SANDVIK
Coromant

CoroDrill® 880

Non-ferrous materials in focus

TREND:
Less Weight Means Less Fuel

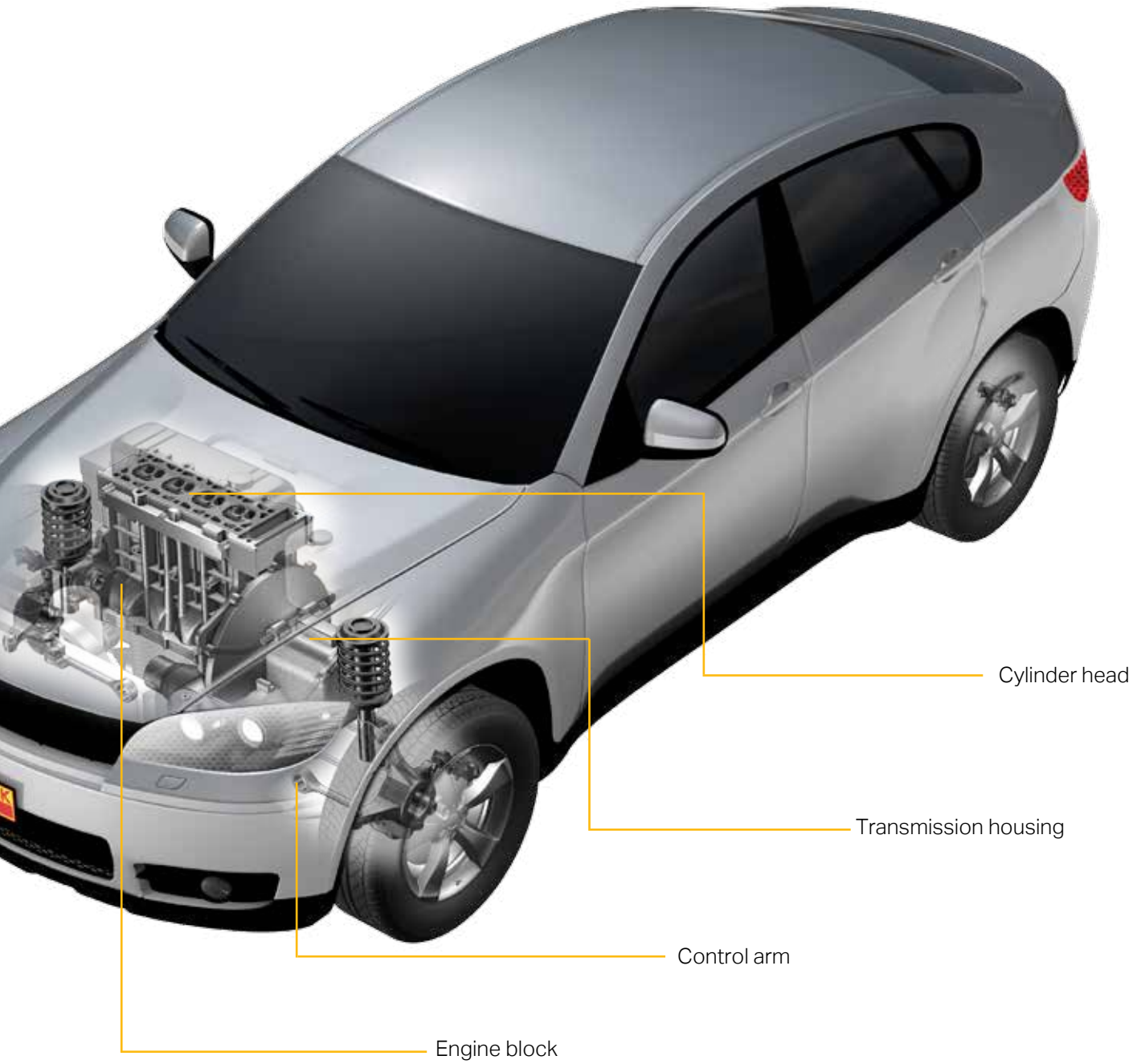
Since it takes less energy to accelerate a lighter object than a heavier one, lightweight materials offer great potential for increasing vehicle efficiency. A ten percent reduction in vehicle weight can result in a 6–8 percent fuel economy improvement. Replacing cast iron and traditional steel components with lightweight metals, such as aluminum alloys or carbon fiber and polymer composites, can directly reduce the weight of a vehicle's body and chassis by up to 50 percent and, therefore, reduce a vehicle's fuel consumption.

Aluminum

Non-ferrous materials contain soft metals with hardness under 130 HB, except for high strength bronzes (>225HB). Aluminum is one of the metals that belongs to this category. Pure aluminum is soft, ductile, corrosion-resistant and has a high electrical conductivity. When applied to an automotive body structure, it provides weight savings of up to 50 percent compared with the traditional mild steel structure. Such weight savings allow other vehicle systems to be downsized, including the engine, transmission, suspension and wheels.

Machinability of aluminum

- Machined aluminum exhibits a tendency to adhere to the cutting tool, which leads to build-up edge, poor surface finish and cutting tool fracture.
- Relatively easy chip control, if alloyed
- Cutting forces, and thus the power required to machine, are low
- Cast Al-Si alloys are abrasive, and over-eutectic Al-Si alloys with Si content over 12% are very abrasive



Exchanging traditional steel components with aluminum components provides up to 50% weight reduction

Did you know?

Aluminum can be recycled continuously with no loss of its qualities. Aluminum recycling benefits present and future generations by conserving energy and other natural resources. It requires up to 95 percent less energy to recycle aluminum than to produce primary metal and thereby avoids corresponding emissions, including greenhouse gases.

With the Strength of a Diamond

Making holes in aluminum can be a challenging task. Aluminum is difficult to drill because its ductility and softness cause the material to make constant prolonged contact with the cutting edges of a drill. The built-up edge that is generated by the adhering aluminum makes chip formation and evacuation difficult.

CoroDrill® 880 CVD diamond-coated insert grades N124 and N134 are specifically designed for demanding drilling in non-ferrous materials. This is where the insert coating combines the super hardness of a real crystalline diamond, providing long insert tool life. Together with chip breaker designs and a unique geometry, these inserts guarantee a superior performance in non-ferrous materials.

"It's great to see how CoroDrill® 880's optimized center and periphery geometries, combined with dedicated diamond-coated grades for each insert position, deliver not only outstanding tool life and productivity but also an impressive ability to handle sticky, non-ferrous metals. This really makes these tools all-around solutions in non-ferrous metal applications."

Gustav Grenmyr, Senior R&D Engineer

3 facts about CVD diamond coating:

1. CVD diamond is a synthetic diamond grown by the CVD (chemical vapor deposition) technique.

Benefits

- Low cost per hole due to long-lasting insert tool life and/or productivity increase
- Productivity increase due to reduced machine downtime with fewer insert changes
- Easier handling in production due to the reliability of the inserts and longer insert tool life
- Good hole surface finish resulting from great resistance to built-up edge

Application area

Automotive industry: Drilling and boring in aluminum components such as cylinder blocks, cylinder heads, knuckles, housings, brake calipers, control arms, transmission cases, steering column covers and yokes.

Niche composite applications such as drilling GFRP rotor/wind mill blades.

Assortment

Insert grade	Insert type	Insert size	Geometry
N124	Peripheral insert	1–9	MS
N134	Central insert	1–9	LM

2. CVD diamond coating is grown directly on the insert substrate and is essentially a pure diamond formed as interconnected diamond microcrystallites with no binder.

3. CVD diamond has all the extreme chemical and physical properties of natural diamond and high-pressure, high-temperature (HPHT), synthetic diamond.

Customer cases

In these customer cases, we have compared current, uncoated insert grades with the new CVD diamond-coated insert grades.

Case 1: Front control arm

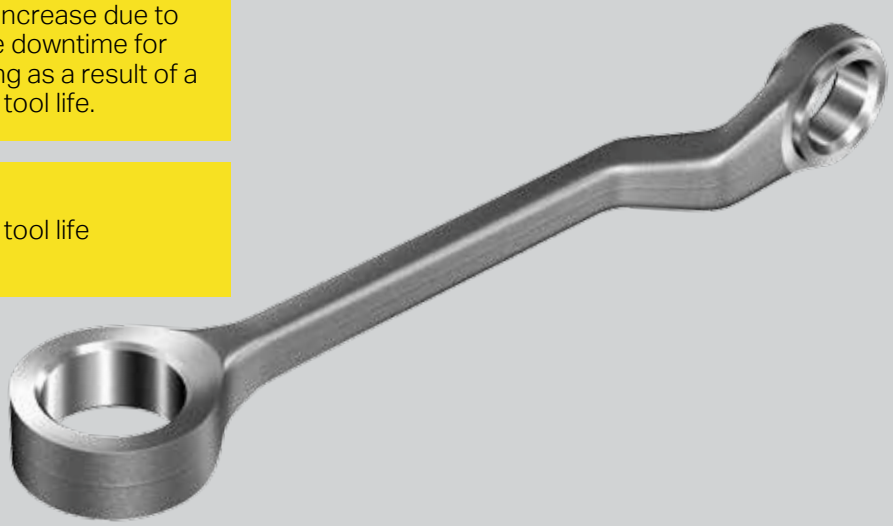
In this particular case, a through hole drilling operation was performed for machining of a front control arm.

Results for the CVD diamond-coated inserts:

17% lower hole cost per component

10% productivity increase due to less machine downtime for insert indexing as a result of a longer insert tool life.

10 times longer insert tool life



Tips: Increase your cutting data for even better results!

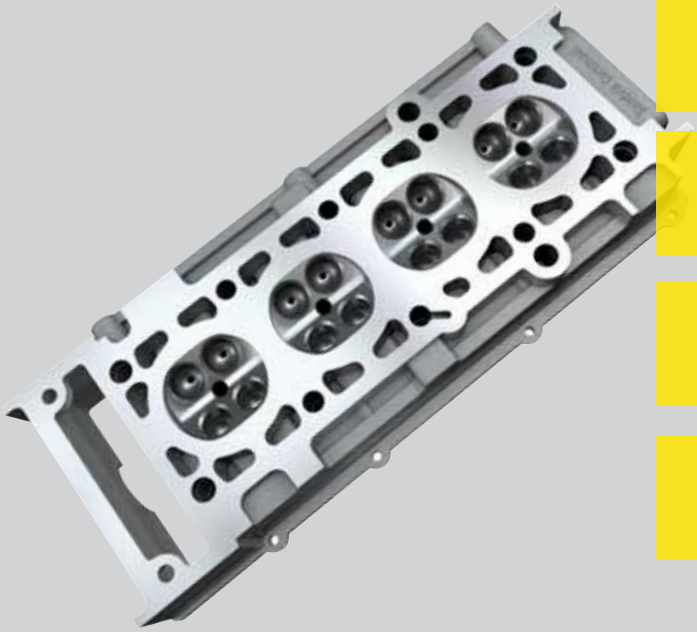
Industry	Automotive
Operation	Through hole drilling
	Hole diameter; depth, mm (inch): 22.5; 20 (0.886; 0.787)
Workpiece material	AlSi1Mg-T6 (N.1.3.C.AG), 150 HB

	CVD diamond-coated insert grades	Present insert grades
Central insert	88004 03 05HCLM N134	88004 03 05HCLM H13A
Peripheral insert	88004 03 W07HPMS N124	880-04 03 W07H-P-LM H13A
Cutting data		
v_c m/min (ft/min)	459 (1506)	459 (1506)
v_f mm/min (in/min)	1.625 (.064)	1.625 (.064)
f_n mm/rev (in/rev)	0.25 (.010)	0.25 (.010)
Insert tool life, pcs.	30,000	3,000

Case 2: Cylinder head

Blind hole drilling operation was performed during machining of a cylinder head component.

Results for the CVD diamond-coated inserts:



23%	lower hole cost per component
+332%	insert tool life
+33%	productivity increase
300 h	saved production time per year

Tip: Maximize the output of your machine by combining long tool life and higher cutting data.

Industry	Automotive
Operation	Blind hole drilling
	Hole diameter; depth, mm (inch): 22; 84.1 (0.866; 3.31)
Workpiece material	Aluminum 6061-T6 (N.1.3.C.AG), 90-100 HB

	CVD diamond-coated insert grades	Present insert grades
Central insert	88004 03 05HCLM N134	88004 03 05HCLM H13A
Peripheral insert	88004 03 W07HPMS N124	880-04 03 W07H-P-LM H13A
Cutting data		
v_c m/min (ft/min)	276 (905)	207 (679)
v_f mm/min (in/min)	0.60 (.024)	0.46 (.018)
f_n mm/r	0.15 (.006)	0.15 (.006)
Insert tool life, pcs.	3,024	700

More about CoroDrill® 880

The CoroDrill® 880 range features indexable insert drills from 12 to 84 mm (0.472–3.307 inch) in diameters with drill lengths of 2, 3, 4 and 5 × DC. The large variety of geometries and grades makes it easy to find the right and optimized solution for most materials.

With the generous Tailor Made offer, it is possible to order intermediate diameter and length combinations as well as different connection types and sizes such as HSK, Coromant Capto® and cylindrical shank.

As a Tailor Made option, it is also possible to design your own step and chamfer drill especially made for your component.

Engineered solution

If your component requires special features which our standard or Tailor Made program cannot offer, there is always a way of solving your challenges by letting us help you to develop your own engineered solution.

ISO application area

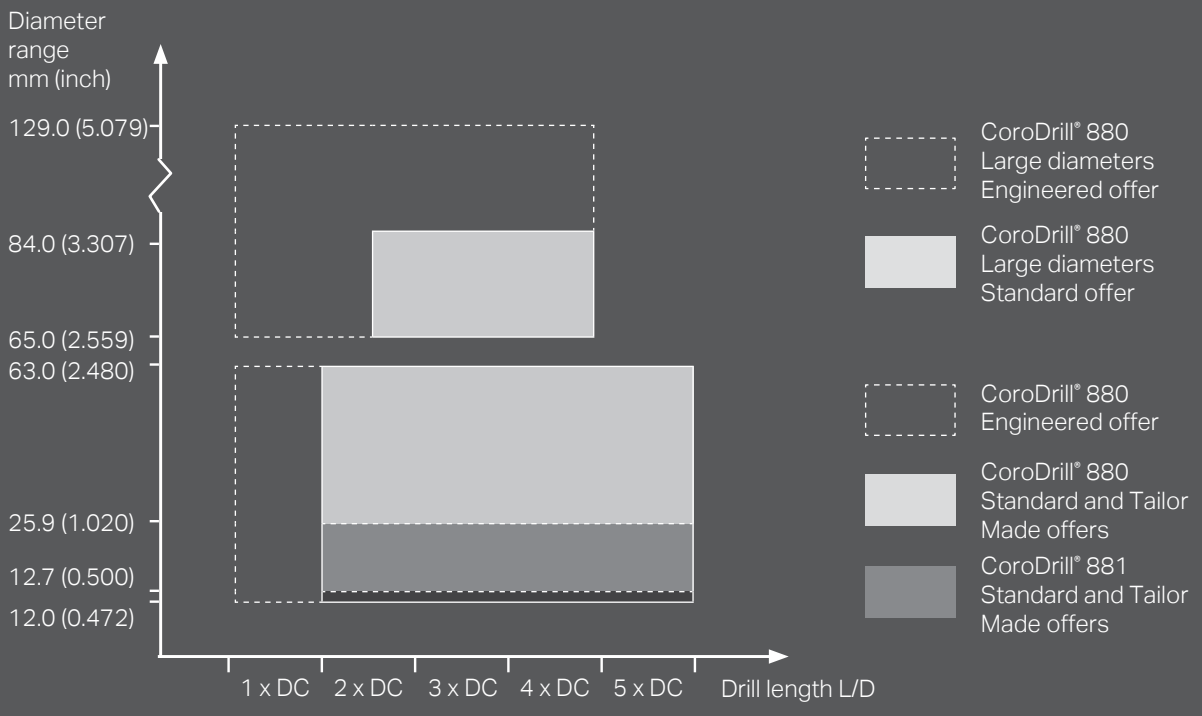
P M K N S H

Features and benefits

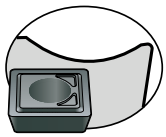
- Optimized inserts featuring geometries and coatings for high performance in most materials
- Wiper geometry for great surface finish and high-feed machining possibilities
- Optimized chip channels for accelerated chip evacuation
- Excellent chip control and chip evacuation as a result of an optimized flute design

Different drilling concepts

- For hole diameters 12.00–63.50 mm (0.472–2.500 inch), use CoroDrill® 880 indexable insert drill
- For hole diameters 65.00–84.00 mm (2.559–3.307 inch), use CoroDrill® 880 indexable insert drill for large diameter holes
- For a complementary product for unstable conditions and non-rotating applications, use CoroDrill® 881

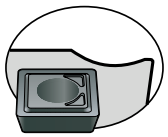


Insert geometries



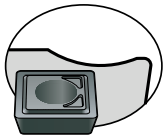
-LM, -MS

- Low to medium feed
- Light cutting
- Excellent chip control in long-chipping materials
- -LM: First Choice for long-chipping materials
- -MS: Sharp edge geometry optimized for stainless steel and non-ferrous metals



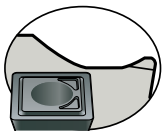
-GM

- Low to medium feed
- Light cutting
- Excellent chip control in feed area
- Low deflection



-GR

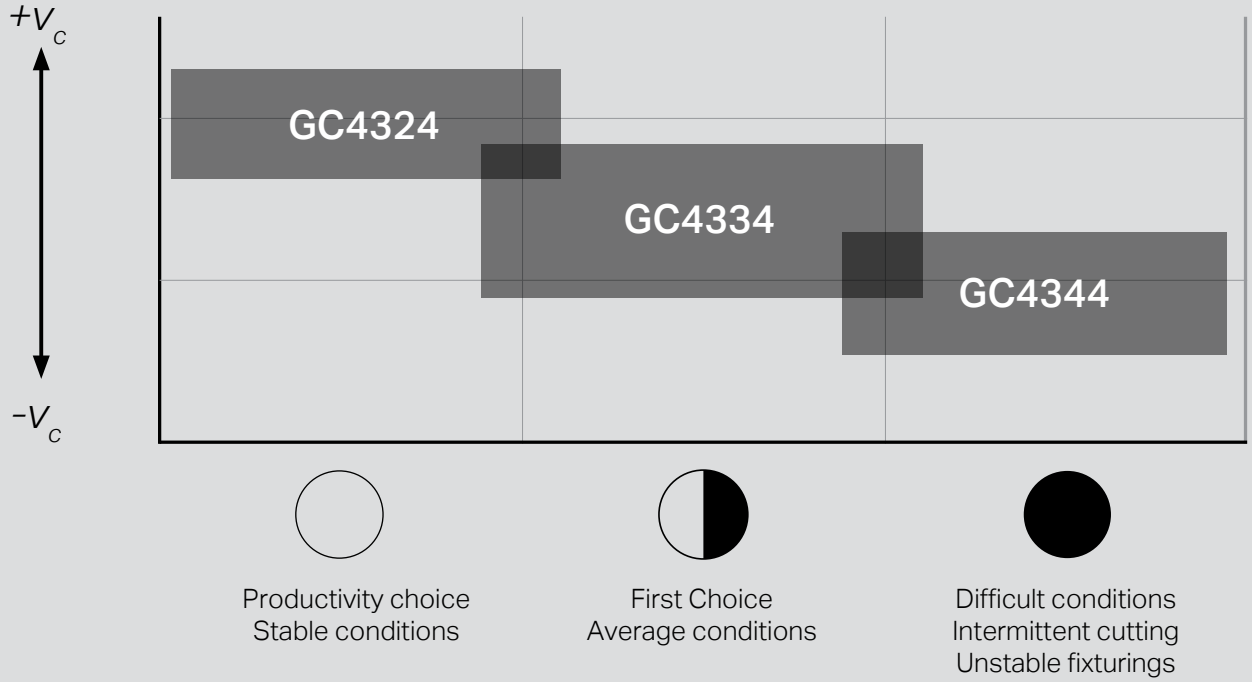
- Low to high feed
- Strong reinforced edge
- Good chip control in high feeds



-GT

- Low to high feed
- Very strong reinforced edge
- Good chip control in most materials
- First Choice for unstable conditions and interrupted cuts

Peripheral insert grade positioning in ISO P and ISO K



Choose the right insert and grade combination

	First Choice		Complementary choice	
	Center insert	Peripheral insert	Center insert	Peripheral insert
P Low-carbon steel	-LM 1044	-LM 4334	-LM 1044	-LM 4324 -LM 4344
P Low alloy steel	-GR 1044	-GR 4334	-GR 1044	-GR 4324 -GR 4344
M Stainless steel	-LM 1144	-MS 2044	-LM 1044	-LM 4344
K Cast iron	-GR 1044	-GR 4334	-GR 1044	-GR 4324 -GR 4344
N Non-ferrous metal	-LM N134	-MS N124	-LM H13A	-LM H13A
S HRSA	-LM 1044	-LM 4344	-LM 1144 -LM H13A	-MS 2044 -LM H13A
H Hardened steels	-GM 1044	-GM 4344	-GR 1044	-GR 4344

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