

# Experimental Studies on Concrete Containing Welding Waste Slag

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## ABSTRACT

*In the field of construction concrete is the largest utiliser of natural sources and industrial materials by products available in the world. The concrete is an essential material to fulfill the requirements of industries, domestic housing and basic infrastructural needs of our society. Rapid increase in urban infrastructural developments in developing countries such as India leads to the need for natural resources such as river sand. The accessibility of the natural resources is diminishing rapidly. At present, other sources of fine aggregates are in great demand. This work concentrates on the utilisation of weld slag (slag left after the welding process) as fine aggregate in concrete. In this research study of strength of a new construction material named as Welding Waste Slag Concrete. Welding Waste Concrete is a concrete made by some quantity replacement by welding slag on the*

*place of natural sand. Welding slag is waste slag of weld which is residue after process of arc welding. Results show that the compressive strength of 10% replacement is best which is also greater than conventional concrete. And results also show that 10% by welding slag also shows greater strength than conventional.*

## Key words

Welding waste slag, compressive strength, workability, split tensile strength.

## Introduction

Concrete is a basic need of construction. Main ingredients of concrete are cement, sand, aggregates and some admixers. The main problem is aggregates basically used (fine or coarse) in concrete are natural stones. And as we know use of concrete is increasing day by day so there will be a problem with availability of natural aggregates in future. So we have to find

some alternative to avoid this problem. Other motive of my work is to reduce the cost of concrete construction.

The use of iron in making so many product increase the process of weld of iron. By increase in demand of vehicles, the production and use of weld are also increased in the developed and developing countries both. Worldwide iron manufacturing is increasing and so welding process also at even higher percentage. Welding Waste Slag is byproduct of arc welding whether weld of vehicles and trucks, in my research work topic is decided to focus on welding waste of slag. After the process of welding by product slag is just a waste, so we have to discard that slag. Weld waste slag is not biodegradable so it is hazardous to environment.

In last few years, handling and management of waste is the main issue infrant of the countries world wide. The problem of waste is faced as one of the most hazardous problems in the world as a cause of the environmental pollution. One of the wastes to be managed is 'Welding waste slag' because; Now development in contries worldwide has produced big amount of iron

products, so that they required welding process and produces big amount of welding waste slag. The disposal of the waste is now a big problem in frant of management worldwide.

## **2. Materials used**

### **2.1. Cement**

Ordinary portland cement (OPC) 43 grade. All tests on cement was performed as per Indian standard code IS 8112-2013.

### **2.2 Fine aggregates**

Locally available sand was used in research work. All the specifications as per IS:383-1970.

### **2.3 Coarse aggregates**

Locally available coarse aggregates having size less then 20mm was used. All the specifications as per IS:383-1970.

### **2.4 Water**

Normal drinking water was used for mixing.

### **2.5 Welding waste slag**

Welding waste slag used in experimental work was collected from local welding workshops.

### **3. Tests performed**

#### **3.1 Slump test**

Slump check is carried out of every sample to check workability of concrete. The slump value was checked as per procedures given in IS: 1199 – 1959 in India.

#### **3.2 Compressive Strength test**

Compressive Strength tests were performed on concrete sample after 7 days and 28 days. As per specifications given in IS:516-1959.

#### **3.3 Split tensile strength**

Split tensile strength tests were performed as per IS:5816-1999. Performed after 7 days and 28 days.

### **5. Results**

### **4. Literature review**

Effect of replacement of Welding waste slag in place of fine aggregates stated and results shown that there is no effect on workability of concrete with replacement of fine aggregates with welding waste slag in all the proportions of replacement (5%, 10% & 15%). Compressive strength of concrete contains welding waste slag 5% shows greater strength after 28 days of curing. It shows 3% increase in strength. In Samples with 10% it shows 8% and 10% increment in strength after 7 days and 28 days of curing. In samples with 15% replacement it shows 5% and 6% increment in compressive strength after 7 days and 28 days. In split tensile strength with 5% replacement it shows 6% increment in strength. In samples with 10% replacement of fine aggregates it shows 14% increment after 28 days of curing.

**Table 1:-** Effect of welding waste slag on compressive strength.

S.no	Specimen Id	Compressive Strength (MPa)	
		7 Days	28 Days
1	FR00	16.5	30.22
2	FR05	16	31.11
3	FR10	17.78	33.33
4	FR15	17.44	32

Results show that with 5% replacement of fine aggregates with welding waste slag compressive strength was decreased at 7 days and there is an increase of 3% in compressive strength tested at 28 days of curing. At 10%

replacement of fine aggregates with welding waste slag shows greater compressive strength it shows 8% and 10% increment in strength after 7 days and 28 days of curing.

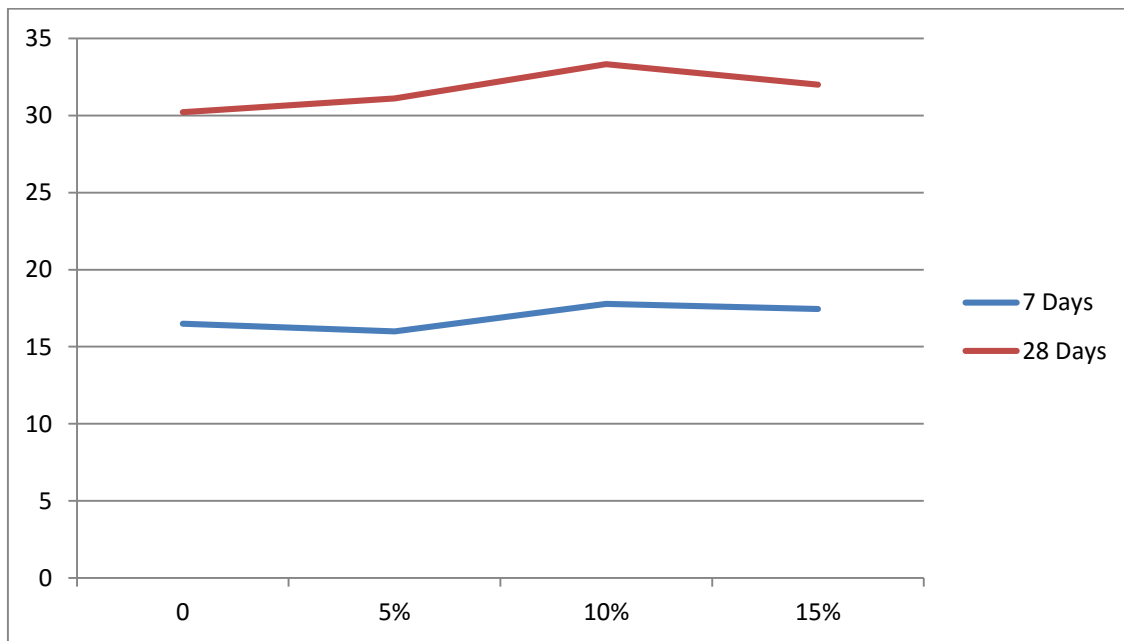


Figure 1:- Effect on compressive strength

Table 2 :- Effect on Split tensile strength.

Sr. no.	Specimen Id	Split tensile strength 28 days
1	FR00	2.96
2	FR05	3.15
3	FR10	3.39
4	FR15	3.25

Results of split tensile strength showed 6% increment in strength in samples with 5% replacement with welding waste slag. It showed 14%

increment in split tensile strength in samples with 10% replacement of fine aggregates with welding waste slag.

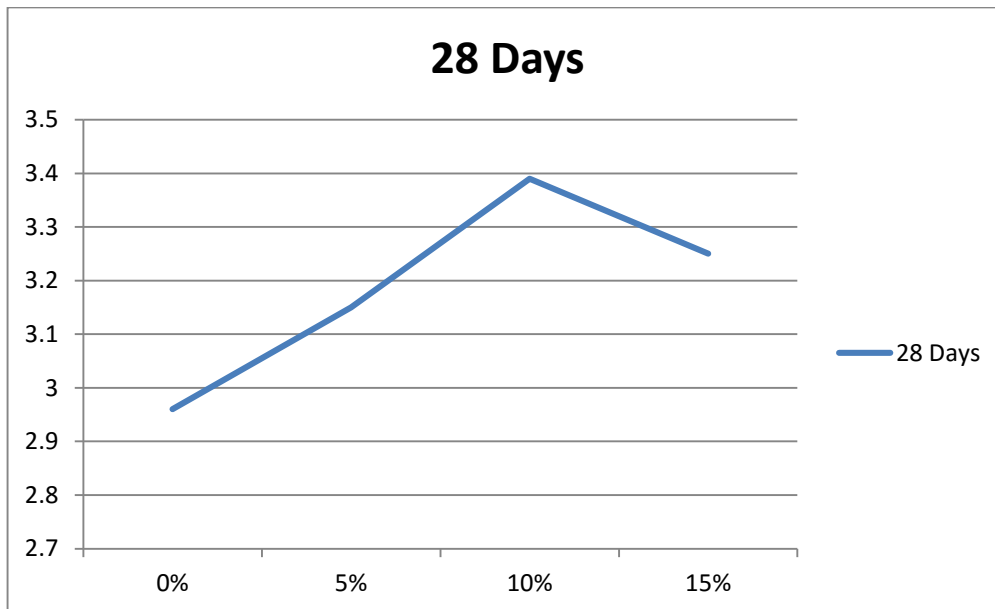


Figure 2:- Effect on split tensile strength.

## 6. Conclusion

From above results of compressive strength and tensile strength it was clear strength of concrete increased in all the samples containing welding waste slag. Samples with 10% replacement of welding waste slag on place of fine aggregates showed best values.

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