Mechanical Testing and Diagnosis
ISSN 2247 – 9635, 2015 (V), Volume 2, pp. 18-22

PLANNING THE EXPERIMENTATION TO EXAM DEVIATIONS IN PARAMETERS OF MACHINE/MECHANICAL TAPS (Part II)

D. Angelova*, S. Kartunov*, S.Macuta**

*Technical University, Gabrovo, Bulgaria, *Technical University, Gabrovo, Bulgaria
**Dunarea de jos University of Galati, Romania,

ditka_16@abv.bg, skartunov@abv.bg, silviu.macuta@ugal.ro

ABSTRACT

The paper presents the work drawings of taps M4, M6, M8, M10 and the tolerances of their dimensions. The authors have planned testing a number of experiments and the factors to be examined.

Keywords: *Experimentation, machine taps, dimensions, tolerances.*

1. INTRODUCTION

Taps are used for cutting or calibration of internal threads.

Types of taps and their purpose are grouped bellow:

- **Hand Taps – set**

They are mainly used for manual cutting of threads. Material they are made from is fast-cutting steal with sanded profile of the thread.

For tabs with step to 3mm , two element sets are manufactured and for tabs with steps over 3mm ,three elements sets are manufactured.

- **Machine Taps.** Their main purpose is for machine cutting of threads passage and hollow holes. According to the hole we distinguish three types of taps:

- implementation A, for passage holes with long cutting part,
- implementation B, for passage holes with sloped cutting part,
- implementation C, for hollow holes with short cutting part.

Machine taps with screw grooves. These types of taps are:

- machine tabs type N- with angle of screw line w=15°, which are:

-implementation A, for passage holes with left slope of screw line,
-implementation C, for hollow holes with right slope of screw line;

- machine tabs type W- with angle of screw line w=35°, which are:

-implementation D, for passage holes with left slope of screw line,
-implementation C, for hollow holes with right slope of screw line;

Nut taps. Their use is for serial production for cutting threads in nuts. Taps with right tails are used for cutting threads in nuts with the help of drills and automats.

Tapered taps. They are used is for cutting tapered threads, on hand or machine, wherein cutting is made with all notch.

Taps for trapezoidal threads. They are used for trapezoidal threads in nuts.

The purpose of the current article is to plan the experiment to study the errors of manufacturing tools.

2. TECHNICAL REQUIREMENTS

An experiment is an orderly procedure carried out for the purpose of verifying, refuting, or establishing the validity of a hypothesis. Controlled experiments provide insight into cause-and-effect by demonstrating what outcome occurs when a particular factor is manipulated. Controlled experiments vary greatly in their goal and scale, but always rely on repeatable procedure and logical analysis of the results.

The object of the experiment is the design of taps for machines M4 M6 M8 M10. There are 2 pictures/images of tap drawings with their dimensions which are the input parameters of the experiment.

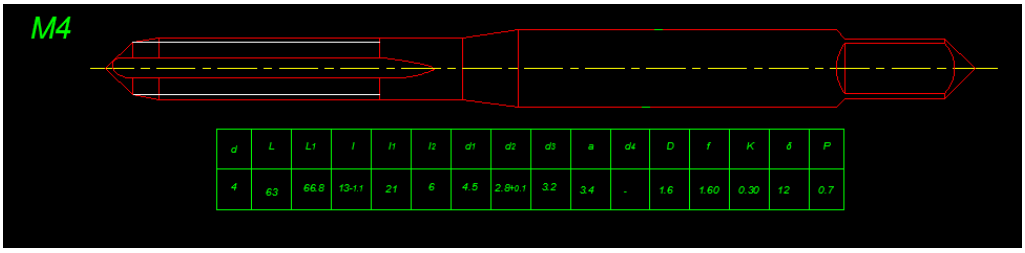

Fig. 1. Drawing of tap: M4

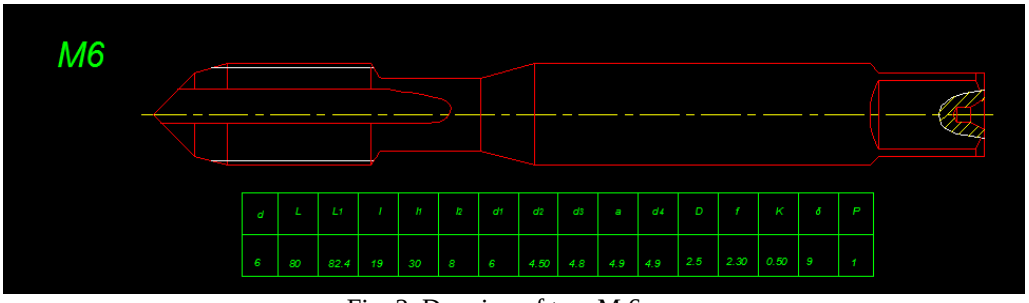

Fig. 2. Drawing of tap: M 6

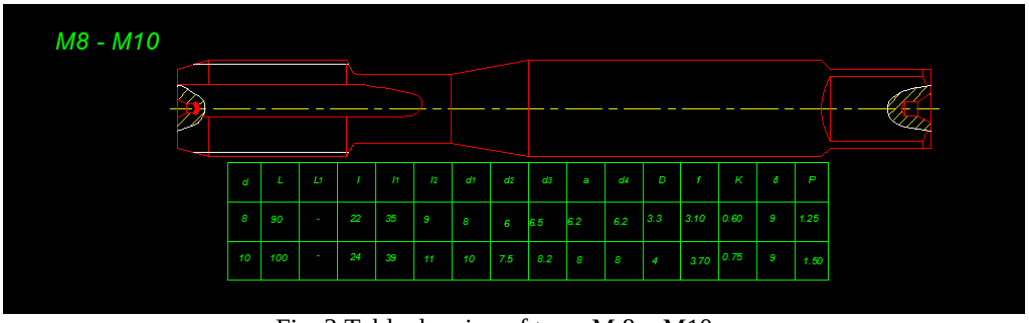

Fig. 3.Table drawing of taps: M 8 – M10

Legend for Fig. 3: L total length of the tap, mm; l – length of the working part, mm; l2 – length of square, mm; d2 – diameter of curvy, mm; d – external diameter of the thread, μm; d – middle diameter of the thread, μm; d – internal diameter of the thread, μm; a (square shape), mm; P - pitch of the thread, mm; D - diameter of the core; d3 – frontal diameter, mm; f - width of the nib, mm; d1 – diameter of the tail.

The authors consider that 8 experiments were enough.

Table1. Dimensions forTap M4

M4	De	Dm	Di	L
	[mm]			
1	4.02	3.578	3.2	63.9
2	4.08	3.586	3.162	63.7
3	4.05	3.59	3.235	63.95
4	4.06	3.574	3.184	63
5	3.98	3.568	3.191	61.5
6	4.08	3.575	3.283	63.5
7	4.03	3.58	3.172	61.4
8	4.04	3.585	3.163	63.1

The tolerances are: de 4.04÷4.08 mm; dm 3.59-0.019 mm; di 3.202 max, mm; L 63±0.95 mm.

The first measurement is an admitted error on the external diameter 4.02, which is thinner, than tolerance and is depending on a not good alignment of the machine. Second and fourth measurements are in tolerance. Third measurement is an admitted error in external diameter 3.23 (tolerance 3.202 max). Fifth measurement is made with short general length 62 (tolerance is 63±0.95, which is dependend on the error of cutting slug), thin middle diameter 3.568 mm (tolerance 3.59-0.019), thin external diameter 3.98 mm (tolerance 4.04-4.08). Sixth measurement is an admitted error with internal diameter 3.22 mm (tolerance 3.202 max). Seventh measurement is made with short general length 61.4 mm (tolerance 63±0.95 mm, which is dependend on the not good alignment of the machine). Eighth measurement is out of the tolerance.

Table 2. Dimension for tap M6

M6	De	Dm	Di	L
	[mm]			
1	6.06	5.385	4.754	80.5
2	6.03	5.39	4.801	78.8
3	6.08	5.4	4.783	80.2
4	6.07	5.405	4.704	79.6
5	6.05	5.37	4.653	79.9
6	6.08	5.39	4.781	80.2
7	6.05	5.40	4.85	80.1
8	6.1	5.405	4.952	80.7

Tolerances: de 6.05÷6.10 mm; dm 5.40-0.024 mm; di 4.868 max, mm; L 80±0.95 mm.

The first measurement is the tolerance. The second measurement is admitted error in external diameter of 6.03 mm (tolerance 6.05-6.10), short general length 78.8 mm (tolerance 80±0.95). Third and fourth measurements are the tolerance. Fifth measurement has thin middle diameter 5.37 mm (tolerance 5.40-0.024). Sixth measurement is the tolerance. Seventh measurement is the tolerance. Eighth measurement is admitted error in internal diameter which is 4.95 (4.868 max tolerance).

Table3. Dimension for tap M8

M8	**De**	**Dm**	**Di**	**L, mm**
	[mm]			
1	8.04	7.251	6.52	90
2	8.03	7.24	6.473	88.5
3	8.05	7.22	6.451	89.5
4	8.08	7.21	6.425	89.4
5	8.09	7.245	6.484	90.2
6	8.1	7.251	6.533	90.2
7	8.05	7.243	6.492	89.5
8	8.02	7.226	6.431	91.5

Tolerances: de 8.05÷8.11 mm; dm 7.25-0.025 mm; di 6.577 max, mm; L 90±1.1 mm

First, fifth, sixth and seventh measurements are in tolerance. Second measurement is with short general length 88.5 (tolerance is 90 +-1.1) and thin internal diameter 8.03 mm (tolerance 8.05-8.11). Third measurement is made with thin middle diameter 7.22 mm (tolerance 7.25-0.025). Fourth measurement is made with thin middle diameter 7.21 mm (tolerance 7.25-0.025). Eighth measurement is made with long general length 91.5 mm (tolerance 90±1.1).

Table 4. Dimensions for tap M10

M10	De	Dm	Di	L
	[mm]			
1	10.05	9.08	8.202	101.2
2	10.07	9.09	8.253	100.4
3	10.06	9.095	8.213	90.8
4	10.06	9.075	8.181	90.5
5	10.08	9.055	8.154	100.5
6	10.1	9.06	8.172	100.4
7	10.07	9.084	8.143	98.5
8	10.09	9.09	8.147	90.9

Tolerances: de 10.06÷10.13 mm; dm 9.09-0.028 mm; di 8.286 max, mm; L 100±1.1 mm.

First, second, third, fourth and eighth measurements are in tolerance. Fifth measurement is made with thin middle diameter 9.055 mm (tolerance 9.09-0.028). Sixth measurement is made with thin middle diameter 9.06 (tolerance 9.09-0.028). Seventh measurement is made with short general length of 98.5 mm (tolerance 100±1.1 mm).

3. CONCLUSION

1. The final of all types of taps and their purposes is presented. Four types of taps and their work drawings have been selected.

2. Eight experiments have been made for the four more often mistakes in the measurements of deviations in taps dimensions.

REFERENCES

[1] Angelova D., Kartunov S., 2014, Analysis of technological mistakes in making thread – processing instruments, *Proceedings of the 23th International Scientific and Technical Conference Automation of Discrete Production Engineering ADP*, Sozopol – Jun 2014, ISSN 1310–3946, p. 237.
[2] Angelova D., Kartunov S., 2014, Planning of the experimentation to exam deviations in parameters of machine/mechanical taps. InRaDMI 2014 Topola Serbia.