PRIME technologies

CNC GEAR MEASURING CENTERS

ECON 30

Econ 30 Gear Measuring Centre permits the cylindrical gear to be inspected with the standard software package . Optional application packs for gear hob , worm hob , shaving cutter , Shaper cutter , worm , worm gear, straight bevel gear and spiral bevel gear can be offered , and extended at customer's requests

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FEATURES

- Compact construction of basic machine and high measuring accuracy. The gear measuring Centre is provided with a 4-axis measuring system with high-precision TESA inductive probe and ball rolling guide . This system measurement accuracy and stability are greatly improved

- Full-closed-loop CNC system based on advanced motion control card , DDR and DDL motors is designed and developed

- This measuring machine allows easy-to-operate inspection of all test items in one set-up . Fully automatic measuring cycle is controlled by the computer with high measuring efficiency . Customized tooth selection for profile and lead test is possible . The evaluation range of measurement curve is defined by a mouse drag operation . The measuring velocities can also be controlled in the software

- Powerful and versatile measuring software functions : The measuring item can be selected according to the workpiece to be tested . This user friendly measuring software allows automatic evaluation of cylindrical gears in accordance with GB10095 , DIN3962 , ISO1328 or AGMA standard . The measuring accessments including tolerance bands for profile and helix testing (evaluations of K charts) , profile barreling (Ca), and tooth crowning (Cb) are also available .

Specifications

Model / Specifications	Econ 30
Module	0.5-15
Max.workpiece diameter	300
Distance between centers	15 - 500
Distance between stylus and lower center	-5 - 390
Helix angle	0 - 90°
Max. permissible test gear weight	150 kg
Over dimensions of basic unit （L×W×H）	1200 X 1000 X1900

# ECON30 GEAR MEASRRING SOFTWARE SOLUTIONS
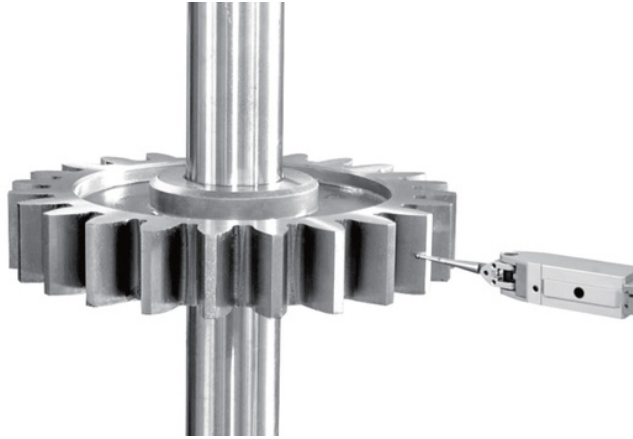
Cylindrical gear

Measurement and analyses of the inner/outer spur tooth , incomplete tooth , bevel tooth , and segment gear are also available :

- **Measuring items** : Tooth profile deviation($F\alpha$、 $ff\alpha$、 $fH\alpha$)、 helix deviation($F\beta$、 $ff\beta$、 $fH\beta$)、 pitch deviation(Fp、 Fpk、 fpt、 Fu), redial runout(Fr) , root diameter(Rd) , tip diameter(Td) , base tangent length(Wk), span over ball/balls(Mrk/Mdk) , tooth thickness(s) , tooth thickness variation(Rs) , 3D topograph .
- **Evaluation modes** : Analyes confirming to the standard ISO1328、 AGMA2015、 GB/T10095、 JIS B1702、 DIN3962、 GB2363、 K-chart、 userdefined tolerance band 、 tooth modification 、 tip relief 、 tooth crowning

Straight bevel gear

The complete measurement and evaluations of the set of straight bevel components including the straight bevel gear , clamping holder , electrode , mould and forging stock can also be carred out . The conical datum for the darft angle is allowed tobe corrected in the axial direction . Upto 625 testing points are allowed on the single tooth flank and numbers of checking teeth are not limited :

- **Measuring items :** pitch deviation(Fp、 Fpk、 fpt、 Fu), redial runout(Fr) , tooth thickness variation(Es) , 3D topograph .
- **Evaluation modes :** Standard ISO17485、 AGMA2009、 GB11365、 DIN3965、 user-defined tolerance band
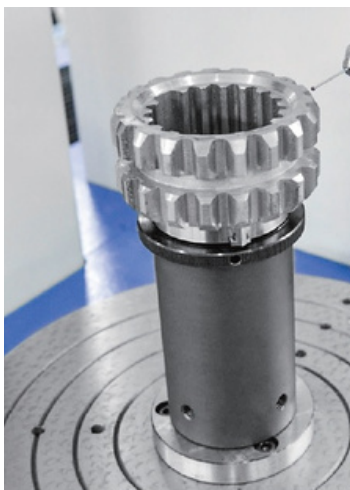
Involute spline

Measurement and evaluations of the inner/outer involute splines inside the normal and incomplete tooth gears are available :

- **Measuring items :** Tooth profile deviation($F\alpha$、 $ff\alpha$、 $fH\alpha$)、 helix deviation($F\beta$、 $ff\beta$、 $fH\beta$)、 pitch deviation(Fp、 Fpk、 fpt、 Fu), redial runout(Fr) , root diameter(Rd) , tip diameter(Td) , base tangent length(Wk) , span over ball/balls(Mrk/Mdk) , tooth thickness(s) , tooth thickness variation(Rs) , 3D topograph .
- **Evaluation modes :** Standard GB/T3478、 DIN5480、 K-chart、 user-defined tolerance band 、 tooth modification 、 tip relief 、 toothcrowning .

# ECON30 GEAR MEASRRING SOFTWARE SOLUTIONS
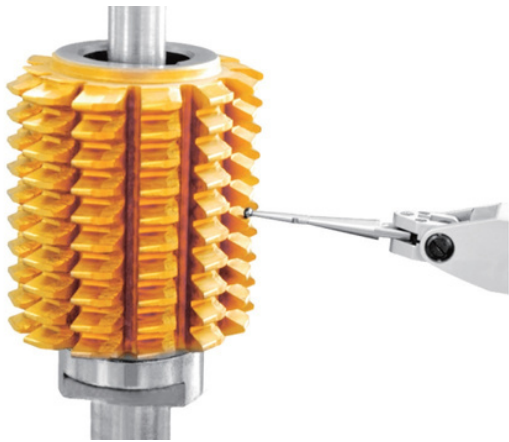
Hob

Measurement and evaluations of gear hob , worm hob aiming at ZA modeling , ZI modeling , ZN modeling and hob blank , rack hob , disk milling cutter are also available

- **Measuring items :** radial runout of hub diameter(frp) , axial runout of hub face(fps) , from and position of cutting face(FfN) , spacing of cutting face of gashes(ftN、 fuN、 FtN) , gash lead(fHN) , radial runout of tips teeth(frk) , profile over cutting edge(Ffs) , profile behind cutting edge(Ffs) , helix over cutting edge(fHF、 FHF、 FH3) , tooth thickness(fs) , line of action(fe、 Fe) , axial pitch or dividing error (fpx、 Fpx、 Fpx3).
- **Evaluation modes :** analyses confirming to the standardDIN3968、 ISO4468、 JISB4355、 GBT6084、 JBT7654、 JBT2494、 GBT5103 user-defined tolerance band .

Shaper cutter measurement software

It can measure the deviation of tooth profile and multi-section tooth profile ($F\alpha$, $ff\alpha$, $fH\alpha$, $C\alpha$), spiral line and multi-section spiral line deviation ($F\beta$, $ff\beta$, $fH\beta$, $C\beta$) Basic error items such as tooth pitch deviation (FP, FPK, fPt, Fu) and radial runout (Fr) also support tooth profile trimming amount (FKo, Fuo,), spiral trimming amount (OE, OB) and shape Calculation of appearance map. Support for error assessment of gear shaping cutter:

- Evaluation according to standards (DIN1829, GB6082);
- Customized tolerance range;
- Customized tolerance zone (K-shaped diagram) for evaluation.The tolerance zone supports any combination of straight lines,arcs, and quadratic curves.
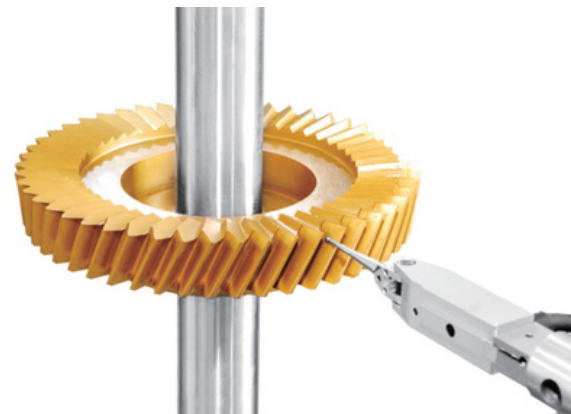
Shaving cutter measurement software:

It can measure the tooth profile and multi-section tooth profile deviation ($F\alpha$, $ff\alpha$, $fH\alpha$, $C\alpha$), spiral of ordinary ring shaving cutter, spiral shaving cutter with misalignment and incomplete tooth shaving cutter (ring and spiral type) Basic error items such as line and multi-section spiral deviations ($F\beta$, $ff\beta$, $fH\beta$, $C\beta$), tooth pitch deviations (FP, FPK, fPt, Fu) and radial runout (Fr)

also support tooth profile trimming (FKo , Fuo), helix trimming amount (OE, OB), common normal length (Wk), span bar pitch (Mrk across one ball, Mdk across two balls), tooth thickness (s) and tooth thickness variation (Rs) :

- Assessment according to standards (GB14333, GB21950, DIN3962);
- Customized tolerance range;

ECON 30 GEAR MEASRRING SOFTWARE SOLUTIONS
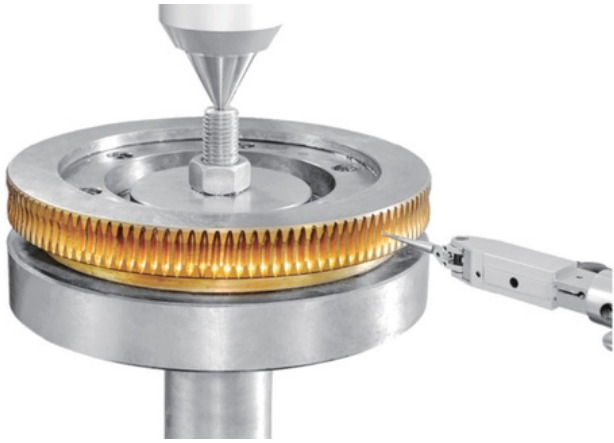
Worm gear measurement software

It can measure and evaluate errors of common worm gears and incomplete tooth worm gears that are paired with ZA (Archimedes modeling), ZI (involute modeling), ZN (normal straight profile modeling) worms of various shapes. It can measure basic error items such as tooth profile deviation ($F\alpha$, $ff\alpha$, $fH\alpha$, $C\alpha$), tooth pitch deviation (FP, fPt, Fu), radius jump (Fr), and also supports tooth profile margin (FKo, Fuo) and tooth Calculation of items such as thickness (s) and tooth thickness variation (Rs).

- **Evaluation standard:** according to standard evaluation (DIN3974, GB10089_2018, GB10089_1988), custom tolerance range evaluation, shape modification evaluation, edge evaluation, and display the corresponding error symbol according to the standard
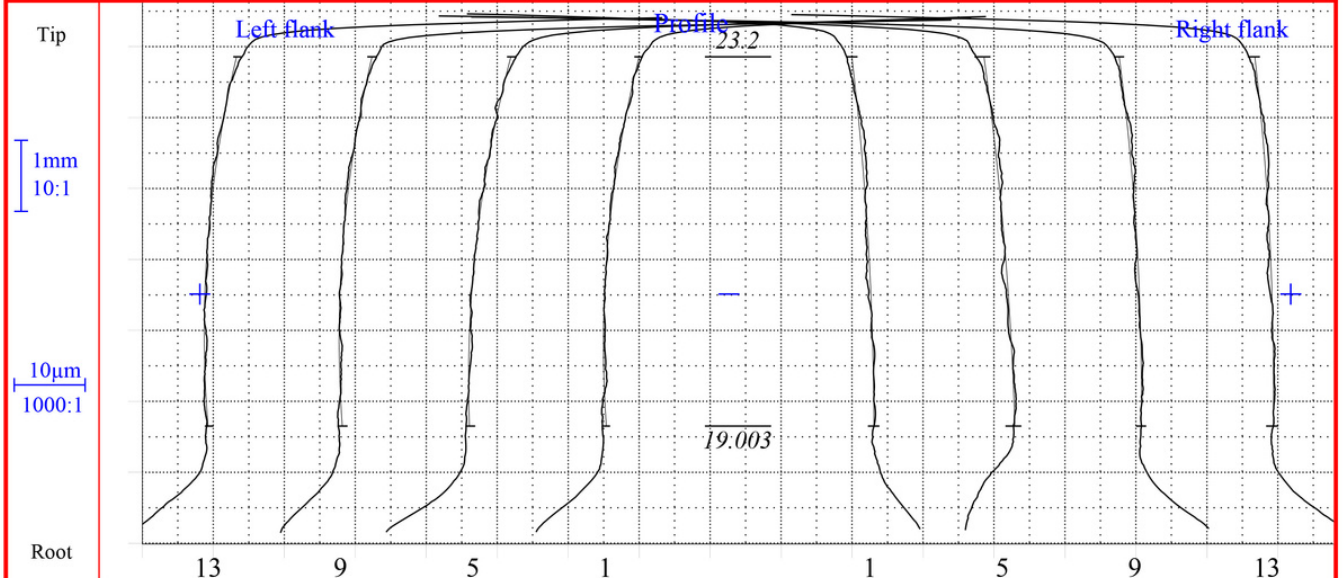
Worm measurement software

It can measure and evaluate errors of single-headed worms and multiheaded worms with various shapes such as ZA (Archimedes modeling), ZI (involute modeling), ZN (normal straight profile modeling) Measurable tooth profile and multi-section tooth profile deviation ($F\alpha$, $ff\alpha$, $fH\alpha$, $C\alpha$), helix and multi-section helix deviation ($F\beta$, $ff\beta$, $fH\beta$, $C\beta$), pitch deviation (FP, fPt, Fu), diameter Basic error items such as jump (Fr), also support tooth profile trimming amount (FKo, Fuo), spiral trimming amount (OE, OB), oneturn spiral deviation (fh), spiral pitch error (fpx) And calculation of items such as tooth thickness (s) and tooth thickness variation (Rs).
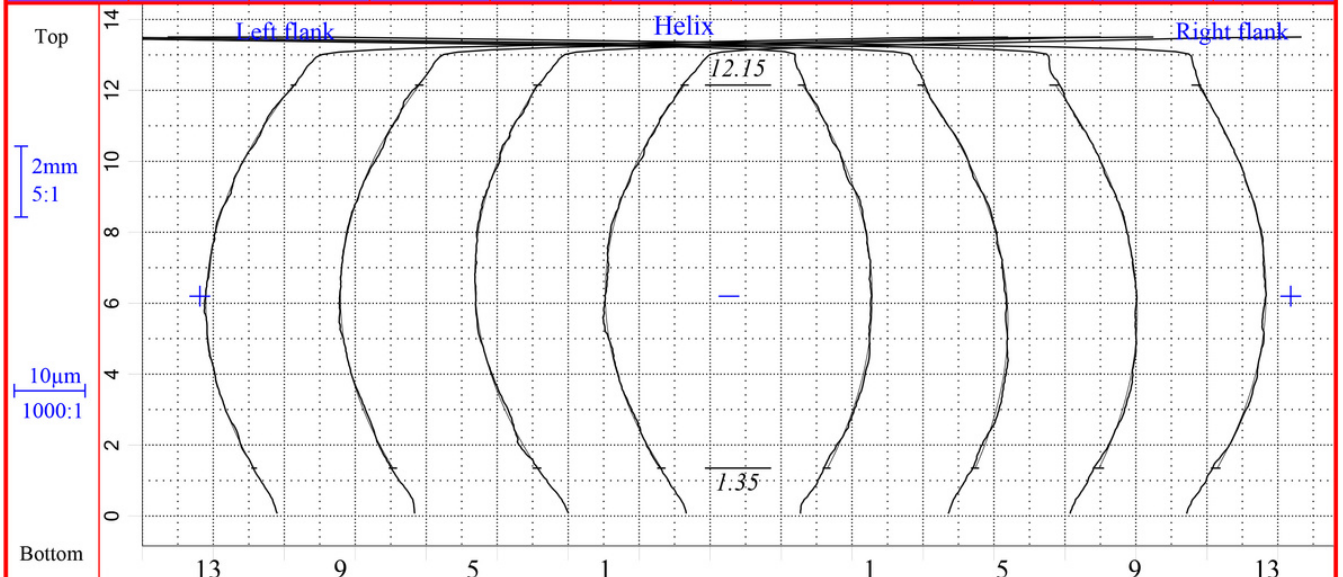

- E**valuation standard:** according to standard evaluation (DIN3974, GB10089_2018, DIN3962, GB10089_1988), custom tolerance range evaluation, shape modification evaluation, edge correction evaluation, and display the corresponding error item representation symbols according to the standards.

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Workpiece name	5747D	tooth no.	15	Modi.coefficent	0.4464	Signer
Draw No.	5747DFT642L	Module	1.25	Probe dia.	1	
Serial No.	No. 1	Pressure Angle	17°30'00"	Width	13.5	
User No.		Helix Angle	18°00'00"	Tip dia.	23.5	Date
Operator	Sachin / Anil	Reference dia.	19.715			1/8/2019 1:50:45 PM
		Base dia.	18.713			

Profile — Left flank / Right flank — 23.2 / 19.003

Tooth no.	13	9	5	1	DIN3962	DIN3962	1	5	9	13
Fα	4.8	5.3	6.9 6	5.5	12 7	12 7	3.9	5.3 5	3.7	3.5
ffα	1	1.2 2	1.2	1	9 7	9 7	1.4	1.9 3	1.2	1.4
fHα	-4	-4.2	-5.8 7	-4.6	±7 7	±7 7	-3.1	-4.3 6	-3.1	-2.6
fHmα/V	-4.7 6		1.8				-3.3 5		1.7	
Cα	2	2	1.9	2.1	[1,3]	[1,3]	0.7	0.7	0.9	0.8
fFu	0	0	0	0			0	0	0	0
FKo	0	0	0	0			0	0	0	0

Helix — Left flank / Right flank — 12.15 / 1.35

Tooth no.	13	9	5	1	DIN3962	DIN3962	1	5	9	13
Fβ	6.1 5	4.5	2	4.6	13 7	13 7	3.6	7.1 6	5.8	3.1
ffβ	0.7	1 1	1	1	7 7	7 7	0.9	0.9	1.3 1	1.1
fHβ	-5.5 5	-3.7	-0.1	-3.3	±11 7	±11 7	3.5	7.6 6	6.2	2.7
fHmβ/V	-3.2 4		5.4				5 5		4.9	
Cβ	9.3	9.2	8.9	9.5	[4,10]	[4,10]	8	7.9	8.1	8.2
fu	0	0	0	0			0	0	0	0
fo	0	0	0	0			0	0	0	0

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Workpiece name	5747D	tooth no.	15	Modi.coefficent	0.4464	Signer
Draw No.	5747DFT642L	Module	1.25	Probe dia.	1	
Serial No.	No. 1	Pressure Angle	17°30′00″	Width	13.5	Date
User No.		Helix Angle	18°00′00″	Tip dia.	23.5	
Operator	Sachin / Anil	Reference dia.	19.715			1/8/2019 1:50:45 PM
		Base dia.	18.713			

Pitch(L) 2μm 5000:1

Total(L) 2μm 5000:1

Pitch(R) 2μm 5000:1

Total(R) 5μm 2000:1

Run-out 2μm 5000:1
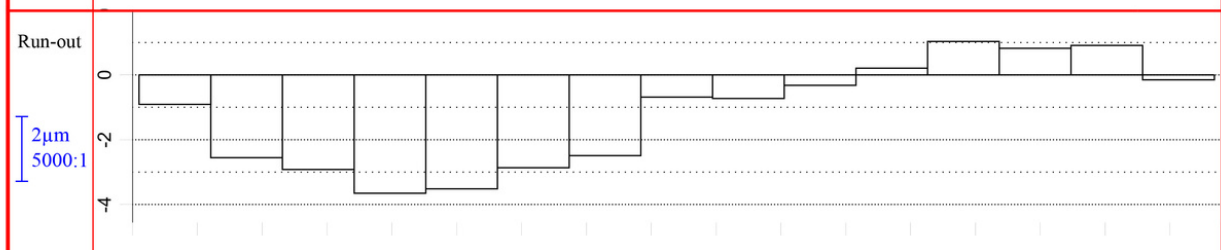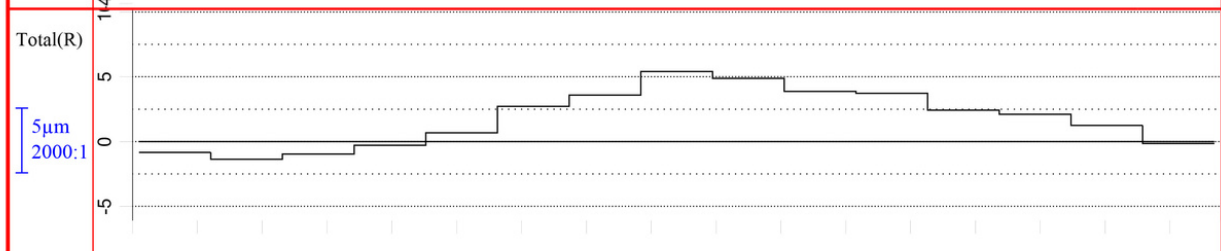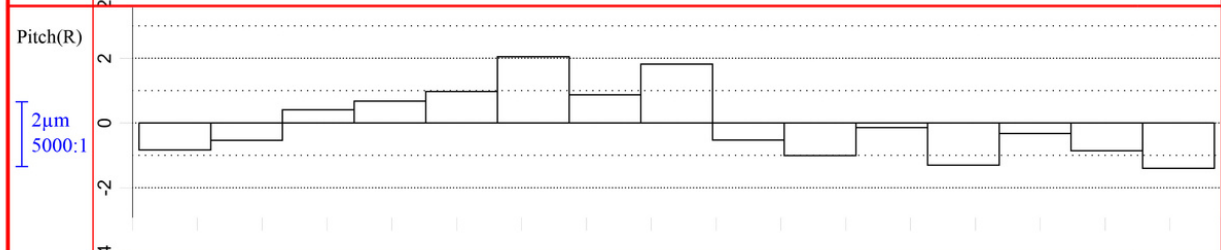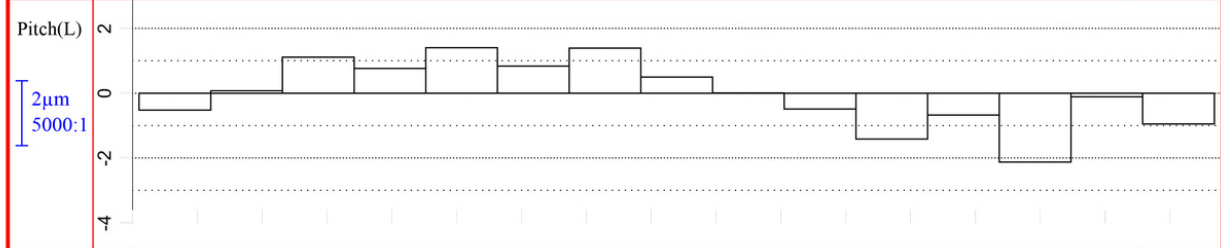
	Left Pitch	Tooth no.	GB/T10095	GB/T10095	Tooth no.	Right Pitch
Fp	6.1 4	1,9	16 6	16 6	2,8	6.8 4
Fpk	4.2	11->13			6->8	4.7
Fpt	2.1 3	13	6.5 6	6.5 6	6	2 3
Fu	2	13,14			8,9	2.3
Fr	4.7 4		13 6			

Harbin Measuring & Cutting Tool Group Co.Ltd.   3040A Gear Measure Center

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