Innovation And Implementation of Direct Tapping On 2w Frame Pipe with The Help of Form Drilling Process for Cost Reduction and Productivity Improvement

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Abstract - Thermal friction drilling is a novel non-traditional hole-making process. A rotating conical tool is applied to penetrate a hole and create a bushing in a single step without generating chips, providing a more solid connection for attachment than attempting to thread the original sheet. The amazing applications of thermal friction drilling in different industrial fields will lead to new era of joining process for different work materials, especially in the sheet metal applications. The aim of this work is to review the state of the art for researches performed on the friction drilling process as well as its applications considering its advantages and limitations. Thereby, to highlight the important and critical issues that should be tackled and investigated by researchers in the near future such as studying the optimal machining parameters of such process and evaluating their effects on the multiple performance characteristics. This phenomenon we are going to use in 2W frame for effectively process reduction, material reduction, cost and time saving.

***Key Words*:** Thermal friction drilling, Form Drilling, conical tool, penetrate, Chips, optimal machining parameters, process reduction, material reduction, cost saving and time saving.

1. INTRODUCTION *(Size 11, Times New roman)*

In 1923, the Frenchman Jean Claude de Valiere tried making a tool that could make holes in metal by friction heat, instead of by machining. It has been recognized that if enough heat is generated it could melt and form a hole through the metal. With that thought in mind, he developed a special drill designed to increase friction. It was only a moderate success, because at that time the right materials were not yet available. Moreover, the right shape for this type of tool hadn't yet discovered till1980's [1]. Increasing production of automobile industry, pipe industry, development of mechanical products, materials, design of joining in civil engineering force the producers to accelerate the production and to utilize new technologies.

Friction drilling, also known as thermal drilling, thermo-mechanical drilling, flow drilling, form drilling, or friction stir drilling, is a non-traditional hole-making method. Figure 1 shows a schematic illustration of the friction drilling steps. The tip of the conical tool approaches and contacts the work piece, as shown in Fig. 1(a). Friction on the contact surface, created from axial force and relative angular velocity between tool and work piece, produces heat and softens the work piece material. As the tool is extruded into the work piece, as shown in Fig. 1(b), it initially pushes the softened work-material sideward and upward. With the work piece material heated and softened the tool is able to pierce through the work piece, as shown in Fig. 1(c). Once the tool penetrates the work piece, the tool moves further forward to push aside more work piece material, as shown in Fig. 1(d), and form the bushing using the cylindrical part of the tool. As the process is completed, the shoulder of the tool may contact the work piece to collar the back extruded burr on the bushing, as shown in Fig. 1(e). Then the tool retracts and leaves a hole with a bushing on the work piece, as shown in Fig. 1(f). Finally thread forming is performed, as shown in Fig. 1(g). The drill consists of five regions as illustrated in Fig. 1.

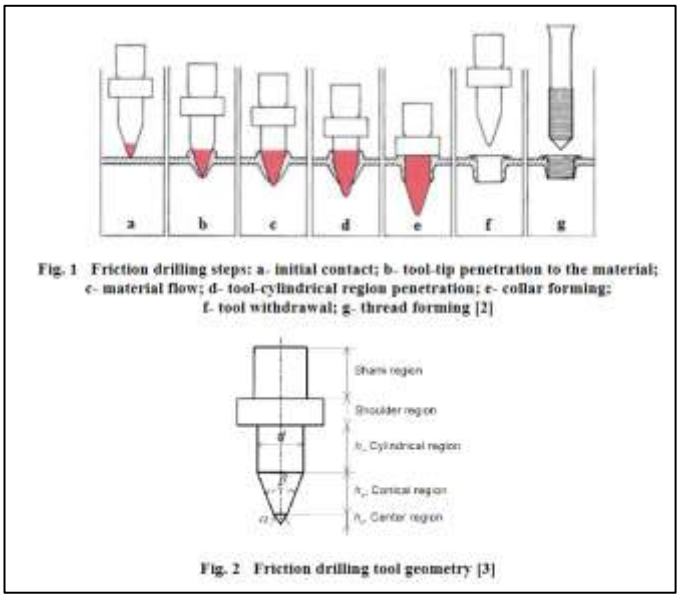

Fig. 1 Friction drilling steps: a- initial contact; b- tool-tip penetration to the material; c- material flow; d- tool-cylindrical region penetration; e- collar forming; f- tool withdrawal; g- thread forming [2]

Fig. 2 Friction drilling tool geometry [3]

Fig. 1.1 Form Drilling Stapes

2. METALLURGICAL RESULTS:

The existing process Bush has internal threading & considered as a Nut which is further brazed to the Tube.

Table -1:

Sample No.	Slippage Torque in Kg-m	Design Torque
1	1.15	**0.4~0.5 kg-m**
2	1.07	
3	1.14	
4	1.11	
5	1.04	

3. CONCLUSIONS

- New ideas to improve the quality of bushing are still necessary for brittle cast metals. The deformation and fracture of work-material to form petals are not well understood. Practically, different ways to heat the work piece need to be investigated, such as using the induction heating to locally raise the temperature on the spot of drilling or the tool, ultrasonic vibration of the work piece, or designed tool features that cause frictional heating prior to drilling.

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The heading should be treated as a 3rd level heading and should not be assigned a number.

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