254 SMO®
Machining Guideline

The aim of this machining guide is to be an introduction to fabricators machining in 254 SMO®. The machining parameters in this guideline will work under normal machining conditions.

Machining superaustenitic stainless steel

High alloyed superaustenitic stainless steels, such as Outokumpu 254 SMO®, are generally more to difficult to machine than conventional austenitic stainless steels, e.g. Outokumpu 4404. Due to the high strength and the high alloying content of 254 SMO®, the cutting forces will be higher and the tool wear more severe than that experienced when machining lower alloyed stainless steel grades. Even under optimized conditions the tool life when machining 254 SMO® is shorter than that obtained when machining in lower alloyed stainless steel grades.

- Ensure a stable setup – Higher cutting forces compared to standard austenitic grades
- Use sharp tools in order to generate less heat and minimize work hardening
- Coolant – Less heat results in a longer tool life

Machinability ranking

The machinability of different stainless steel grades can be illustrated by a machinability ranking. This ranking, where a higher figure means better machinability, is based on a combination of test data from several different machining operations. The ranking shows that 254 SMO® is more difficult to machine than 4404 and that the machinability decreases with increasing alloy content. Please note the relative ranking of steel grades and that the scale is very different between Cemented Carbide CC and High Speed Steel HSS tools which is demonstrated in the tables below.

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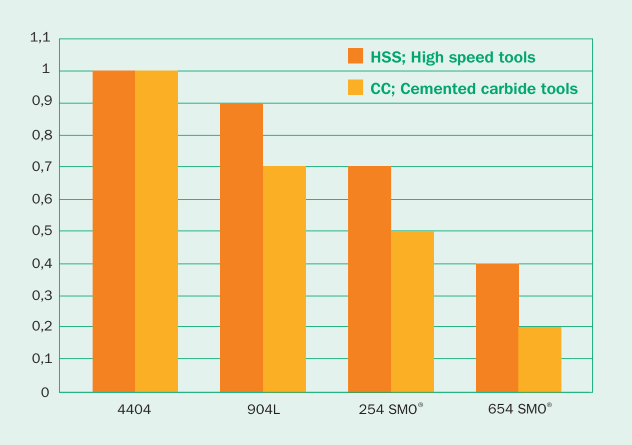

Turning

- The machine and setup must be rigid
- Use carbide grade M20-M25 or P20-P25
- Always use coolant
- Use smallest possible nose radius to avoid vibrations

	Cemented carbide		HSS
	Roughing	Finishing	Finishing
Cutting speed v_c (m/min)	60-80	80-110	12-19
Feed f_z (mm/rev)	0.3-0.6	0.05-0.3	0.05-0.2
Depth of cut a_p (mm)	2.0-5.0	0.5-2.0	0.5-2.0

Cutoff turning

- The machine and setup must be rigid
- Always use coolant
- Use carbide grade M20-M25 or P20-P25

	Cemented carbide	HSS
Cutting speed v_c (m/min)	30-50	10-14
Feed f_z (mm/rev)	0.08-0.10	0.05-0.08

Milling

- Use shortest possible tool length
- Avoid cutting through holes/cavities
- Ensure good chip evacuation. Recutting of chips may cause tool damage

	Cemented carbide		HSS	HSS
	Roughing	Finishing	Slot milling	Face milling
Cutting speed v_c (m/min)	40-60	60-80	12-15	6-8
Feed f_z (mm/tooth)	0.2-0.4	0.1-0.2	0.01-0.07	0.1
Depth of cut a_p (mm)	2-5	1-2		0.1xD

D = cutter diameter (mm)

Drilling

- Always use coolant
- If possible use internal coolant through the drill
- Stable setup is very important when drilling through holes

	Cemented carbide	HSS
	Indexable drill	Twist drill
Cutting speed v_c (m/min)	80-120	5-10
Feed f_z (mm/rev)	0.08-0.12	0.04-0.25

Threading

- Use of a plunge infeed normally gives the best result
- For internal threading reduce the cutting speed by about 30%
- Use coolant

	CC	HSS	HSS
	Single point	Single point	Tapping
Cutting speed v_c (m/min)	40-60	8-13	3-5
Number of passes	7-12	10-16	

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