04. Methodology

The material used for the research work is cold rolled closed annealed steel having the better formability among the material available in the general market. The methodology adopt for the research work is to select the material as per Indian Standard 513 of 2008 for the formability and the ductility of the material. Further to the material chemical composition the mechanical properties to be checked for the actual application to be implemented. The output of the research work will be selection and confirmation of the grade of the material and analysis to show the better results. The cold rolled closed annealed steel having lower percentage of carbon with soft in nature to improve the ductility. Apart from the duct ability the strength of the material is equally important to manufacture of the product. The CRCA material used in actual application is at outdoor condition therefore the corrosion resistance aspect is also to be considered.

The material is also checked for the various environment conditions and for the better aging condition. The research work analysis to find out the optimum results of the tests so that the better quality output of the product can be achieved.

**Methodology involves following main stages**

- Spectro chemical test on cold rolled closed annealed steel as per specification of Indian Standard 513 of 2008 edition and as per ASTM A 1008/A 1008M.

- Micro structure test on cold rolled closed annealed steel sheet as per ASTM E-112 for determining grain size.

- Hardness test on cold rolled closed annealed steel sheet as per ASTM E0092-82R03E02 of Test method for Vickers Hardness of Metallic Materials

- Tensile test, bending test on cold rolled closed annealed steel sheet as per ASTM A 370 of Mechanical test method of steel products.
- General corrosion test on medium and low carbon steel sheet as per ASTM G0005-94R04 Reference Test Method for Making Potentiostatic and Potentiodynamic Anodic Polarization Measurements

- Formability test on cold rolled closed annealed steel sheet as per ASTM E 1695-95 for Ball Impact Test i.e. cupping test.

**Work Plan for the Research Work**

The research work will be completed as per below schedule in the tenure of two years

- **First Year**
  
a)  Review of Literature survey, related publications and patent on the research topic.

b)  Observations on the industrial problems for sheet metal forming and observe the feasibility of work.

c)  Study of various parameters related to forming of sheet metal and compare with the critical literature survey.

d)  Finalization the various testing parameters and the test setup with the standard method and procedure of testing.

e)  Preparation of test samples for set of experiments as per ASTM and Indian Standards.

f)  Finalization on experimental set up to carry out the testing on the test samples.

- **Second Year**

  a)  Preparation of experimental preparation for various tests to be conducted.

  b)  Confirmation and analysis of process parameters for both chemical and physical testing of the test samples.
c) Confirmation of the test results and carries out the supporting test of annealing of the CRCA at various temperature gradients and reconfirm and conclude the research work.

d) Preparations of the documents for the research work and arrange it for the final thesis of the research work.

e) Submission of the thesis and preparation for the final Viva.