



GCX LINEAR

GEAR UP FOR SKIVING

Gear power skiving is revolutionising the gear manufacturing process. It is 5~10 times more efficient than shaping, more flexible than broaching and can produce both internal and external gears.

In 2019, there are twice as many companies looking to invest in new skiving equipment than in 2018. The rising popularity of skiving has caused a surge in demand for skiving cutters. Responding to the market, ANCA brings a complete solution for manufacturing and sharpening skiving cutters as part of a comprehensive gear cutting tool package.

ANCA
CNC MACHINES

The GCX Linear will set the new benchmark for skiving cutter grinding. Adapted from ANCA's proven top-of-the-range CNC grinder platform, the GCX Linear adds tailored features to finish all operations for skiving cutters and shaper cutters in a single setup.



- 5 axis CNC grinder, with LinX linear motor technology on X, Y and Z axes
- 37kW (49HP) peak power direct drive spindle with BigPlus arbor
- Dedicated gear cutting tool software package
- Full process virtualisation on design station before grinding: Design, Optimise, 3D Simulation, MRR Estimation and more
- In-process dressing with acoustic emission monitoring system (AEMS) and supervised machine learning algorithm
- High accuracy headstock offers greatly improved index positional accuracy
- Motor temperature control (patent pending), minimises machine warmup time, and delivers optimal thermal stability during grinding



POWERED BY LINX

OFFERING RELIABILITY AND HIGH PERFORMANCE THROUGH ITS UNIQUE CYLINDRICAL DESIGN

Our LinX linear motor technology for axis motion (X, Y and Z axes), in conjunction with linear scales, achieves superior precision and performance. Specially designed for a lifetime of operation in harsh grinding environments, the LinX motors have a cylindrical magnetic field which means there is no additional down force on the rails or machine base.

With no temperature variations (meaning no need for a separate chiller unit), and being sealed to IP67, there is minimal wear and tear so that the machine accuracy remains over the lifetime of the machine. The LinX linear motor has higher axis speed and acceleration, leading to reduced cycle times while maintaining a smooth axis motion.

MOTOR TEMPERATURE CONTROL (MTC)



MTC IS A PATENT PENDING INNOVATION BUILT INTO THE MOTOR SPINDLE DRIVE FIRMWARE

Smart control algorithm actively manages and maintains the temperature of motorised spindles in the GCX Linear. Benefits delivered by this feature include:

- Dramatically reduced machine warmup time, meaning you can start grinding tools sooner, knowing the machine has reached thermal stability. This improves productivity and machine utilisation.
- Consistent thermal stability of the spindle over time regardless of changes in spindle load or speed, or spindle cooling coolant temperature. This greatly improves dimensional stability of grinding results.

BI-SYMMETRICAL GANTRY
A proven design for ultra-high precision grinding. It keeps the grinding spindle centre of rotation (C-axis) on the machine centreline which delivers superior rigidity and minimises effects of thermal growth.

ANCA MOTION CONTROL
ANCA Motion's latest AM5C CNC and AMD5X servo drives provide all the computing power needed for sub-micron motion control.

WHEEL PACK CHANGER

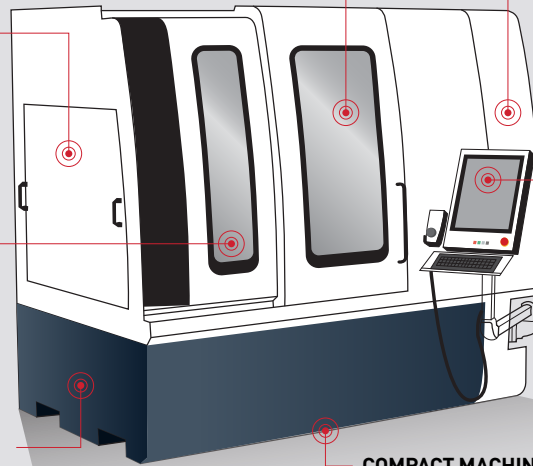
The GCX Linear features a dual wheel pack changer to cover all grinding operations in one setup. Upgrade to GCXcell with 9 standard wheel packs, and options for up to 24. Coolant manifolds also change with the wheel packs.

LARGE WORKING ENVELOPE

For tool diameters up to 260mm (10.2"), the GCX Linear gives total flexibility to tackle any job.

POLYMER BASE (ANCACRETE)

Provides excellent thermal stability and vibration dampening properties delivering grinding process stability and outstanding tool surface finish.



CONTROL PANEL

Including touch screen, USB ports and space for a standard keyboard. Ergonomic tilt adjust to suit different operators' heights. The handheld remote pendant includes ANCA's MPG Feed to make machine control and setup easier and safer.

COMPACT MACHINE FOOTPRINT

One machine for all grinding operations saves factory floor space compared to having multiple special purpose machines.

AUTOMATION

ROBOMATE LOADER

ANCA's RoboMate robot loader is a versatile and flexible automation solution that is equally efficient on a range of ANCA CNC tool and cutter grinders. Using the accuracy and reliability of the Fanuc robot, RoboMate takes the tool directly from the pallet to the collet in a single grip.

- ANCA's own LoaderMate software makes setup and programming simple
- Designed with high levels of safety and ergonomics
- Available with 2 pallets (standard) or 4 pallets (optional)
- Can load tool shank diameters from Ø3 mm (1/8") to Ø32 mm (1 1/4")
- Maximum standard tool length 350 mm (14")
- The size of the loader is L 2379 mm (94") x W 722 mm (28") x H 1865 mm (73")

GCXcell LINEAR

GCXcell Linear enjoys all the functions and features of the GCX Linear, but has a standard robot loader. With the option of up to 24 wheel packs, multiple wheel sets for different tool sizes or types can be immediately available with zero change over time. Larger wheels also mean longer wheel life and reduced dressing requirements. The result is reduced machine setup and idle time and maximised productive tool grinding time.

- Offered in two configurations
- Loads wheel packs up to 300mm (12") diameter, together with their coolant manifold
- Loads rotary cutting tools from 3mm (1/8") up to 32mm (1 1/4") diameter shank
- Maximum payload (wheel pack or tool) is 8kg
- Can have custom engineered solutions to include pre and post grinding operations in the GCXcell Linear

	GCX Linear	GCXcell Linear
Wheel packs (one pack can hold up to 4 wheels)	2	Small cell: 9 standard, 14 optional. Large cell: 9 standard, 14/19/24 optional
Grinding wheel diameter	Max. 203mm (8")	Max. 305mm (12") (on selected wheel packs)
Tool Loader	RoboMate (option)	Included
*Loader Tool Capacity	Shank Diameter 2 Pallet 4 Pallet 12mm 120 360 20mm 40 120	Shank Diameter Small cell Large cell 2 Pallet 4 Pallet 12mm 120 360 20mm 40 120
Tool Load Time	15 sec	20 sec
Machine Power Requirement	25kVA	Machine: 25kVA +. Cell : 3kVA
Machine Weight	8500kg (16,500 lbs)	Machine: 8500kg (16,500 lbs) +. Cell: 2500kg (5500lbs) max

*Depends on the head size, the capacity will vary

STANDARD ACCESSORIES

WHEEL DRESSERS

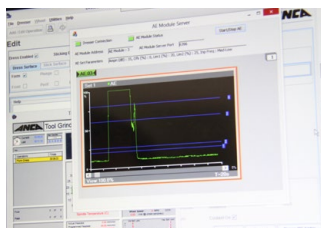
Two wheel dressing options are included. Able to run at 3000RPM, the machine headstock can run a 200mm dresser roll. Additional secondary motorised dresser is suitable for profile wheel dressing. Secondary dresser uses quick change HSK arbor for fast change over times.

- Integrated dressing software for complete flexibility of in-process dressing
- Automatically update grinding wheel size after dressing
- Mount plated diamond or aluminium oxide dresser rolls
- On machine dressing ensures zero runout on grinding wheels
- Maintain wheel form and grinding performance to maximise machine productivity

HIGH ACCURACY HEADSTOCK

Large disk type skiving cutters and shaper cutters require higher headstock accuracy, as the impact of A-axis positional error will linearly increase with diameter. This option improves the A-axis accuracy by a factor of 10. The positional accuracy is now ± 0.00034 degrees.

ACOUSTIC EMISSION MONITORING SYSTEM (AEMS)



Dressing the complex profile wheel is critical for achieving the high accuracy for skiving cutters. With the latest acoustic emission monitoring technology, AEMS adds an “ear” to the machine that is tuned in to the fine pitches of wheel dressing. AEMS learns as well as listening, it is built with advanced supervised machine learning algorithm. The system can be trained to pick up the right tunes of perfect dressing in noisy production environment. It ensures the wheel profile is dressed within micron accuracy with the least possible time while minimising the reduction in size.

OPTIONAL ACCESSORIES

AUTO ADJUSTING COOLANT MANIFOLDS

As wheels are regularly dressed, their diameter will reduce. Auto-adjusting coolant manifolds will move with the reducing wheel diameter to ensure consistent coolant delivery to the grind point. This is essential to avoid tool burn and maintain optimal grinding wheel performance.

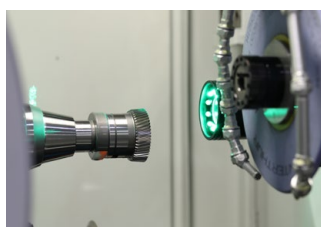
CNC TAILSTOCK

The Travelling Steady (P-axis) is fitted with a tailstock for between centre grinding, ensuring rigid support. Tailstock position and engagement force is fully programmable. A range of replaceable male and female centres are easily changed for fast setup time.

AUTOSTICK

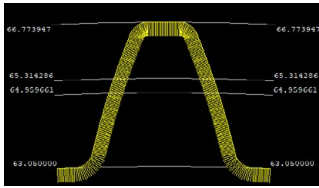
The AutoStick is the automatic wheel-conditioning system for ANCA’s tool grinders. Automatic wheel conditioning improves the life and grinding performance of resin bond grinding wheels. When continually grinding, wheels become glazed or loaded. The sticking process exposes the wheel grit and removes chips (swarf) embedded in the wheel so the wheel cuts better.

iVIEW



iView is a measuring system that is able to measure the ground tool while it is still in the workholding in the grinding machine. The image of the ground tool taken by the iView camera is compared with an ideal overlay profile which is generated by the iView software.

DEDICATED SOFTWARE

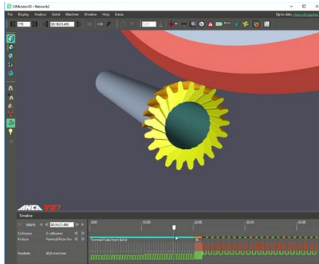
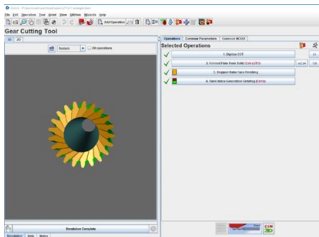


The GCX Linear software package includes multiple software components for manufacturing and resharpener pinion type gear cutters. It includes design, simulation, grinding sequence programming, wheel editing and wheel dressing, supporting full virtualisation of the manufacturing process.

Gear cutting tools, such as skiving and shaper cutters have complex geometries. The design process relies largely on iterative optimisation. Using the design station, the cutter can be designed from basic gear workpiece data or the transverse section of the enveloping gear. The skiving kinematics can also be simulated to verify the cutter design and potential collision rectified.

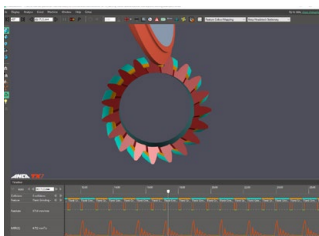
Virtualisation of the full manufacturing process reduces setup time and scrap allowing streamlined manufacturing. Software modules include:

- Specialised import wizard - guides the user through the process of creating the wheel packs and setup grinding points.
- iGrind software - provides dedicated flank index generation grinding operation, supports both stepped and conical rake face as well as fluting, cylindrical grinding, step geometry editing operations and more.
- CIMulator3D - simulate the grinding process and analyse the parameters of each operation.
- Dresser software - supports standard and formed dresser roll, visualise the dressing process with errors over 1µm highlighted.
- Tool file management - take your saved tool file straight to the machine or upload to the tool library.



SOFTWARE OPTIONS

CIMULATOR3D



The ability to fully simulate the grinding process using ANCA's patented CIMulator3D software means the entire grinding operation, as well as the final geometry, can be set up and visually verified in 3D. CIMulator3D also provides the benefit of performing process optimisation, maximising machine utilisation and further reducing set-up times.

- The parts can also be accurately sliced and inspected in any orientation providing fine control of the measurement process.
- The ability to import DXF overlays allows comparisons to be made between the simulation and the nominal design.
- All machine models, work holding and accessories are available in CIMulator3D for the entire grinding sequence to be animated and collisions detected automatically.

iBALANCE

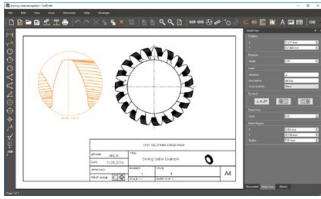
iBalance is an ANCA designed wheel balancing system to achieve perfectly balanced wheels. It is a cost-effective system as the iBalance software uses hardware already on the machine.

iBalance enables the balancing of wheel packs in the machine through a semi-automatic process. Wheel packs are balanced by adding weight to the wheel nut at locations indicated by the iBalance software. The software is also able to monitor the wheel balance while the machine is in operation. Some of the benefits of iBalance are:

- Provides improved tool surface finish due to the removal of wheel vibration
- Extends wheel life
- Cost-effective and practical
- User-friendly graphical interface

iBalance has been extended to balance the headstock to support the accuracy requirement for skiving cutters.

TOOLDRAFT



ToolDraft is used for creating 2D cutting tool drawings from a simulated tool or direct from ToolRoom. This is built on the foundation of CIM3D engine projecting a 3D model into accurate 2D projection views. This will help customers to create drawings of cutting tools manufactured on ANCA machines without relying on third party software.

- Dimension all tool features with tolerances and surface finish requirements.
- Annotate drawing with text, images, and drafting symbols from the drafting symbols library.
- Load and save customer defined drawing templates with defined text, line and colour styles.
- Export drawing as PDF or DXF with ability to print drawings

MANAGEMENT SUITE



Management Suite provides customers with the ability to manage their tool production, tool files and wheel files. This standalone software comes with three main features:

- REDAX monitors machine production 24/7 in real-time and delivers up-to-date information, greatly enhancing the visibility and control of the tool manufacturing operation. This system will enable customers to improve the productivity of their machines by reducing machine downtime, analysing tool production, and past production history.
- Wheel management is a server-based wheel library which provides means to easily share wheel packs and qualification data between machines.
- Tool management is a server-based application which makes it easy to transfer between simulators and machines. This also maintains version control and history of all tool files. This has user permissions for read/write for better control of tool files.

TECHNICAL SPECIFICATIONS

CNC DATA

- ANCA AMC5, EtherCAT, high performance CNC, 8GB RAM, H/D 64GB SSD, Processor i7, Windows 8

MECHANICAL AXES

	X-axis	Y-axis	Z-axis	C-axis	A-axis
Position Feedback Resolution	0.0001 mm 0.0000039"	0.0001 mm 0.0000039"	0.0001 mm 0.0000039"	0.0001 deg	0.0001 deg
Programming Resolution	0.001 mm 0.000039"	0.001 mm 0.000039"	0.001 mm 0.000039"	0.001 deg	0.001 deg
Travel	586mm 23.1"	408mm 16.1"	242 mm 9.5"	264 deg	360 deg

SOFTWARE AXES (PATENTED)

- B, V, U, W

WORKPIECE*

- Max Tool Diameter: 260mm (10.2")

DRIVE SYSTEM

- ANCA Digital AMD5X (EtherCat Standard)
- Machine Axes:
 - ANCA LinX Linear Motors (X, Y & Z Axis)
 - Direct drive rotary axis (A & C axis)

MACHINE DATA

- Grinding Spindle
 - 37kW (49hp) (peak power)
 - ANCA Bi-directional, with spindle orientation
 - 8000RPM (optional 10,000RPM and 15,000RPM)
 - Direct drive induction motor
 - BigPlus BT40 wheel arbors
- Wheel bore: 20mm, 31.75mm (1.25"), 32mm, 50.4mm (2"), 76.2mm (3")

OTHER DATA

- Probe System: Renishaw
- Coolant System: External
- Machine Base: ANCAcrete (polymer concrete)
- Colour: RAL 7035 / RAL 5008
- Control Panel: 19" touch screen
- Machine Structure: Bi-symmetrical column

* Dependent of on tool geometry and weight, program and tooling layout
ANCA reserves the right to update or amend specifications without prior notice.

