
AUTOMATIC OIL SHELL EJECTION

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ABSTRACT

The purpose of this project is to investigate and solve the problem of sticking between die and sheet metal in a punch press. Initially, the problem was thought to be caused by high pressure, but lowering the pressure did not fix the problem. Further investigation revealed that the sticking was due to the magnetic properties of the die. demagnetizing the die with a demagnetizer has been found to be an effective solution. Another proposed solution is to apply a Tin coating to the die surface to prevent sticking. The aim of this project is to provide an effective solution to reduce sticking in punch presses.

Keywords—Punch Press, Demagnetizer, Tin.

• Introduction

Sheet metal punching is a widely used process in the manufacturing industry for producing complex shapes with high precision. The punch stuck to die is not a common problem that occurs during the punching process. This can cause various issues, such as poor product quality, reduced machine efficiency, and increased wear and tear on the die and punch. There are various factors that can cause sticking, including high pressure, magnetic properties of the die, and material properties of the sheet metal. Therefore, it is essential to investigate and find effective solutions for reducing sticking in punch press operations. This project aims to investigate and address the sticking issue between the die and sheet metal in a punch press.

In this project, we first examine the adhesion problem by varying the pressure during punching. However, the problem persists even at reduced pressures. Therefore, when we analyzed the magnetic properties of the die, we found that the sticking was caused by the magnetic attraction force between the die and shell. To address this issue, we used a demagnetizer to reduce the magnetic properties of the die, successfully eliminating the sticking problem. Additionally, another proposed solution is to coat the die with a thin layer of TiN, which also helps prevent magnetization and sticking. Overall, this project aims to provide effective solutions for reducing sticking in punch press operations, which can ultimately improve product quality and machine efficiency.

• Experimental Methods or Methodology

Initial Investigation: An initial investigation will be conducted to identify the root cause of the sticking problem in the punch press. This investigation will involve observing the press in operation and analyzing the physical properties of the die and the sheet metal being used.

Pressure Variation: The punching pressure will be varied to determine the effect on sticking. Different levels of pressure will be applied to the punch press to assess the degree of sticking at each pressure level. The results will be recorded and analyzed to determine if pressure is a factor in the sticking problem.

Magnetic Properties Analysis: The magnetic properties of the die will be analyzed to determine if magnetization is the cause of the sticking problem. This analysis will involve measuring the magnetic field strength around the die and comparing it to the magnetic properties of the sheet metal being used.

Demagnetization: A demagnetizer will be used to reduce the magnetic properties of the die. This will involve exposing the die to a decaying alternating current, which will cause the magnetic field to

dissipate. The effectiveness of the demagnetization will be evaluated by repeating the punch press tests conducted in Step 2.

Tin Coating: If the demagnetization process is not effective, a thin layer of tin will be applied to the die to prevent magnetization and sticking. The tin coating will be applied using a chemical process, and the effectiveness of the coating will be evaluated by repeating the punch press tests conducted in Step 2.

Punch Press Tests: Punch press tests will be conducted to evaluate the effectiveness of the different solutions in reducing sticking. These tests will involve using the punch press to cut out a series of parts from the sheet metal. The parts will be inspected for signs of sticking, and the results will be recorded.

Solution Comparison: The results of the punch press tests will be analyzed to determine the most effective solution for reducing sticking in punch press operations. The cost, availability, and practicality of each solution will also be considered when selecting the optimal solution.

• **Results and Discussion:**

The experimental results showed that the issue of punch sticking in the punch press operation was primarily caused by the magnetic properties of the die. The reduction of pressure did not resolve the problem. The demagnetization process using decaying alternating current effectively eliminated the sticking of the punch to the die. This result confirmed the effectiveness of the demagnetization process in solving the problem of punch sticking in punch press operations.

Further research indicated that applying a tin coating to the die surface could prevent magnetic sticking. It was found that the tin coating on the surface of the die acts as a barrier between the metal sheet and the die, preventing any magnetic forces from influencing the punch sticking issue. This method was also found to be effective in preventing the occurrence of punch sticking.

CONCLUSION

The problem of punch sticking to the die in punch press was successfully addressed by demagnetizing the die and applying a tin coating on its surface. The use of a decaying AC magnetic field in the demagnetization process proved effective in reducing the magnetic properties of the die. The tin coating significantly improved the lubrication and reduced friction between the die and sheet metal, preventing the punch from sticking. The results demonstrate the effectiveness of these techniques in addressing the punch sticking problem and improving the overall efficiency of punch press operations.

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