

Design and Development of Flexible Shaft Inner Assembly for Grinding Machine

Jayakumar¹, M.Siva², Gopalakrishnan³

Assistant Professor ,Department of Mechanical Engineering,^{1,3}

Assistant Professor, Department of Aeronautical Engineering ,²

Dhanalakshmi Srinivasan College of Engineering and Technology, Mamallapuram.

Abstract — Flexible shaft Assembly is of potential force in the Fettling, Die – Grinding, Buffing & Polishing activities in every foundry and heavy engineering industries. This Flexible shaft assembly is robust in construction, proven technology, and user friendly and has continuous requirements for developing nation in our global village.

In present method the flexible shaft inner assembly is happening by soldering method, in this method the life of the assembly is very low due to failure at soldering. It is proposed to use crimping method of assembly to reduce the failures.

Suitable crimping tools and hydraulic press is identified to complete the project successfully. The various test to be carried are as follows:

- i) Pull-load test.
- ii) Smooth rotation & Vibration tests.

The experiment results will be analysed to find the performance of flexible shaft assemblies, compare with existing soldering method.

I. INTRODUCTION

Renowned engineers private limited is a successful organization run by efficient and expert professionals. We manufacture SUNNER INDIA FLEXIBLE SHAFT MACHINES ranges from 0.75 to 2.5.H.p.and also with single phase range. SUNNER INDIA flexible shaft machines have stood the test of time both in quality and performance in our country and developing nations too. In short, 1 million satisfied customers throughout the globe has bench marked their quality standard and perfection too of every single product churned out from their works.

Our motors are thoroughly tested for insulation and overloading; incorporated with a high quality windings and bearings.

Our tool holder's suit different applications like mounting of grinding wheels mounted points,

sand discs and right angle attachments.

Our programme embraces the up gradation of soldering activity in the process of manufacturing flexible shaft inners. In short, it is introduction of crimping for inner versus shaft couplings. This would enable user-friendly, less cost and eliminating the risk of hazardous chemicals in soldering fitment procedures.

II. ANALYSIS OF CUSTOMER COMPLAINTS:

Weak soldering and let loose in short period of time: Collected at random from manufacturing bay picked-up-10nos of inners of 10mm from various batches and conducted the following tests:

By switching ON & OFF of the motor at every 10minute on a cast iron job.

The following observations were noted-

While switching ON the inner jolts/ twist there is a tendency to let loose and give way.

- i) While working in one particular angle the soldering is let loose & breaks in 56 hours time.

Reason for Removing Coupling in Inner:

Uniformity of soldering work is at times not achieved.

Workers tend to make mistake while grinding, degreasing and inserting inner in shaft coupling with molten lead in haste to complete norms.

III. Research and Development

The existing activity /practices has drawn attention from the following

- i) Customer complaints
- ii) Production was a distant cry
- iii) Material cost and its spiraling

Costing for Existing soldering method:

1. Labour Cost Analysis:

The price inclusive of all the above operations Rs 885.68/- for 60 Nos per day (8 hours)

2 .Material cost Analysis:

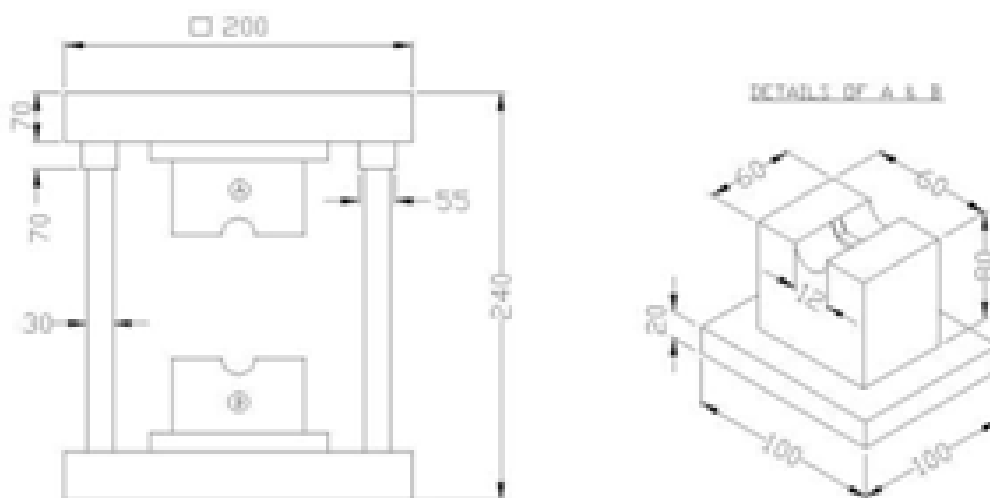
Material cost = 18.141

3. Total Costing for Existing soldering method:

Table labour cost + Material cost =14.76+18.141=32.901 perno.



Crimping die



Crimping die

200MMX200MMX30MM-02Nos Top and Bottom plate 100MMX100MMX20MM
Die and Punch box housing

Milling & Surface grinding – top and bottom plate

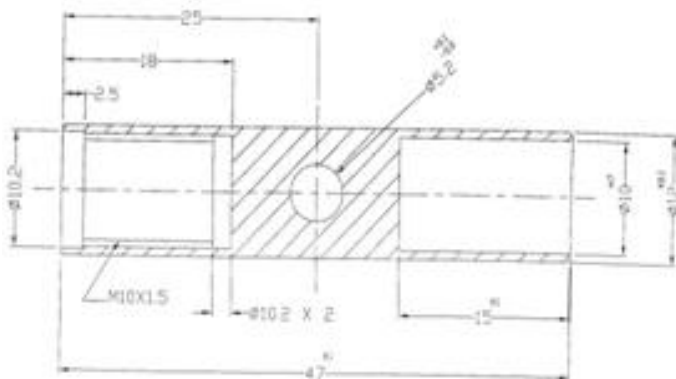
punch and die Wire cut- profile for outer dia 12mm of 10mm Flat of 6 face 60mm
x60mmx80mm length die and punchholder.

TOOL HOLDER SIDE SHAFT COUPLING



Crimping die designed for length 10mm Width
2 mm Coupling bore dia 10H7

MOTOR SIDE SHAFT COUPLING



Flat crimping designed for 2mm of six faces of both motor side and tool holder side shaft coupling.

Pull Load Test Report:

SOLDERING METHOD CRIMPING METHOD 2KN 4KN

Costing for crimping method:

Labour Cost = 4.428 Material cost = Nil

Total Costing for crimping method: 4.42 per no. Profit:

Total Profit for Crimping method 86.5%

IV. CONCLUSION

The project conducted systematically was to investigate the steadfastness of the crimping function versus the conventional soldering activity for flexible shaft assemblies.

The conclusions of the developed samples are as follows: The service life of the flexible shaft assembly has doubled. The material cost has dropped by 30%.

The hazardous conditions such as obnoxious fumes and high temperatures eliminated.

The quality consistencies were achieved for the entire batch. The production quantities norms have to be re-visited.

The vibrations of the inner shaft were eliminated. Overall productivity was achieved.

REFERENCES

1. Machine Design, an Integrated Approach, Second Edition, Robert Norton, Third Impression - 2009, Publishing by Dorling Kindersley.
2. Introduction to Machine Design V.B. Bhandari, seventh reprint-2006, Publishing by the Tata McGraw Hill Publishing Company limited.
3. Analysis and design of Machine Elements Vijay Kumar Jadon, Suresh Verma, Published by I.K. International publishing House Private limited.
4. A Text book of machine design Dr. Rajendra KARWA, Lakshmi Publishing private limited.
5. Hand Book of Hydraulics, by Ernest F. Brater. et al. Hydraulics and pneumatics techniques and engineering guide, second edition, Andrew Parr, Oxford Boston.
6. Basics of fluid power Machine, Geog. Gordon, DE, Design of Flexible Shaft Renowned Engineers Private Limited, Puzhal, Chennai. 66