Parametric analysis for performance enhancement of process parameters in external thread rolling

[1]VASAVA VASANTIBEN KANUBHAI, [2]DR. MANISH GANGIL

M.Tech.Scholar[1], *Professor*[2]

Department of Mechanical Engineering, RKDF, University Bhopal, (M.P.) India.

[1] hindvasava6212@gmail.com, [2]rkdfbhojpal@gmail.com,

Abstract

The Threads are maximum widely used in many industries. For the industries which produces the thread is a key skill to adopt the correct and specific machining of threads because there are so many parameters which affect the scale of thread.. The purpose of the have a look at is to generate the threads with the considerations of the parameters (hardness, clean diameter and floor roughness) that are for use. Due to this we can decide the size of thread without doing the thread rolling manner experiment as a result if we recognize the cost of the each parameter as it should be than we can supply the correct dimensions of the threads before the rolling procedure and therefore reduces the rejection of the threads within the thread forming enterprise.

Key word:- Process Parameters, external thread rolling, roughness, rolling procedure.

1. History of threads

1.1 General Applications of Screw Threads

The widespread packages of numerous items having threads are;

[a] Fastening; screws, nut-bolts and studs having screw threads are used for quickly fixing one element directly to every other part

[b] joining; co-axial joining of rods, tubes etc with the aid of external and inner screw threads at their ends or separate adapters

[c] Clamping; strongly keeping an object by a threaded rod, e.g., in c-clamps, vices, tailstock on lathe bed etc.

[d] Controlled linear movement; e.g., tour of slides (tailstock barrel, compound slide, cross slide and so forth) and work tables in milling device, shaping gadget, CNC system gear and so on.

[e] Transmission of motion and power; e.g., lead screws of device tools

[f] Converting rotary motion to translation; rotation of the screw causing linear travel of the nut, which have wide use in machine tool kinematic systems

[g] Position manages in gadgets; e.g., screws permitting precision movement of the work desk in microscopes and so forth.

[h] Precision measurement of length; e.g., the threaded spindle of micrometres and so on.

[i] Acting as worm; for acquiring sluggish rotation of gear or computer virus wheel

[j] Exerting heavy pressure; e.g., mechanical presses

[k] Conveying and squeezing substances; e.g., in screw conveyor, injection moulding system, screw pump and many others.

[l] Controlled computerized feeding; in mass manufacturing meeting.

2. Classification of Threads

Screw threads having numerous programs may be categorized as follows

[a] According to location;

(i) External thread

(ii) Inner thread

[b] According to the path of helix;

(i) right hand (commonplace)

(ii) left hand (every so often)

[c] According to shape;

(i) Vee threads (600 or 550 perspective)

(ii) Acme threads (290)

(iii) Square thread (electricity screw)

(iv) Buttress thread (450)

(v) Worm threads (290 - 400)

[d] According to number of start

(i) Single start (maximum not unusual)

(ii) Multi start (2 to 4)

[e] According to fineness of threads

(i) General threads (extensive thread spacing)

(ii) Fine threads (commonly for leak proof)

[f] According to segmentation

(i) Full thread (common)

(ii) Half turns as in half of nut

(iii) Sector thread (in jaw of the lathe)

3. Production of screw threads by means of thread rolling

Thread rolling is achieved via moving work material by using plastic deformation, instead of cutting or separation, with the assist of a pair of dies having identical threads favoured.

Different styles of dies and strategies are used for thread rolling which include,

(i) Thread rolling among flat dies

(ii) Thread rolling between couples of round dies

(iii) Thread rolling through quarter dies

4. Rolling of external screw threads by way of flat dies

The primary precept of flat dies is one die is constant and different die movements parallel in flat rolling dies and those flat dies used in 3 configurations

(i) Horizontal; maximum handy and common.

(ii) Inclined; derives gain of each horizontal and vertical functions

5. Study on dimensions of threads

In an operating system, a process is a job or a program that can be executed by the computer.

5.1 Effect of Surface roughness:- The effect of surface roughness of clean diameter has been studied on dimensions of threads the result. Indicate that the floor roughness affect significantly the dimensions of thread [1]

5.2 Effect of Selected procedure parameters:- It effect of Seleucid system parameter on material float one thread profile in external thread rolling the consequences of the look at show that clean diameter had little impact. While go with the flow sliders, friction aspect horrific full-size impact at the thread root, crest, and the attainable thread height.[2]

5.3 Effect of tensile testing on threads:- It have been investigated that the thread fashioned by using inner thread rolling have as it should be dimensioned threads and advanced floor had been acquired the tensile load capacity of the rolled thread is discovered higher than the thread made by way of reducing method.[3].

6. Manufacturing process of the threads for the adapter

Manufacturing technique is composed three steps to shape the threads at the adapter In first step Turning, Grooving and parting off of the material is achieved on the computerized lathe gadget to shape the substrate fabric. In second step Grinding of blank diameter of substrate cloth is executed on center less grinding device to get the higher floor finish of the fabric before the rolling. In third steps after turning, grooving etc. and grinding the rolling of threads is executed on flat rolling dies to shape the preferred threads at the substrate material.

7 Manufacturing process of the threads for the adapter

Manufacturing technique is composed three steps to shape the threads at the adapter In first step Turning, Grooving and parting off of the material is achieved on the computerized lathe gadget to shape the substrate fabric. In second step Grinding of blank diameter of substrate cloth is executed on center less grinding device to get the higher floor finish of the fabric before the rolling. In third steps after turning, grooving etc and grinding the rolling of threads is executed on flat rolling dies to shape the preferred threads at the substrate material.

Figure 1- Adapter

7.1 Analysis of Defects During Manufacturing Operations

In this evaluation, The defects taken into consideration in the manufacturing of the Coller bolt. The Coller bolt has the subsequent ranges throughout their production. There are degrees at some point of the operation of the threads formation in which the rejection of the material takes place. Following are the two tiers.

7.1.1 Stage -I- In these levels. Turning, Grooving and parting off of the material is accomplished on the automated lathe gadget to shape the substrate cloth. Defects throughout the producing occurs due to the over length, under length, quick duration and huge period of the substrate cloth. On an average here are about 70/72 one/72 defected portions from the 1000 portions of the substrate material.

Table 1 Defected pieces by turning

Number of defected pieces 70/71/72	Number of substrate material 1000

Figure 2 - Automatic lathe machine

7.1.2 Stage-II- Now in this the grinding process earlier than the thread rolling then it'll help to will increase the surface end . There is about eleven/12/13 defected pieces out of one thousand pieces. As given under table 2

Number of defected pieces 11/12/13	Number of substrate material 1000

7.1.3 Stage-III- Now on this level the defects is occurs due to

the thread rolling process. During the rolling system their can be the over length, beneath size , Dent at the threads and Flat threads . On an average there are about thirteen/14/15 defects pieces come out of 1000 pieces of the substrate fabric due to the thread rolling technique

Table 2 defected pieces by rolling process

Number of defected pieces 13/14/15	Number of substrate material 1000

As a end result. From the starting point to the finishing point there are about 90 defected pieces pop out from one thousand quantities of pieces of the fabric. This rejection can be reduced by including the grinding process to the manufacturing operation before the thread rolling system.

7.2 Estimation of fee of the rejected material and grinding operation:-

As referred to above that about 98 - 99 portions are rejected out of 1000 portions and the cost of 1 piece is around 10 rupees so about 980-990 rupees rejection is happened which involve all of the tiers of producing of collar bolts.

It is truly observed that the value of rejection is excessive inside the above operations of manufacturing. The following desk suggests the value of rejection of materials is given under

Table 3 Rejection cost of material during manufacturing process

S.No	Total cost of material	Rejection cost of the material
		Operation

1		10,000	980
2	10,000	990	

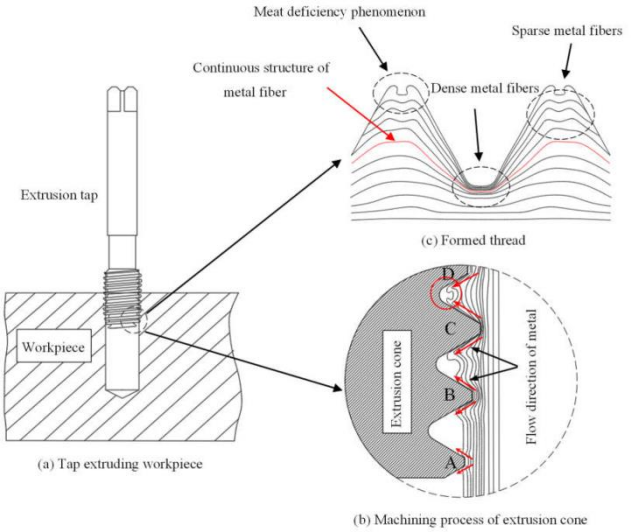

Figure 3 Schematic diagram of thread machining process

Conclusions

The following points may be concluded:

1. Thread form has an effect on the effective strain generated at the root and crest during rolling. For equivalent Unified and ACME thread forms, strain will be higher at the root for the ACME thread while strain at the thread crest will be greater for the Unified thread form. Little difference is predicted to occur along the thread flanks.
2. Friction factor has little impact on thread form or height at low values which are typical of cold forming. At higher values of friction factor, the thread height will decrease. Little effect was found on strain contours at the thread peak or crest as friction factor was varied.
3. The rate of work hardening has an effect on thread height and profile. As the rate of work hardening is increased, the crest profile was predicted to change from a concave to a convex shape. The thread height was also observed to decrease slightly as the rate of work hardening increased.

References

[I] quality Supplants Bid-and-Buy Tradition, Vol. 85, No. 10, Industrial Distribution, October 1996, pp. 10-12.

[2] A Wrigley, Critical times for fastener firms, Am. Met. Market 103 (63) (1995) 4.

[3] PF. Ostwald, 1. Munoz, Manufacturing Processes and Systems, 9th Edition, Wiley, New York, 1997, p. 516.

[4] 1. Schey, Introduction to Manufacturing Processes, McGraw-Hill, New York, 1977, p. 254.

[5] 1.A Martin, Mesh density study for application to large deformation wfdhbwa```FFF rolling process evaluations, in: Fatigue, Fracture, and Residual Stresses, Vol. 373, American Society of Mechanical Engineers, Pressure Vessels and Piping Division, Fairfield, Nj, 1998, pp. 177-184.

[6] 1. Walters, 39th H.R. Bergman Memorial Seminar on Metal Forming Simulation: A State of the Art Overview for Industry, ASM International Milwaukee Chapter, Milwaukee, WI, March 1997, p. 5.

[7] 1.A Martin, Fundamental finite element evaluation of a three-dimensional rolled thread form: modelling and experimental results, in: Fatigue, Fracture, and Residual Stresses, Vol. 373, American Society of Mechanical Engineers, Pressure Vessels and Piping Division, Fairfield, Nj, 1998, pp. 457-467.

[8] lP Domblesky, F Feng, 2D and 3D finite element simulation of external thread rolling, j. Eng. Manuf., Part B, in press.