test.

REFERENCES

1. Bekir Cevik“Gas tungsten arc welding of 7075 aluminum alloy microstructure properties, impact strength, and weld defects”, 27 June 2018.
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