

Composite

product solutions



In cooperation with



Composite machining

– a programme for improved competitive performance and results



Sandvik Coromant and Precorp

.... products and support are aimed at giving a wide range of engineered and standard solutions. These include cemented carbide, diamond-coated and PCD vein tools adapted for hole-machining tools, surface- and edge-machining tools.

The joint forces of Precorp specialist technology and back-up along with Sandvik Coromant tooling and application-centre support provide composite-component manufacturers for the aerospace industry with unequalled support.

Machining solutions dedicated to specific composite materials as well as operations and demands are becoming an increasingly important competitive factor.

Sandvik Coromant offers tool solutions designed to improve the manufacturing process when machining composite and metallic stack materials in hand held, power feed and CNC machines.

The best solutions and support

....are the success factors for today`s machining of composite components. Tool developments and customized designs, along with application support, play vital roles in finding the best answer to how components should be machined.

Sandvik Coromant and Precorp offer solutions and support from dedicated application specialists globally, along with application centres where research of composite materials and machining strategies are developed.

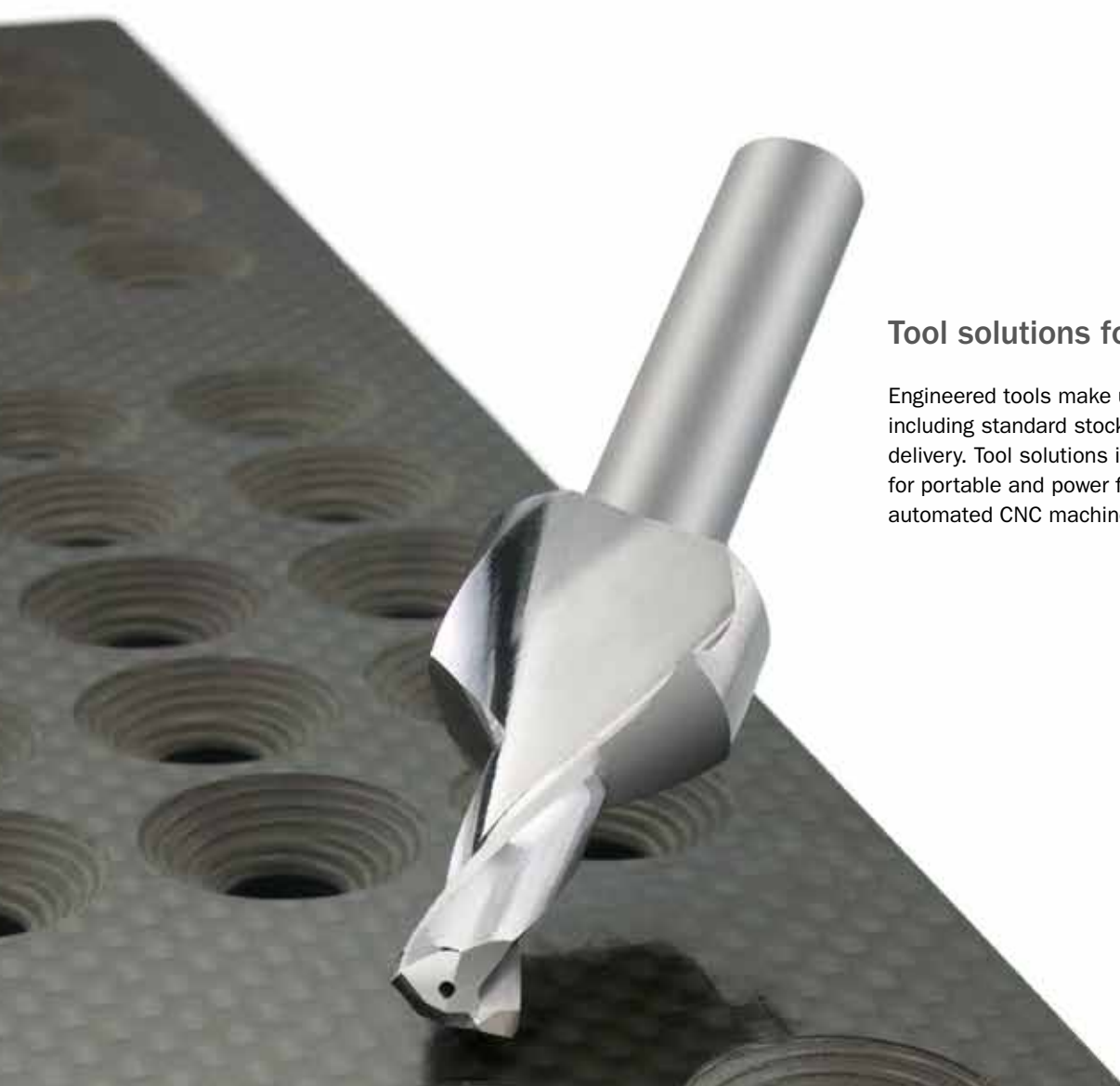


Obtaining quality in composite machining

Quality control along with achieving good security and productivity levels are the drivers in tool selection. Sandvik Coromant and Precor diamond coated and PCD-vein technology drills have been developed as dedicated solutions to suit various material and set-up applications.

PCD vein, diamond coated and reamers have been designed with unique geometries developed for optimizing different applications such as the unique CoroDrill 859V PCD vein geometry.

For surface machining, the offer includes indexable milling cutters with diamond (PCD) inserts such as the CoroMill 590. CoroMill Plura, the range of products for edging includes coated carbide as well as diamond (PCD) tipped cutters with compression design. To remove fasteners, a collar cutter is available and helps to speed up repair work of aircraft structure.



Tool solutions for every machine

Engineered tools make up part of the solutions including standard stocked tools with next day delivery. Tool solutions include dedicated tools for portable and power feed machines as well as automated CNC machines.

Hand held drilling

- CFRP

*Smooth hole exit -
low thrust geometry*



CoroDrill 452.1-C H10F

- Portable hand drilling of CFRP materials
- Geometry optimized for unidirectional and woven CFRP's (such as M21E and BMS8-276)
- Low thrust force due to unique geometry design (split point)
- Smooth drill exit due to left hand helix on right hand drill
- Good hole quality due to sharp cutting edges
- Expected hole tolerance: +/- 0.025 mm (+/-0.0010") using drill bushing
- Standard stocked from diameter 2.5 to 12.7 mm (0.098"- 0.5")
- Other dimensions available as made to order

*Close tolerance holes -
precision step-reamer*



CoroDrill 452.R-C H10F

- High precision reaming of CFRP materials
- For CFRP only and stacked materials with material CFRP on exit
- For applications with high demand on accuracy and surface finish
- Low thrust force design improving hole quality
- Expected hole tolerance +/- 0.010 mm (+/- 0.0004") with drill bushing
- Standard stocked from diameter 4.17 to 12.7 mm (0.164"-0.5")
- Other dimensions available as made to order

*Accurate countersinking - PCD
cutting edge and
carbide pilot.*



CoroDrill 452.C-C H10F

- Single edge PCD countersink tool
- Accuracy and consistency with PCD cutting edge
- Predictable performance using carbide pilot
- Standard stocked from pilot diameters 4.143 to 12.68 mm (0.163-0.499") with 100 and 130 degree chamfer angles
- Other dimensions available as made to order



H10F = uncoted carbide

- CFRP metal stack (Ti/Al)

CoroDrill 452.1-CM and 452.4-CM H10F

- Portable hand drilling of CFRP-metal stack materials
- For aluminium, titanium and stainless steel materials
- Accurate holes using double margin flute design and self centering drill point
- Non pilot version (452.1) and piloted version (452.4)
- Low thrust force design reducing burr on exit
- Expected hole tolerance +/- 0.025 mm (+/- 0.0010") with drill bushing
- Standard stocked items from 2.5 to 12.7 mm (0.098" to 0.5")
- Other dimensions available as made to order

CoroDrill 452.R-CM H10F

- High precision reaming of CFRP and metal stack materials
- For applications with high demand on accuracy and surface finish
- Low thrust force design improving hole quality
- Expected hole tolerance +/- 0.010 mm (+/- 0.0004") with drill bushing
- Standard stocked from diameter 4.17 to 12.7 mm (0.164"-0.5")
- Other dimensions available as made to order

Pilot design reducing thrust forces



Pilot design reducing thrust forces



Close tolerance holes - precision step-reamer



Cutting data

Application	Material	V_c		f_n	
		m/min	ft/min	mm/rev	inch/rev
Drilling/reaming	CFRP	60	197	0.08	0.0031
	CFRP/Aluminium	60	197	0.08	0.0031
	CFRP/Titanium	20	66	0.05	0.0020
	Aluminium	60	197	0.08	0.0031
	Titanium	15	49	0.05	0.0020
Countersink	Stainless steel	15	49	0.05	0.0020
	CFRP	60	197	0.08	0.0031

CFRP= Carbon Fiber Reinforced Plastic

Power feed

- CFRP drilling

85 PT series CD10 PCD vein drill

- Specially designed for power feed machines
- Shielded diamond design for a stable drilling process in power feed applications
- Available with coolant through coolant
- Available as made to order from diameters 3-16mm (0.124"-0.625")

8F85 series H10F or N20C

- Carbide drill point designed for power feed applications
- Generates good hole exit quality in demanding UD and woven materials
- Reduction of splintering and delamination due to upsharp 8 facet point geometry
- Available with coolant through coolant
- Available as made to order from diameters 3-25.4mm (0.124"-1")



Back-end couplings – shank design

- All drills and reamers can be made to fit various machine designs with multiple thread couplings available.
- Shank designs available for all tools designed for the powerfeed applications.

Cutting data

Application	Material	m/min	ft/min	mm/rev	inch/rev
Drilling/reaming	CFRP	60	197	0.06 - 0.15	0.0023 - 0.0059

- CFRP (Ti/Al) drilling

86 PT series CD10 PCD vein drill

- Designed for power feed machines and metal stack materials
- Shielded diamond design for a stable drilling process in power feed applications
 - 86PTA : CFRP/aluminium stack
 - 86PTB : CFRP/titanium stack
- Available with through coolant, recommended for stacked materials
- Available as made to order from diameters 3-16mm (0.124"-0.625")

40DH series H10F or N20C

- For power feed applications using carbide tool design
- Designed for metallic stack applications (aluminium and titanium)
- Optimized chip evacuation with unique flute design
- Available as made to order from diameters 3-16mm (0.124"-0.625")

PD – D2WM series H10F or N20C

- Carbide drill point designed for power feed applications and metal stacked materials, optimized for larger holes
- Strong flute design with maximum chip evacuation due to optimized flute form
- Double margin to improve roundness accuracy and stability
- Available as made to order from diameters 3-25.4mm (0.124"-1")

Reamers

- PCD and carbide reamers made to order.
- Design depending on application and material including stacked materials (titanium and aluminium)
- Multi-flute designs: 4-6 flutes
- Through coolant available and directed onto cutting edges.

Cutting data

Application	Material	m/min	ft/min	mm/rev	inch/rev
Drilling/reaming	CFRP/Aluminium	60	197	0.13	0.0051
	CFRP/Titanium	18	59	0.03	0.0012

CNC drilling

- CFRP

PCD vein technology resulting in accurate holes



CoroDrill 859V: CD10 vein PCD

- For CNC automated drilling of CFRP materials
- Optimized for uni-directional materials (such as M21E) as well as epoxy and BMI resins
- Good performance on CFRP's with coatings such as fibre glass, copper etc.
- Sharp PCD vein drill geometry for optimal hole quality
- Unique double angle geometry reducing delamination on demanding materials
- Available as made to order in diameters 3-16 mm (0.125"-0.625")

85 series: CD10, N20C or H10F

- For CNC automated drilling of CFRP materials
- All-round drill with a 4-facet point geometry for various CFRP materials such as BMS8-276
- Sharp cutting edges for improved hole quality
- Available as carbide with diamond coating or vein PCD
- Available as made to order in diameters 3-16 mm (0.125"-0.625")

Clean hole exit due to upsharp cutting edges



CoroDrill 856: N20C

- For CNC automated drilling of CFRP materials
- Designed for unidirectional and materials with high epoxy resin content as well as BMI resins
- Reduced risk for delamination and splintering
- Optimized double angle carbide geometry design with diamond coating (N20C)
- Standard stocked from diameter: 4-12.7 mm (0,157"-0.5")



Cutting data

Application	Material	m/min	ft/min	mm/rev	inch/rev
Drilling/reaming	CFRP	60-135	197 - 443	0.06 - 0.15	0.0023- 0.0059

H10F = uncoted carbide
N20C = Diamond coated (CVD)
CD10 = PCD vein technology

- CFRP metal stack (Ti/Al)

86A and 86B series: CD10 (vein PCD)

- For CNC automated drilling of CFRP – metal stack materials
- Designed for demanding CFRP and aerospace aluminum and titanium material combinations reducing burr and fibre breakout
- PCD vein drill technology
- 86A : CFRP/aluminium stack (118° point)
- 86B : CFRP/titanium stack (135° point)
- Available with through coolant (recommended)
- Available as made to order in diameters 3-16 mm (0.125"-0.625")

40DH series: N20C or H10F

- For CNC automated drilling of CFRP – metal stack materials
- Carbide drill point designed for CFRP and aerospace aluminum and titanium material combinations
- Stable tool life in aluminium stack combinations and works well in titanium stack combinations
- High productivity drill - high speed and feed applications
- Great chip evacuation due to 40° helix
- Available with through coolant (recommended)
- Available as made to order in diameters 3-16 mm (0.125"-0.625")

- CFRP and CFRP aluminium stack

CoroDrill 854: N20C

- For CNC automated drilling of CFRP and aluminium stack materials
- Reduced risk for splintering and delamination in high fibre content materials with spur point geometry
- Reduced burr formation on exit in aluminium materials
- Carbide drill with diamond coating (N20C) for improved performance
- Standard stocked from diameter: 4-12.7 mm (0.157"-0.5").

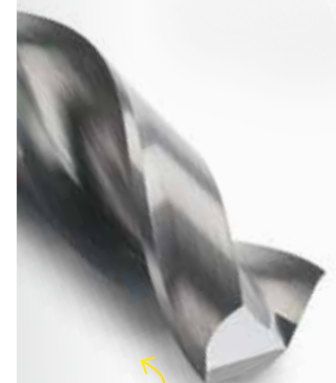
Durable process with vein PCD technology



Great chip evacuation 40° helix



Clean cut fiber using spur point design



Cutting data

Application	Material	m/min	ft/min	mm/rev	inch/rev
Drilling/reaming	CFRP/Aluminium	60	197	0.13	0.0051
	CFRP/Titanium	18	59	0.08	0.0031

Edge milling

- CFRP

CoroMill Plura S215...

- Made to order in diameters 8-16 mm 0.315"-0.625" and 2-8 flutes
- Different geometries
 - Compression helix design
 - Thicker CFRP
 - Equal geometry is needed for both sides
 - Low helix design
 - +5 degree when bottom surface is most important
 - -5 degree when top side is most important and down forces are important
 - Different grades
 - 1610, 1630 to maintain sharp edges
 - N20C diamond coated for longer tool life in CFRP not require ultra sharp edges
 - PCD brazed for long tool life and best surface finish

CoroMill 329

- Standard product in diameter 100-160 mm 4"-5" and width 2-5 mm 0.118"-0.197"
 - when machine spindle is not in line with component
 - used for larger cut off

Cutting data

Application	Material	m/min	ft/min	mm/rev	inch/rev
Milling/edging	CFRP	200-500	656-1640	0.02 - 0.04	0.0008 - 0.0016

- Surface milling in CFRP

CoroMill 590

- Standard product in diameters 40 mm 1.5" and up
- PCD and uncoated H10 grades
- High accuracy with micro adjustment
- Light cutting face mill cutter
- Steel and aluminium cutter body designs
- Indexable PCD inserts with high precision tip-seat for accuracy

CoroMill 390

- Standard product in diameters 12-125 mm 0.5"-5"
- PCD, uncoated H13A and coated 1010 grades
- 11 and 17 insert size
- Large radii offer
- For sculptured surfaces using sturtz method

Orbital machining in CFRP

* **Solution to be offered as special**

- Carbide orbital machining cutters
- Also available as PCD vein edge design
- For CFRP, aluminium and titanium stacked material combinations

* Special - contact Sandvik Coromant for more information.

Cutting data

Application	Material	m/min	ft/min	mm/rev	inch/rev
Milling/surface milling	CFRP	300 - 500	984 - 1640	0.40 - 0.60	0.0157 - 0.0236
Orbital machining	CFRP/Aluminium	60	197	0.13	0.0051
	CFRP/Titanium	18	59	0.08	0.0031

Composite center
Utah, USA

Composite center
Sheffield, UK

Composite center
Nagoya, Japan

Composite center
Shanghai, China

Composite center
Orleans, France

Composite center
Bremen, Germany

Global support

Whether you are a large company or a small business you can always be sure we are just a phone call away. Our composite centers and trained application specialists can support you in making sure you get the most out of your production facility. With global strength behind local support your demands set our standards.

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Your success in focus