

POWER GENERATION
TOOLS & SOLUTIONS FOR THE POWER INDUSTRY

SECO 



TOOLING SOLUTIONS FOR POWER GENERATION COMPONENTS

High quality precision engineering demands premium tools. At Seco we understand the specific challenges of the power generation industry and we have the know-how to keep your production at the leading edge of this competitive segment.

We provide optimized machining solutions and cutting tools for your specific requirements. Seco technology is available worldwide through a network of Technical Centres and power generation machining specialists.

TURBINE BLADES

The hostile conditions under which turbine blades operate places severe demands on the materials from which they are made. This in turn demands exceptional performance from the cutting tools designed to handle the machining of these critical components; particularly blades exposed to the full effect of the hot gas stream. We have the tools and machining strategies to fulfill all the expectations of manufacturing engineers engaged in this type of production.



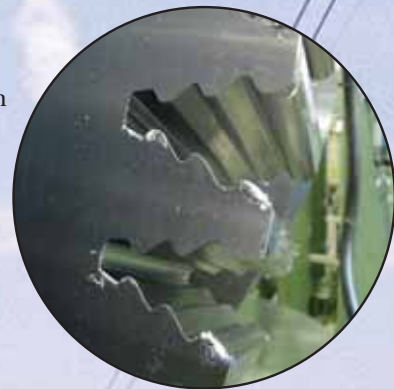
IMPELLERS



We closely follow developments in 3 and 5 axis machining and associated computer support technologies. These technologies have enabled major advances in the cost effective manufacture of fully machined impellers and rotor hubs. New machine technologies are inseparable from new cutting tool technologies and we provide a full range of tooling and machining strategies to realise even the most demanding and advanced aspects of producing these types of component.

FIR TREE ROOTS

The machining of vane and blade fir-tree roots involves the production of highly customised tooling to compliment the processes that have been developed to ensure both quality and consistency of the finished product. We have the knowledge and expertise to work alongside you to increase throughput and explore new machining strategies. New carbide grades, geometries and designs are continually evolving and finding their place in this specialised area of machining.



BUSINESS SOLUTIONS

Manufacturing power generation components is not all about tools and materials. It is also about efficient component production, controlling tooling inventories and reducing all other costs.

This is where Seco's Component Engineered Tooling, Secopoint tooling dispensing and Productivity Cost Analysis systems offer many advantages to the manufacturing process.

DESIGNED FOR POWER GENERATION



MINIMASTER Our Minimaster range gives you more than 800 different combinations between heads and shanks.



FIR-TREE CUTTERS With our solid carbide fir-tree root cutters we offer a wide range of complete solutions to maximize your turbine rotor production.



PULL-BROACHING is the fastest way to produce slots in turbine discs and with our solutions using indexable carbide inserts the cutting speed can be increased four fold; productivity will be doubled and no more tooling regrinding operations will be required.



ROUND INSERTS High productivity in roughing operations with an easy to handle 4-index round inserts.

TOOLING SOLUTIONS



TURBINE BLADE

Material	X22CrMoV12-1		
Operation	Roughing		
Tool	Cutter: R220.42-0040-05.4A Insert: ODHT050412TN-M10, 620470		
Cutting data	v_c	300 m/min	f_z 0,32 mm/t
	a_e	Variable	a_p 2 mm
	v_f	3000 mm/min	
	n	2400 rev/min	
RESULT	High metal removal		



TURBINE BLADE

Material	X22CrMoV12-1		
Operation	Finishing		
Tool	Cutter: R217.69-1616.0-06.4A Insert: XOMX060208R-M05, F40M		
Cutting data	v_c	450 m/min	f_z 0,125 mm/t
	a_e	3 mm	a_p 0,4 mm
	v_f	4500 mm/min	
	n	9000 rev/min	
RESULT	With this solution it is possible to avoid solid carbide cutters and the regrinding cost		



TURBINE BLADE (PLATFORM)

Material	X22CrMoV12-1		
Operation	Semi-finishing		
Tool	Cutter: Special Inserts: Standard + Specials		
Cutting data	v_c	270 m/min	f_z 0,2 mm/t
	a_e	0,5 mm	a_p Variable (1-30 mm)
	v_f	2000 mm/min	
	n	5000 rev/min	
RESULT	Long tool life and replacing the regrinding operation		



TURBINE BLADE (PLATFORM)

Material	X22CrMoV12-1		
Operation	Finishing		
Tool	Cutter: Minimaster Inserts: Special conical heads		
Cutting data	f_z	0,25 mm/t	a_e 0,4 mm
	a_p	0,5 mm	
	v_f	5000 mm/min	
	n	10000 rev/min	
RESULT	Replacing the regrinding operation, Heads with Radius from 2 to 8 mm, High Speed Machining		




TOOLING SOLUTIONS




TURBINE BLADE ROOT MACHINING

Material	Jethete			
Operation	Semi-finishing			
Tool	Standard + Specials			
Cutting data	v_c	420 m/min	f_z	0,18 mm/t
	a_e	0,8 mm	a_p	variable (1 to 15 mm)
	v_f	5000 mm/min		
	n	9000 rev/min		
RESULT	Semi-finishing and finishing in one operation 60% less in machining time 40% less production cost			



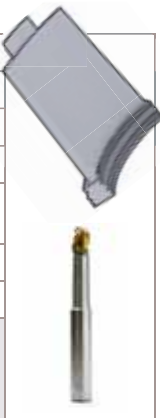
FIR-TREE PROFILES FINISHING

Material	Steel			
Operation	Finishing (Side-entry profile)			
Tool	Cutter: Specials solid carbide cutters			
Cutting data	f_z	0,06 mm/t	a_e	0,6 mm
	a_p	total profile depth		
	v_f	235 mm/min		
	n	1300 rev/min		
RESULT	Machining time and major cost reduction, Excellent surface finishing ($R_a = 0,8$), Machining 1 stage with one cutter (1 set-up)			



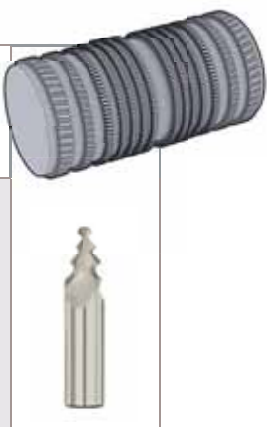
TURBINE BLADE PEELING

Material	X20Cr13			
Operation	Semi-finishing and finishing			
Tool	MM16-16019-B90A30-E06, F30M			
Cutting data	v_c	420 m/min	f_z	0,18 mm/t
	a_e	0,8 mm	a_p	Variable (1 to 15 mm)
	v_f	5000 mm/min		
	n	9000 rev/min		
RESULT	Semi-finishing and finishing in one operation 40% less in machining time 35% less production cost			



FIR TREE PROFILES ON TURBINE ROTORS

Material	Steel			
Operation	Roughing to finishing			
Tool	Cutter: Custom design solid carbide cutters			
RESULT	Drastic reduction in machining time Cost reduction			

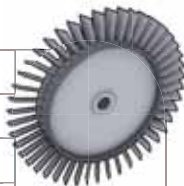


TOOLING SOLUTIONS



PULL BROACHING – DOVETAIL PROFILE

Material	Steel		
Operation	Roughing/Semi-finishing		
Tool	Cutter: Special pull-broach		
Cutting data	v_c	60 m/min	
RESULT	Long tool life 50% less in machining time 50% less in production cost No regrinding/indexable carbide inserts solution instead of HSS		



SHROUDED IMPELLERS

Material	17.4-PH stainless			
Operation	Semi-finishing Plunging strategy			
Tool	Cutter: Special Insert: XOMX120420TR-ME08, F40M			
Cutting data	v_c	140 m/min	f_z	0,12 mm/t
	a_p	1-3 mm		
	v_f	320 mm/min		
	n	900 rev/min		
RESULT	Step removal (left from the roughing plunging operation)			



SHROUDED IMPELLERS

Material	17.4-PH stainless			
Operation	Plunging strategy			
Tool	Cutter: R220.79-0063-16.4A Insert: APKT160408PDTL-M14, F40M			
Cutting data	v_c	140 m/min	f_z	0,14 mm/t
	a_p	10 mm		
	v_f	400 mm/min		
	n	700 rev/min		
RESULT	High metal removal			



WIND TURBINE ROTOR

Material	Cast Iron		
Operation	Finishing boring		
Tool	Cutter: Jumbo bridge D = 750 mm Insert: CCMT09T304-F1, TK2000		
Cutting data	v_c	200 m/min	
	n	85 rev/min	
	f	0,1 mm/rev	
	a_p	0,4 mm	
RESULT	Concentricity and tolerances		



TOOLS DEDICATED TO PRODUCTIVITY



MILLING

Innovation has always been an integral part of Seco's milling range and all areas of power generation machining can benefit from our expertise in carbide grade development, coating technologies, edge geometries, cutter body design and application knowledge.

Cutters for helical interpolation, steep ramping, face milling, square shoulder, plunge milling, high speed machining and many more are available along with the advice needed for their successful application.

TURNING

Always viewed as an area of machining with a long and traditional history turning has, in recent years, undergone some radical changes. Our Duratomic coating technology offers a new level of toughness and wear resistance in the same grade, with more versatile grades, a wider range of applications and a greater flexibility in cutting data.

We work with our customers on a daily routine of ensuring that only the very latest in turning technology is committed to the power generation industry.



HOLEMAKING

The Seco holemaking range has expanded rapidly over the last few years and provides all the tools and technology needed in power generation manufacturing. The key to power generation machining is in achieving the correct balance between the cutting edge, grade and geometry and the material being machined.

On the smaller diameters this is provided in the Feedmax range, and in the larger diameters Seco Crownloc and Perfomax drills meet all the demands for accuracy and performance. Bifix, Precifix and EPB complete the picture for reaming and boring operations.

40,000 STANDARD PRODUCTS

TOOLING SYSTEMS

Tooling systems must always reach the highest levels of accuracy and quality to be really effective. The Seco EPB range of draws on years of experience in producing some of the world's most advanced spindle tooling.

A full range of solid and modular systems are available in all the common taper types and they are complemented by EPB boring heads that meet the stringent demands required by power generation manufacturing. The increasingly popular concept of shrink grip and shrink release tool holding is now provided by Seco's Easy Shrink system.



CUSTOM TOOLING

Our power generation customers often test our capabilities by exhausting all the numerous possibilities available in our standard range and then continuing to press for novel solutions. We welcome these challenges and turn them into an opportunity to try out new ideas or modify existing solutions which can often result in completely new product ranges.

We can offer you access to the whole of the Seco knowledge base and manufacturing capability to discuss, design, develop and produce your own unique solution to a manufacturing problem.

ENGINEERED SOLUTIONS

We have a global network of engineers specifically assigned to supporting your local projects. We can offer advice concerning tooling set-up, project documentation and definition of machining strategies.

We are also able to offer Seco Technical Education Programmes which are designed to encourage your engineers to actively participate in the rapid advances that are being made in this dynamic and fast growing industry.



OPTIMIZING PRODUCTION

Premium tooling solutions are just one part of the equation – Seco Tools also offers training, technical support and innovations designed to streamline your production costs and maximize your productivity. By working in partnership with our customers we are often able to achieve significant improvements in productivity, efficiency and quality.

COMPONENT ENGINEERED TOOLING – OPTIMIZED PRODUCTION

Our Component Engineered Tooling engineers can provide turnkey solutions for any type of component manufacturing scenario. After analysing all the pieces of the puzzle, they will put together the best elements to make sure you are working in the most cost effective way.



SECOPOINT – THE INDUSTRY’S MOST INNOVATIVE DISPENSING TECHNOLOGY

SecoPoint is an advanced web-enabled point-of-use tool management and dispensing system. It helps you to control, track and manage tooling inventories and usage.

PCA – THE ‘GPS’ SYSTEM OF THE PRODUCTION PLANT

Seco Tools computer based PCA (Productivity and Cost Analysis) system enables measurement, control and management of manufacturing processes.

Using the system, we take a wider view of your manufacturing methods, focusing not only on the tooling costs, but the total cost of production.



Evaluations conducted in a wide range of industries using PCA have shown that reductions in total cost of 15-30% and improvements in productivity of up to 40% are achievable.



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