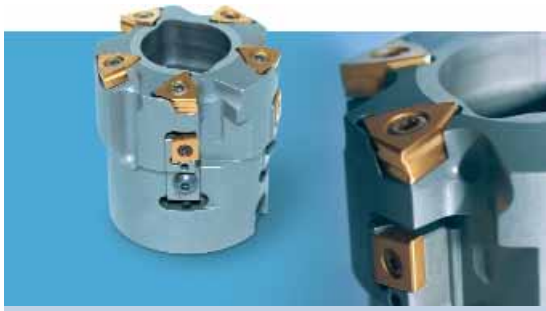


The cylinder bores in cylinder crank cases with ø70.2 mm and 130 mm stroke of a GG25 4-cylinder engine are pre-machined on a transfer line.

The TSW tools used are in modular design with 5 inserts and held in a precision ground adaptor. In addition to the fixed step with the roughing inserts with six cutting edges, the tools have a further, adjustable tangential insert with two cutting edges for an integral semi-finishing operation.

ø	70.2 mm
v_c =	80 m/min
v_f =	280 mm/min
a_p =	3 mm

Tool life per insert:

4,800 engines =
9,600 bores

Cylinder bore
Cylinder crank case

Material: Grey cast iron 25
4-cylinder engine

The pre-machining of the cylinder bores of a CGI 6-cylinder engine is carried out with a TSW tool with six inserts on a machining centre.

Because of the considerable reduction in machining time compared to the machining with the previous tool, so much additional capacity was produced and made available that the operation of the hone clearance could be transferred to the machining centre from another machine.

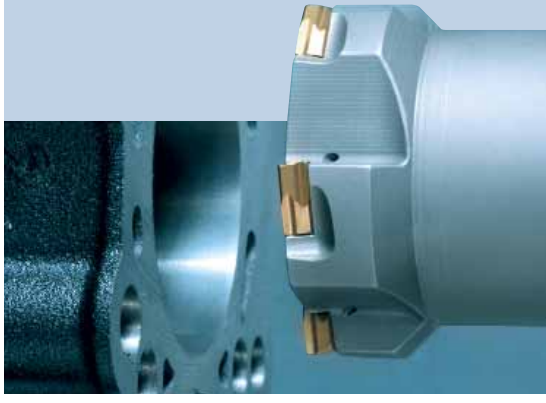
ø 80 mm		
	MAPAL	Competition
v_c [m/min]	110	100
v_f [mm/min]	1,005	470

Machining time saved

1 minute

Cylinder bore
Cylinder crank case

Material: CGI
6-cylinder engine



Cylinder bore Cylinder block

Material: SGI60
Diesel locomotive

	Cutting material	No. of steps	No. of inserts per step	v_c (m/min)	v_f (mm/min)	Diameter (mm)	Tool life (engines)
Pre-mach. 1	Carbide uncoated	3	4	100	80	312.5+325+338	3
Pre-mach. 2	Carbide uncoated	2	4	100	60	334.6+337.5	3
Finish mach	Carbide uncoated	1	8	50	80	335 H7	12

The SGI60 cylinder blocks for a diesel locomotive are machined with MAPAL tangential tools. Approximately one ton of material is cut away of the cast material with dimensions of 3.40 x 1.50 m.

Roughing is carried out by two multi-stepped tangential roughing tools with four inserts each. Tool no. 1 drills out the rough casting by 20 mm in the diameter in two steps and rough machines the diameter of the sealing surface. Tool no. 2 carries out the finishing operation for the stop shoulder and access for the liner. The second step rough machines the actual location for the cylindrical liner.

Both tools are in modular, lightweight design. The inserts sit in cartridges and can be replaced individually.

A radially adjustable tangential fine boring tool with eight inserts finish machines the location diameter for the cylinder liner. Despite the large projection length (325 mm) and the relatively "small" ISO50 adaptor, the fine boring tool achieves a tool life of 30,000 mm.

Cylinder bore Brake housing

Material: SGI50
Rail vehicle

Diameter (mm)	No. of inserts	Depth of bore (mm)	a_p (mm)	n (1/mm)	v_c (m/min)	f_z (mm)	v_f (mm/min)
178.2	8	141.5	0.5	350	200	0.2	560

The cylinder bores of a SGI50 brake housing are finish machined with a tangential fine boring tool ø178.2 mm. Requirements to the machining result were a maximum roughness depth < 10 µm and a contact area > 50 %.

With the modular tangential fine boring tool a maximum roughness depth of 4.5 – 8 µm is achieved. The contact area is between 60 – 80 %. In this example, the conventional boring, facing and final flex honing could be omitted by the application of the TFB tools.