



6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the
Affiliated Conferences, AHFE 2015

Evaluation approach for measuring the skill transfer level in the forging die polishing

Hidehito Kito^a, Hiroyuki Nishimoto^a, Yuka Takai^b, Akihiko Goto^b, Hiroyuki Hamada^a

^a*Kyoto Institute of Technology, Kyoto 606-8585, Japan*

^b*Osaka Sangyo University, Daito 574-8530, Japan*

Abstract

In forging parts production, the die life is important for the production efficiency. It is required for more skillful craftspeople because the die life depends on damage of scratches. Therefore it is important to succeed their expertise constantly. It takes several years for craftspeople to be the expert on the job training. In this study, in order to accelerate their expertise transferring, we analyzed their expertise in focusing on quality of polishing in a forging part. Craftspeople with different time of the experience were entered and compared in this experiment. Their skills were measured by checking the quality including the roughness on the die surface, the variation from the designated thickness and the work time.

© 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of AHFE Conference

Keywords: Skill transfer level; Forging; Die Life; Polishing

1. Introduction

Cold forging processing is a method of manufacturing parts that involves inflicting damage on the die used as tool. Therefore, the die life is key to maintaining manufacturing with stability. The mode of damage is of two forms. One is breakage in the product's forming area, generally an issue of die construction including press fit rings. The other is frictional wearing of the product's forming area through contact with a processing material, thought to be caused by the surface condition, in other words the way it is polished. Die-making for cold forging is distinguished by hand polishing of the processing part known as product area, which adds greatly to the die life. The polishing work is dependent on a person referred to as "die craftspeople" and though from the past a technical approach has been given trial, the skill has not been fully explicated. This research is aimed at expediting nurture of technicians through analysis of the polishing work.

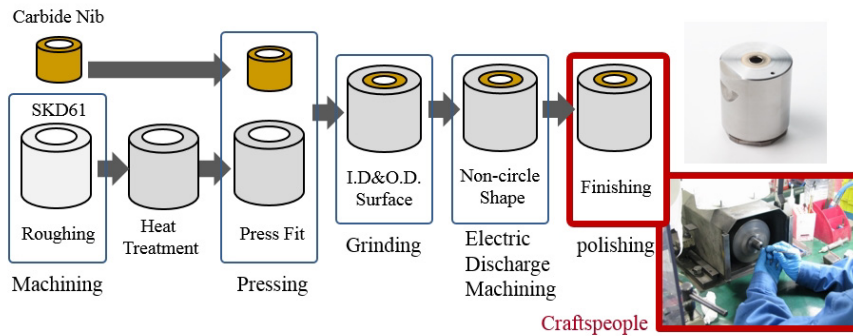


Fig. 1. Forging die manufacturing process.

2. Polishing skill of cold forging die

Die manufacturing consists of multiple procedures with machine processing at the core. Generally polishing work is called “finishing process” and comes into play at the end (see Figure 1). Polishing work has the following two purposes.

- Operation to create a shape that cannot be made by machine processing.
- Operation to draw the surface condition needed for manufacturing of parts.

Even with a polishing process that is treated as a single operation, the craftspeople mentally plans the order for polishing area and the processing method to be used. In other words, a single process of polishing work has a procedural design, and the processing method follows the procedural design.

Several years is required to learn polishing work. One factor is the ability to work out the procedural design mentioned above. The other requirement is expert operational ability to faithfully implement the procedural design. In this report we will do a comparative analysis of experts and non-experts concerning the latter requirement.

3. Analysis of polishing work of forward extrusion die with simple form

3.1. Experimental method

In the selection of the target die, we established the condition that a non-expert can also perform the polishing work. The ease of this type of polishing work was thought to make a large difference in polishing quality unlikely. Therefore we decided to mainly analyze the amount of time it takes to reach the desired quality level and its procedure. For the experiment, along with letting all test subjects know in advance about the general framework of the operational procedure, we shared ideas about the method of examination of the polishing, including palpation of the polishing surface with a needle and an enlarged photo showing the surface condition that is to be refined.

The evaluation items of quality were set as the main dimensions of the polishing part following the drawing and the demanded surface roughness for before and after polishing were measured. The time of the polishing work was measured, and timing of checking the dimension and palpation were recorded. For test subjects, three people with different experience were selected. Polishing work with the same die was implemented ten times with one test subject.

Download English Version:

<https://daneshyari.com/en/article/1143834>

Download Persian Version:

<https://daneshyari.com/article/1143834>

[Daneshyari.com](https://daneshyari.com)