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Pathade H. P

Production Engineering,
Pune University,
Sangamner, Maharashtra,
India

Balasaheb Titame

Production Engineering,
Pune University,
Sangamner, Maharashtra,
India

Parth Potdar

Production Engineering,
Pune University,
Sangamner, Maharashtra,
India

Painjane Dipali

Production Engineering,
Pune University,
Sangamner, Maharashtra,
India

Design of trimming tool and its cassette

Pathade H. P, Balasaheb Titame, Parth Potdar, Painjane Dipali

Abstract

The paper deals with a trimming tool and its cassette design and performance of HSS single point cutting tool and its cassettes while performing machining operation on the trimming machine. The main attention is focused on utilization of machine and workers effort during working. Cassette which is redesigned which based on Single Minute Exchange Die concept. The result shows a safe and fast manufacturing of starter ring with good surface finish.

Keywords: HSS cutting tool, Single Minute Exchange Die, Tool cassette.

1. Introduction

A] HSS Tool: HSS tool are used for multiple technical application. There standard technology for production in trimming. The fundamental material for the tool is high speed steel due to better machinability of complex shape. Actually company facing problems while manufacturing starter rings, are as follows

1. The inner diameter of ring is not trimmed while forward stroke of hydraulic vertical slide for trim the inner diameter of that rings company used grinding wheel.
2. It will increase the human effort.
3. Trimming time per ring.
4. Also increase the human unsafety.

• This problem solved effectively by:

- I. Resigning of HSS trimming tool geometry
- II. Tool which is designed having shape become the shape of inner diameter of starter ring diameter.



Fig 1: Previous geometry



Fig 2: New designed geometry

B) Cassette: It is used for holding the trimming tool and the material of cassette is C-41.

- Problems while loading and unloading the cassette and tools-
 1. Cassette required to be removed completely from slide.
 2. Tools are not easily unloaded from cassettes.
 3. Hammers are used for loading and unloading the tool from cassette slot which increases the time.
 4. Four tools are used to achieve required depth of cut.
 - These problems can be solved by-
 1. Directly fixing the cassette on horizontal and vertical slide.
 2. Depth of cut can also achieved with the help of three tools.
- Plate arrangement is provided for easily loading and unloading the tool without removing whole cassette assembly from the slide.

Correspondence:

Pathade H. P

Production Engineering,
Pune University,
Sangamner, Maharashtra,
India



Fig 3: Currently used cassette



Fig 4: New design cassette

2] Design and Modeling of cassette-

✓ Modeling of cassette-

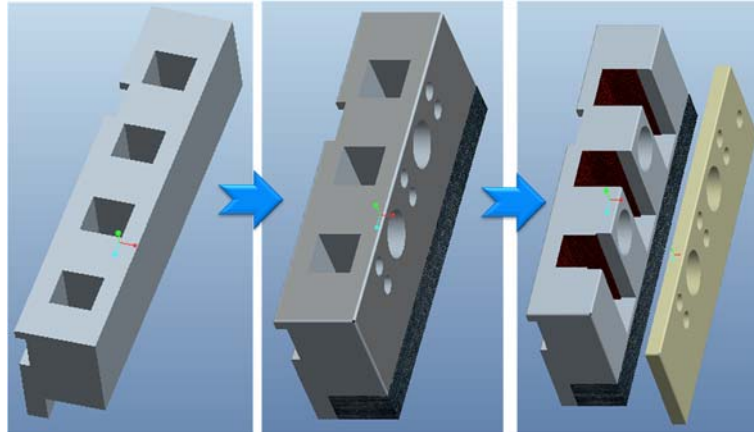


Fig 5: Modeling of cassette

2. Experimental Setup:-

Firstly ring which is coiled from coiling machine is cut with the help of power saw. Then it is load on butt welding machine. After welding it is load on trimming machine to trim out four surfaces of ring flash (upper, lower, outer, inner). After loading ring on machine operation is start by moving horizontal slide and then vertical slide which is automated. Upper and lower trimming operation is done by horizontal slide and outer and inner trimming is done by vertical slide cassette, by moving vertical slide up and down respectively. Because of changing the previous geometry of the tool shape inner trimming is done at a same time on same machine. Because of this there is no need to move the ring on grinding machine for trimming the inner surface which is required previously.

After completing the trimming on four surfaces ring is unload from trimming machine and move to the further operations like normalizing, flattening etc.

3. Observations:-

Observations are derived from a previously used cassette and new design cassette. Some of the important observations are taken from experimental result which are listed below

Table1: Time study of setup activity

SR.NO	ACTIVITIES	TIME REQUIRED	AFTER
1	Cassette removal (all four)	20 min	-
2	Tool removal from cassette	20 min	7 min
3	Cleaning of cassette using air blow gun	2 min	2 min
4	Tool setting using SOP	60 min	45 min
5	Mounting of cassette over slide	20 min	-
	Total	122 min	54 min

- SOP- Simplified Operation Process.

4. Conclusion:-

From the above table it is conclude that newly design tool and cassette is very effective from previously used tool and cassette. Rate of production is higher than that of the previously used tool and cassette. Also the workers efforts are getting neglected and machine utilization also increased than previously.

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