How cost-effective is your tapping process?

The following three examples provide some illuminating figures arising from a comparison of the costs of conventional tapping operations with the costs of tapping on a machine with torque monitoring and accurate thread depth control. All three examples show that the capital cost of a modern machine can be recovered within a few months. When used for several years, the use of this modern machine results in substantial savings

Large and medium production series

A cost example of the conventional production process

The target cost for a small aluminium casting part is € 20,00. Production is to run at the rate of 10.000 parts per month. Among other features, the part has a blind hole to be tapped M4

	Material cost €	Labour cost €	Machining cost €	Tool cost €
Raw material	2,00			
Finishing		1,00	1,00	
Mill, drill, chamfer, deburr		7,00	7,00	
Tapping		0,04*	0,04	0,006**
Cleaning		0,50		
Quality control, packing and despatch		0,50		

(*) = placing part in fixture manually, 5 second cycle -> 720 parts/hour at € 30,00 /hour labour cost (complete)

(**) = € 30,00 per high-grade thread tapping tool, tool life 5.000 parts under optimum conditions

Assumption

Of 10.000 parts per month only 0,5% will have a guide hole too short, too small or at an angle ® tool breakage!

The scrap rate will therefor be 50 parts per month.

Evaluation of production loss per month?

50 parts at	18,46 €	923,00 €
50 broken taps at	30,00 €	1.500,00 €
50 set-up sessions At = 5 hourstool setter's time	50,00 €	250,00 €
Loss / month		**2.673,00 €**

Problem solution

Thread tapping machine microtap II-G5

Capital cost € 8.600,00 incl. quick tool change system / with 5 inserts (M1 – M6)
Which effect does this capital investment have?
Threads are tapped under the following conditions

- torque is monitored -> tool breakage is eliminated
- the spindle is counterbalanced -> optimum tool life is attained
- quality is controlled -> depth is measured to +/- 50 mm
- technical evolution -> increasing know how

Amortisation of capital investment within **2,7 months**

Cost savings over one year

Production loss	Total	Capital cost	**Profit in one year**
12 * 2.673,00 €	32.076,00 €	8.100,00 €	**23.976,00 €**

Production loss prevention minus capital cost

Small production series

A cost example of the conventional production process

After all machining, a comparatively large part made of V2A-steel, Titanium or Inconell has a value of € 100,00. The last operation is the tapping of 10 metric M2 threads (blind holes). Because of the toughness and hardness of the material, on average 5 % of the taps break during tapping. The required production is 200 parts per month. The daily production rate is 10 parts. The number of holes tapped per month of 20 working days is therefore 200 x 10 = 2000

Assumption

10 parts/day = 200 parts/month = 2000 tapping operations/month

At 5 % tap fractures when tapping M2 in high-tensile materials, 100 tapping operations result in 5 seized or broken taps per day. Because of the high value of the part, broken taps are removed, the parts are eroded

Evaluation of loss per month?

100 broken taps at	30,00 €	3.000,00 €
100 erosion operation at	50,00 €	5.000,00 €
100 set-up times at 6 min. = 10 h at tool setter's time	50,00 €	500,00 €
Loss / total		**8.500,00 €**

Problem solution

Thread tapping machine **microtap II-G5**
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Which effect does this capital investment have?
Threads are tapped under the following conditions

- torque is monitored -> tool breakage is eliminated
- the spindle is counterbalanced -> optimum tool life is attained
- quality is controlled -> depth is measured to +/- 50 mm
- technical evolution -> optimum quality

Amortisation of capital investment within 1,1 months

Cost saving over one year

Captial costs	Production loss prevention 12 x	Total	**Profit in one year** (Production loss prevention)
8.600,00 €	8.500,00 €	102.000,00 €	**93.400,00 €**

(Production loss prevention minus capital investment)

Advantages and cost savings via automatic quality control during the tapping process

A part is to be tapped with M6 in blind holes (2x)

Material:	9sMn28 (mild steel)
le depth:	2xD = 12 mm
Value per part:	€ 40,00
Tool:	high grade tapping tool à € 60,00
Parts/month:	1000 parts = 2000 threads
Quality requirements:	Depth must be accurate to +/- 0,1 mm by gauge. Red part of gauge must screw into tapped hole by no go gauge (more than “0” / Zero degrees angle)

Measurement of the torque Mz required for tapping, as a function of the diameter Dv of the guide hole, gave the following results

Dv (mm)	Mz	Gauging result	Remark
4,9	280 Ncm	ok	
5,0	200 Ncm	not ok	
5,1	170 Ncm	not ok	red side screws in ½ turn
5,2	140 Ncm	not ok	red side screws in 2 turns

Quality control is normally carried out by sampling finished parts by means of a thread depth gauge. The pitch of an M6 thread is 1 mm per turn. As the desired thread depth is 12 mm, the black side of the gauge must be screwed in 12 mm. Dimensional accuracy is normally checked by the customer via sectioning of samples of received parts. As a result, whole batches are frequently rejected

To what can the financial loss per month amount to?

Quality control during a production series (every 10th part per 100 is checked)	9 minutes per 100 parts 90 minutes per month 1,5 hours =	 75,00€
customer`s rejects -> complete batch 1000 parts is returned -> recontrol, recovery of good parts	1 batch per year rechecking 1.000 parts 900 min. 15 h/year 750,00 € per month	 62,50 €
Due to unrecognised tapping tool wear amounts the production loss 10 parts until the problem is recognised and the tool is exchanged , 10 replacement taps	per month 10 x 40,00 €	 400,00 €
Of 100 parts, one is drilled either to small or at an angle - the tapping tool breaks.	of 100 parts 1 x set-up time - 6 minutes 1 x part – unusable per month 60 minutes= 10 parts	 50,00 € 400,00€
10 tapping tools	60,00 € / each	600,00 €
Reject costs per month		**1.587,50 €**

Problem solution

Thread tapping machine **megatap II-G8**

Capital cost € 12.500,00 incl. quick change system / 6 inserts M2 – M10

Features: Automatic quality control plus reduced tool wear

- By presetting torque Mz min = 180 Ncm and Mz max = 220 Ncm, the control unit automatically reports pilot hole diameter larger than 5,05 mm (the torque drops below 180 Ncm); or smaller than 4,95 mm, (the torque rises above preset maximum of 220 Ncm) - the machine reverses in either case out of the pilot hole. - Damage to the tapping tool is impossible. The automatic tapping machine megatap II-G8 monitors automatically the applied torque and the preset thread depth.
- Quality control is assured via the given tolerances, by cutting with a torque of between 180 and 220 Ncm and a monitored thread depth of 12mm +/- 50 mm.
- Inspection of finished parts = not required
- Scrap = not possible
- Tool breakage = eliminated
- Technical evolution = increasing know how

Amortisation of capital investment within 7,8 month!

Capital cost	Production loss prevention	
12.500,00 €	1.587,50 €	**7,4 months**

Cost savings over one year:

19.050,00 €	6.550,00 €	**profit 1st year**
	19.050,00 €	**profit 2nd year**

Thank You for your attention!