Determination Of Failure Strength Of Flat Plate Weld Joint Using Finite Element Analysis

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Abstract: **The problem experienced by the manufacturer is to control the input parameters of the process to obtain a good welding connection with the required welding quality. Traditionally, it was necessary to study the welding insert parameters of the welding product to obtain a welded link of the required quality. To do this requires a time-consuming experience and development errors. The welding joints are then checked to see if the requirements are met or not. Ultimately, the welding parameters can be selected to produce a weld line that now meets general characteristics. Whatever is not achieved or often considered is the combination of improved welding parameters, because weld welding can often be formed with many different parameters. In other words, there is often a perfect combination of welding insertion coefficients that can be used. Welding is the process of permanent adherence to two metals (usually metals) through local fusion due to a suitable combination of temperature, pressure and metal conditions. Depending on the temperature and pressure of high temperature, without high pressure at low temperature, a wide variety of welding processes have been developed. FEA has become a practical method to predict voltage and deviation from charged structures. FEA determines the load path, which can be difficult with conventional analysis with complex structures. Welding is the process of joining two pieces of metal by forming a strong metal bond between them by heating or pressing or both. Welding allows direct transfer of tension between members, removal of metal plates and joints needed for the installed structures. Two types of fillet welding are possible. Single wide fillet weld and double fillet weld. The strength of one transient cutting solder is enhanced by applying the limiting force.**

Keywords-**Finite Element Analysis; Double Transverse Weld; Single Transverse Weld; Restraining Force**

I. INTRODCTION

The problem of interfaces was solved only by screws, but the development that occurred during World War II cut welded joints in most applications. The shipbuilding industry may have been in the forefront and the large vessels of more than 10 000 have been built with welding technology for welding structures, and have had many benefits [1]. Ease of treatment and weight reduction were the benefits initially identified. This is due to a long period of construction surgery and the impact of various phenomena such as corrosion, fatigue or rheology. Often repairs occur because of events of any kind, however the result can be the failure of the structure. If so, the best solution is to replace the item that fails with the new element, but because of the economic factors and complexity of the process, it is often much easier to solve the problem locally.

1.1 WELDING: Welding is the process of joining two pieces of metal by forming a strong metal bond between them by heating, pressing or both. It is distinguished from other types of mechanical connections, such as installation or compression, which are formed by friction or mechanical coupling. This is one of the oldest and most reliable methods to connect. Welding offers many advantages over bolts and fastening. Welding allows for direct transfer of nerve pressure between members removing the hollow panels and the necessary joints from the denture. So, the weight of the joint is minimal.

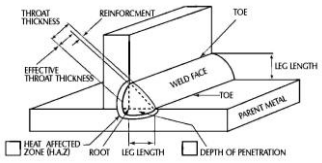


Fig 1.1 welding

1.2 FUNDAMENTALS OF WELDING: A welded link is obtained when two clean surfaces are connected to each other and pressure or heat is applied, or both are applied for bonding. The tendency of atoms to bond is the basic basis of welding [2]. Diffusion can occur in a liquid, solid or mixed state. In welding, metal materials are bonded by forming metal bonds and forming a perfect joint.

1.3 CLASSIFICATION OF WELDING: Welding is the process of joining the metal parts by applying heat with or without pressure. There are many welding processes that involve different techniques and procedures. They differ markedly in the details of

their operations and in the equipment needed to reach the joint. They can be classified into two main categories, depending on the metal reaction on the weld [4].

1.4 ADVANTAGES AND DISADVANTAGES:

- Welded joints are more economical as less labour and less material is required.
- The efficiency of welded joint is more than that of riveted joints.
- The speed of fabrication is faster in comparison with riveted joints.
- Complete rigid joints can be provided with welding process.
- No noise is produced during the welding process as in case of riveting.
- In welding filler plates, gusseted plates, connecting angles etc, are not used, which leads to reduced overall weight of the structure.

1.5 TYPES OF WELDED JOINTS: Two types of welding joints are clearly recognized viz.

- Joints between two plates that Overlap and,
- Joints between two plates that Butt with each other.

The American Welding Society defines a joint as "the manner in which materials fit together."

- Butt joint.
- T-joint.
- Lap joint.
- Corner joint.

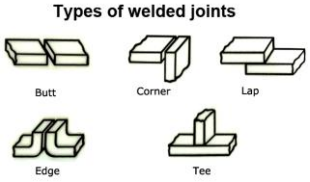


Fig 1.2 welding types

II. LITERATURE REVIEW

2.1 B. Pollard and R. J. COVER "Fatigue of Steel Weldments" (1972).

The literature on the depletion of steel welds has been reviewed and the effect on fatigue conditions of test conditions, weld metric, weld metal sound, residual stress and the microstructure of the weld metal and heat-affected zone has been investigated [3][5]. It is clearly shown that welding measurement is the most important factor in determining the fatigue properties of a weld. For a given welding geometry, the fatigue strength is determined by the severity of the stress concentration at the welding or, with the welding reinforcement removed, by the stress concentration in welding metal defects. Different welding processes affect fatigue strength by delivering welding with different grades of surface reuse and weld metal quality.

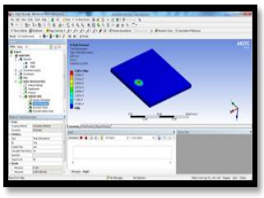
III. RELEATED STUDY

3.1 INTRODUCTION TO CREO: PTC CREO, pre-professional / engineer, is a three-dimensional collection of bundled software that is used to carry mechanical touch, animations, and CAD setup for corporate companies. It is one of the leading 3D CAD operations that includes a control-based control device. Using the parameters, scope, and capabilities to get your brand can promote development, as well as the same point. The prescription from Pro / ENGINEER Wildfire is understood to be CREO in 2010. The barter is based on a doctrine developed by the Technology Parameters Company (PTC) at any beginning to replace the injured of its followers with geographic crops, suggesting one in the plan, namely 2D, orthographic welding Fresh concept work.

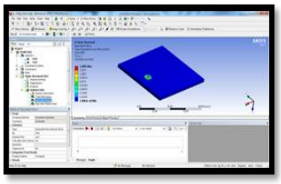
RESULTS AND DISCUSSION

4.1 STATIC ANALYSIS OF A WELDED JOINT AT 60 N POINT LOAD

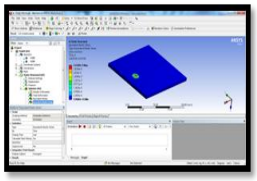
Deformation Diagram



Stress Diagram

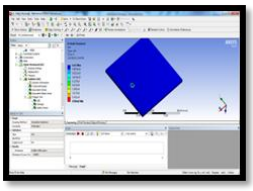


Strain Diagram

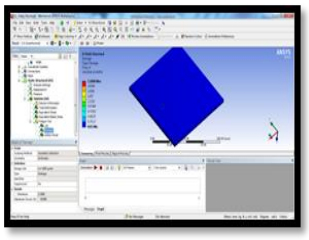


4.2 FATIGUE ANALYSIS OF A WELDED JOINT AT 60 N LOAD

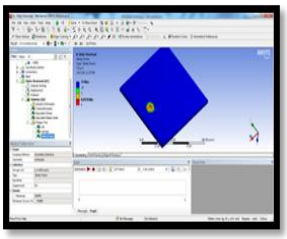
life Diagram



Damage Diagram



Safety Factor



4.3 Static analysis results at point load

At load (N)	Deformation (mm)	Stress (N/mm²)	Strain
60	3.307e-5	1.4981	2.15e-5
80	4.960e-5	2.237	3.23e-5
100	5.7873e-5	2.606	3.77e-5
120	6.6141e-5	2.9783	4.30e-5

4.4 Static analysis results at UDL

At load (N)	Deformation(mm)	Stress(N/mm2)	Strain
60	4.0116E-7	0.022238	1.1119E-7
80	5.3488E-7	0.02965	1.4825E-7
100	6.686E-7	0.037063	1.8531E-7
120	8.0232E-7	0.044476	2.2238E-7

4.5 Fatigue analysis results

At load (N)	Life	Damage	Safety factor	
			Min	Max
60	1e-11	2.1806	0.8978	15
80	1e-11	73.857	0.5984	15
100	1e-11	365.7	0.51303	15
120	1e-11	412.5	0.4489	15

IV. CONCLUSION

Almost all manufacturing structures today involve welding. Therefore, the effects of welding must be considered over the cycles of the cyclical structures for economic and security design. The vast majority of component failures occur in swept joints when the welded structures are prone to fatigue and shock loading. By observing static analysis, the values of stress, strain and stress increase with increasing loads. The minimum pressure value when 60 Newtons is loaded. Monitoring stress analysis increases the safety factor by reducing loads. The maximum security factor is a 60N load. In this thesis, mild steel materials are welded by arc welding joints at 0.25, 0.5, 0.75 and 1 on the output coefficient such as tensile strength of the weld joint. By observing the experimental results, the tensile strength is the maximum in the load joint position 0.5, when we compare the joint point 0.25, 0.75 and 1.

V. REFERENCES

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