

Comparison of precision collet chuck and hydraulic expansion technology for finishing milling in steel 42CrMo4

1) Experimental setup

Toolholder:		TENDO Platinum	Tool holder	ER 32 precision collet chuck	
		Hydro-expansion technology	Clamping principle	Collet chuck technology	
		Ø 12 mm	Clamping diameter	Ø 12 mm	
		85 mm	Cantilever length L1	75 mm	
		0204054	ID-number	1349166	
		ca. 350,- €	Acquisition cost	ca. 200,- € (toolholder + collet)	
Tool:	Cutting material: VHM with TAX (titanium aluminium nitride) coating Design: 6-cutter, unequal division				
Workpiece:	Material: 42CrMo4 (1.7225), tensile strength ca. 800 N/mm ² Pre-machining: bar section 148x148x70mm, scale removed				

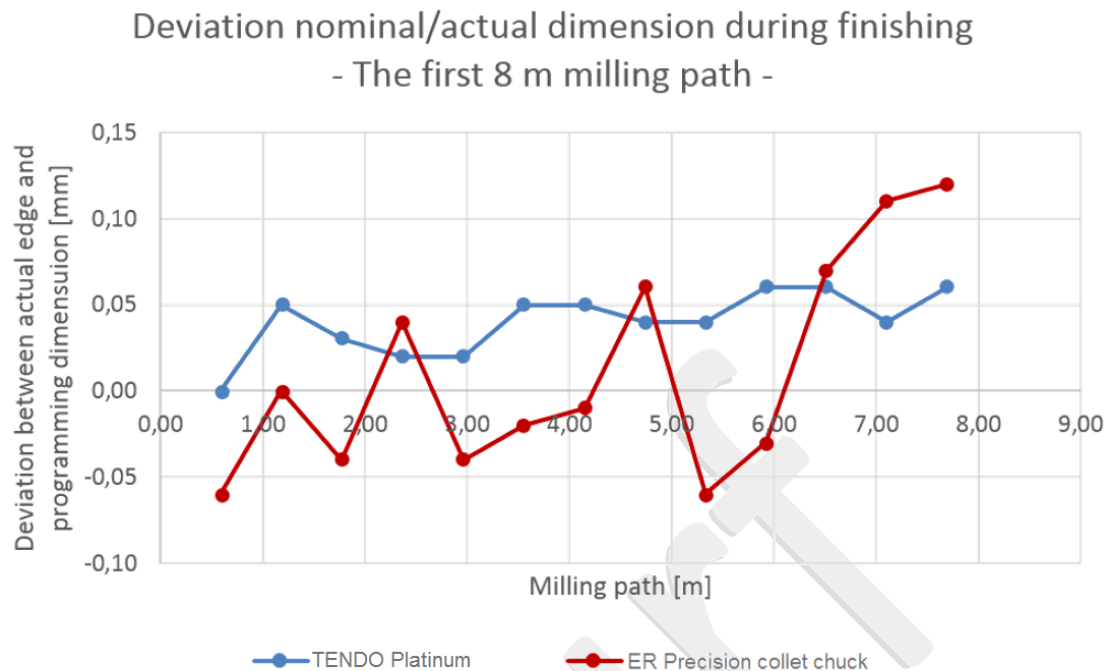
2) Test execution

Processing:	Processing	Depth-adjustment ap	Lateral delivery ae	Vc	n	fz	vf
		[mm]	[mm]	[m/min]	[U/min]	[mm/Schn.]	[mm/min]
	Jacket milling- Roughing	25	0,2	210	5563	0.11	3671
105 m are milled per workpiece. After machining, the surface roughness produced is measured using the stylus method. The remaining web width is measured with a micrometer to determine the difference between the nominal and actual dimensions. The tools are not corrected.							

3) Test results

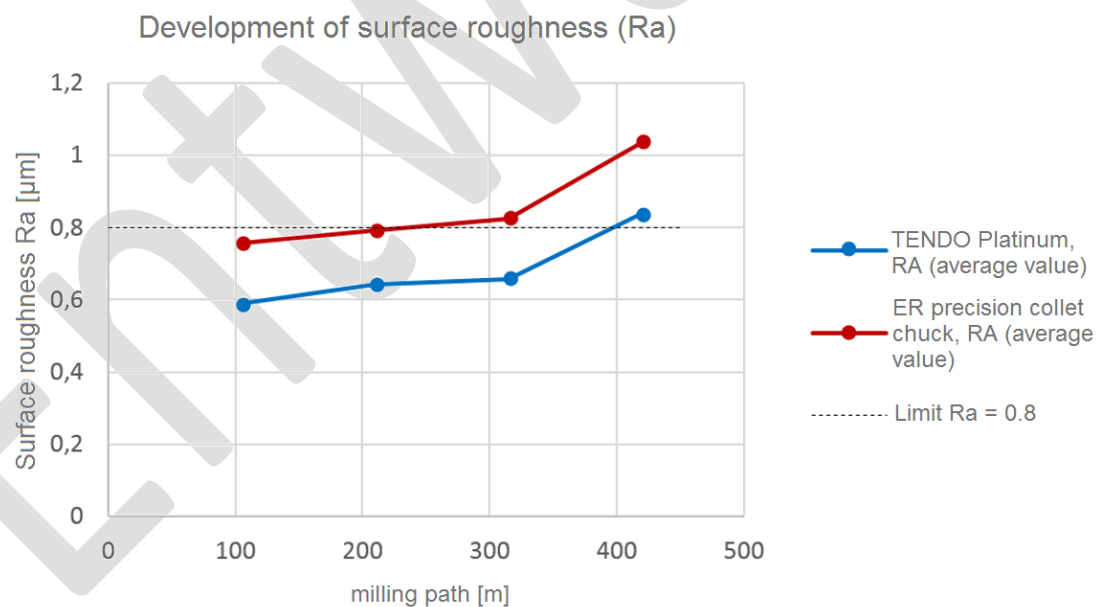
Setup process:	Comparison of set-up times for milling tests:		
	Working step	TENDO Platinum [sec]	Precision collet chuck [sec]
	Clamping process	10	25
Time saving:	Set-up time reduction of approx. 60 % through the use of hydraulic expansion technology. After approx. 800 set-up processes, the lifetime costs with the TENDO Platinum are lower than with the ER 32 precision collet chuck.		
Break-Even:	Saving of set-up costs by approx. 500 € , considering the service life, achieved with a calculated cost rate of 40 €/h.		

Development of dimensional accuracy



During the first 8 m milling path, the actual dimension generated with the TENDO Platinum changes by a maximum of 0.06 mm. When using the ER precision collet chuck, a dimension change of up to 0.22 mm can be fixed.

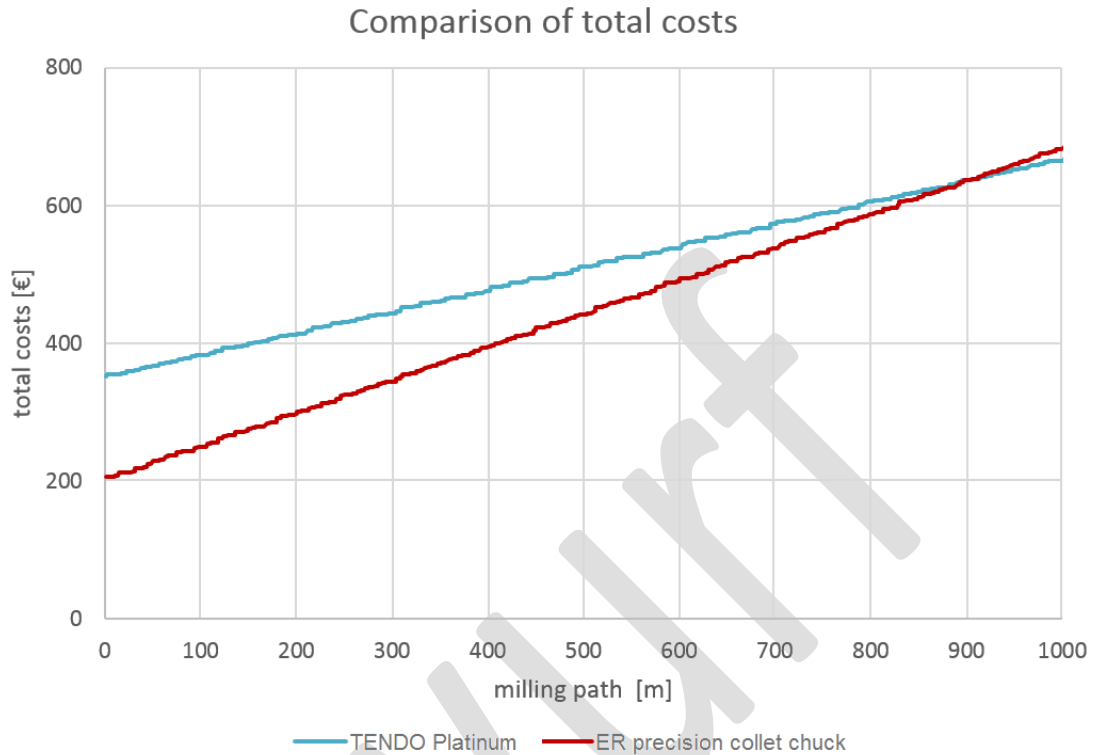
Development of surface roughness



Tool life increased by approx. 50 % through the use of the hydraulic expansion chuck. The surface roughness of $Ra = 0.8 \mu\text{m}$ is achieved with the hydraulic expansion toolholder TENDO Platinum after approx. 380 m, whereas with the ER precision collet chuck it is achieved after approx. 250 m.

4) Cost consideration

Total costs:



Break-Even:

From a milling distance of approx. 900 m, the total costs of the TENDO Platinum hydraulic expansion toolholder are lower than those of the ER precision collet chuck. This corresponds to approx. four worn tools in the ER precision collet chuck and three tools in the hydraulic expansion chuck.