

# Gear Measuring Machine Upgrade

GEARMeasure – CNC solution for gear  
measuring machines

Solution Partner

Automation

**SIEMENS**

**Confidential**

# CNC Design Your Partner for Gear Industry

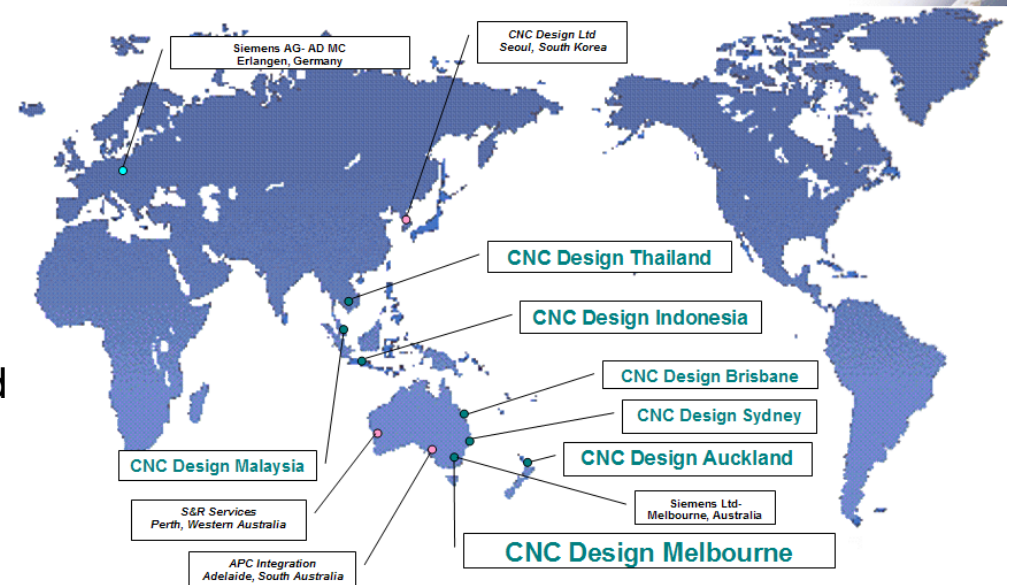
## Company Profile:

- Established 1984 with offices in six countries
- 120 People with > 80 Engineers
- Siemens Motion Control Solution Partner for more than **20 years.**
- More than 1500 Projects around the world over **30 countries**

## Core Competencies:

- Machine Tools - we are the world's largest CNC Retrofitting company.
- Electrical Drive Technologies

## CNC Design around the World



|                  |         |
|------------------|---------|
| Solution Partner | SIEMENS |
| Automation       |         |

## Project Example - Hofler mobile gear measuring machine



- ❑ Mobile Measuring essential for large gears
- ❑ Setup beside gear manufacturing machine
- ❑ Measuring of pitch, runout and profile
- ❑ Separate attachments for pitch-run out and profile measuring
- ❑ Obsolete electronics

## GEARMeasure – electrical solution

- Old PC technology – unreliable and unsupported
- Two electrical cabinets merged into one - solution
- New Sinumerik 840D solution
- Complete Electrical re-design
- Fast analog input acquisition
- Mobile cabinet



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# GEARMeasure – Hand Held Unit



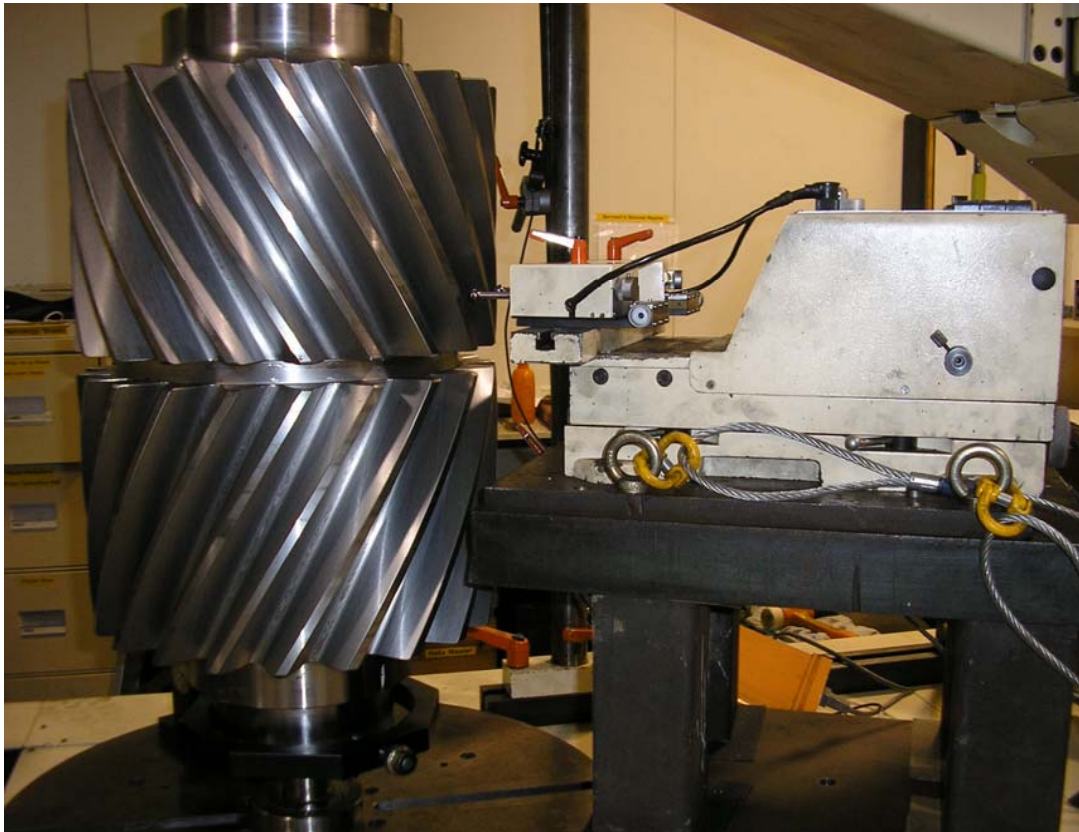
**Old hand held unit**



**New Hand held unit**

- Axes position display
- Handwheel for fine control
- Customised keys

## GEARMeasure – pitch and runout measuring with mobile unit



- ❑ Pitch and runout probes
- ❑ Measuring of pitch and runout with continuously rotating gear (i.e. C axis positioning not required)
- ❑ Gear rotation speed teach-in
- ❑ Quick and easy setup

# GEARMeasure – tooth profile measuring with mobile unit



Hofler old  
Measuring Head

New 3D measuring  
probe

Hofler head replaced with  
new 3-dimensional probe

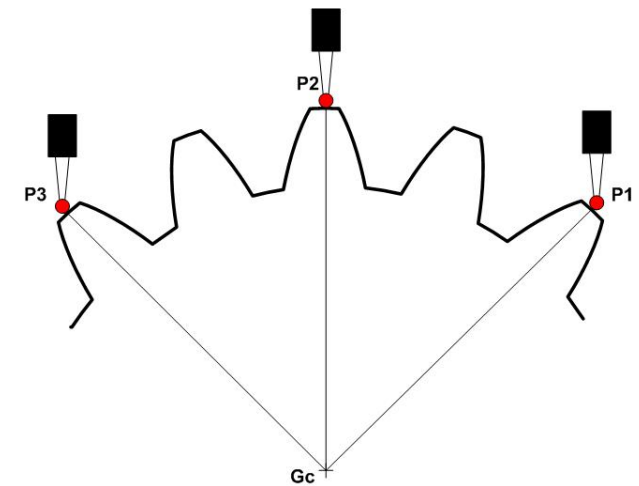
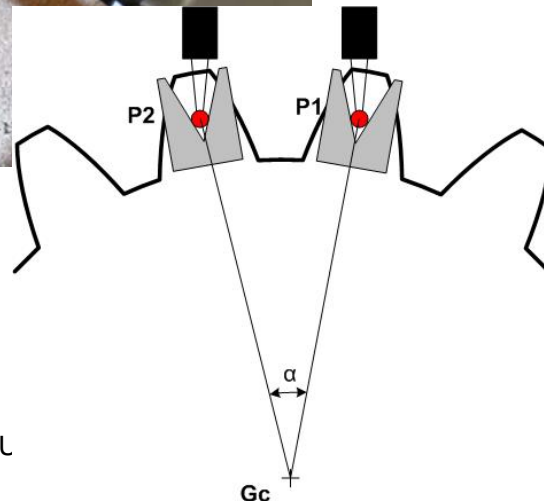
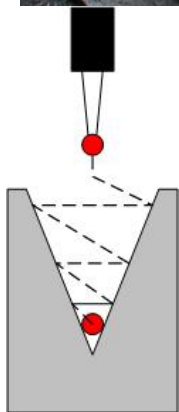
Measuring the variation of  
the actual profile from a  
nominal involute profile



# GEARMeasure – gear centre calculation methods

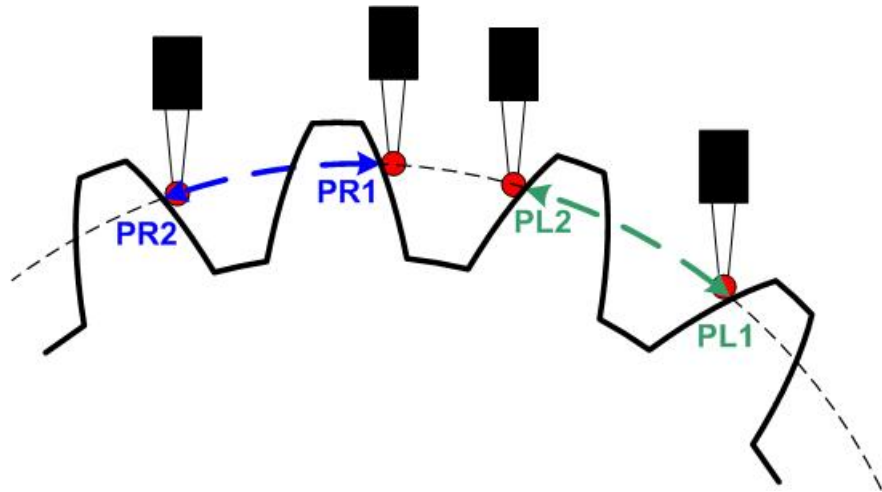


- Gear centering determination required due to random positioning of the unit
- Two methods for gear centering
  - ❖ V Block Method
  - ❖ 3 Point Method
- Both methods are quick and accurate
- Gear centre required to locate the position of the profile

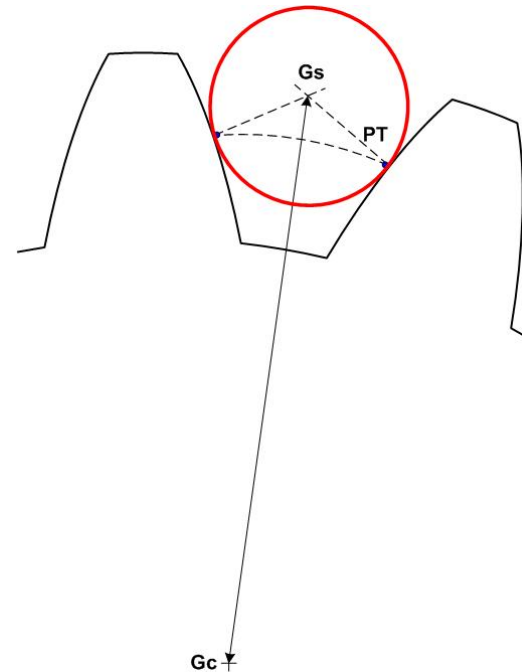


Gear Measuring Machine L

# GEARMeasure – pitch and runout measuring

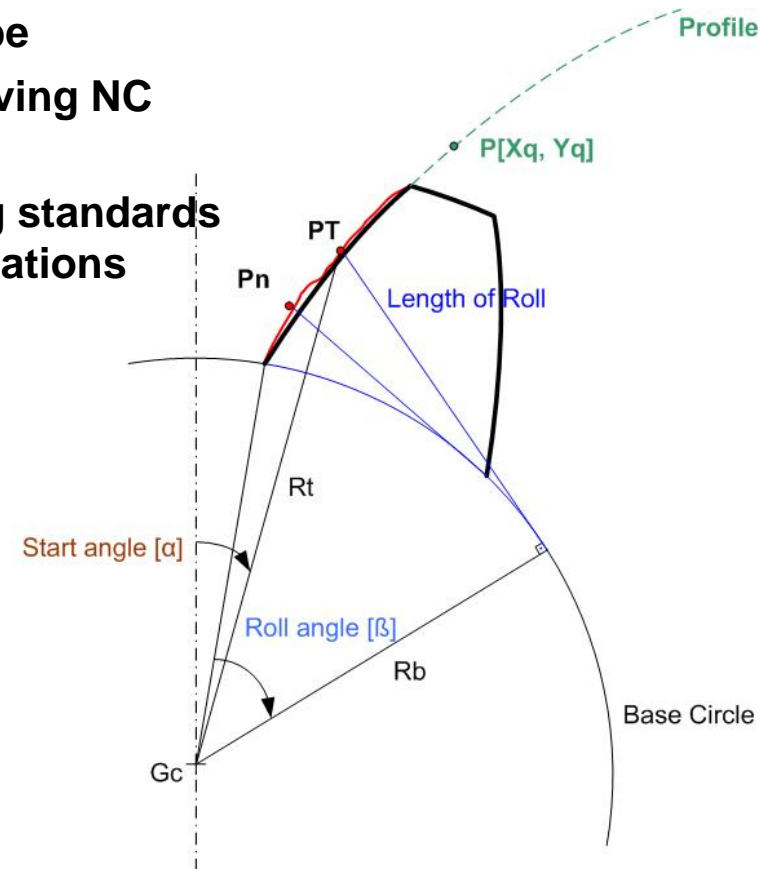
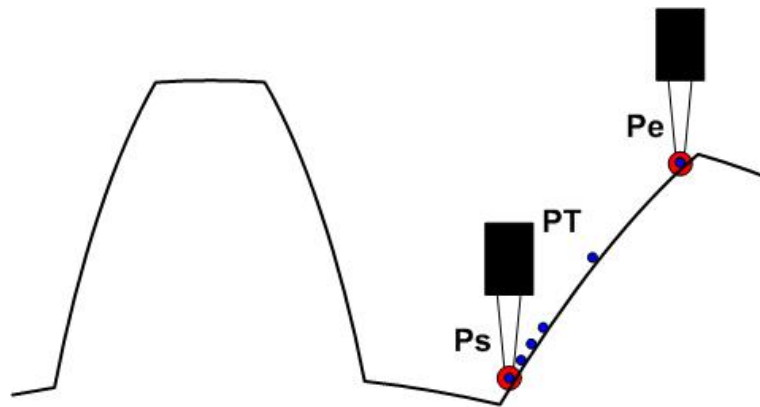


- Using Hofler dedicated measuring heads
- Using international measuring standards methods and formulas for calculations



# GEARMeasure – profile measuring

- ❑ Using new 3D measuring probe
- ❑ CNC control for the probe moving NC axes
- ❑ Using international measuring standards methods and formulas for calculations



$$Xq = Rb * [\sin(\alpha + \beta) - \beta * (2\pi/360) * \cos(\alpha + \beta)]$$

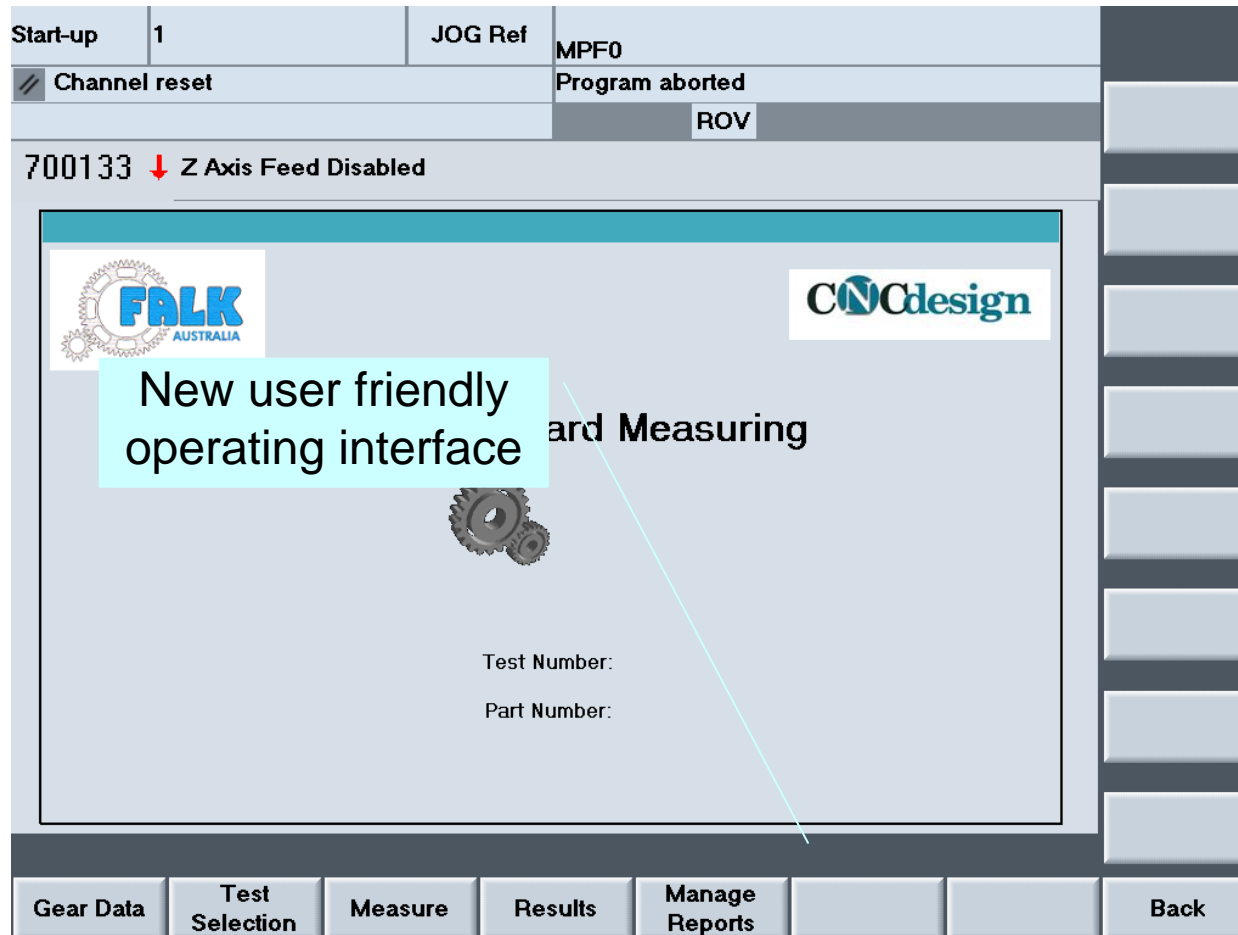
$$Yq = Rb * [\cos(\alpha + \beta) + \beta * (2\pi/360) * \sin(\alpha + \beta)]$$

## GEARMeasure – retrofitting obsolete controls



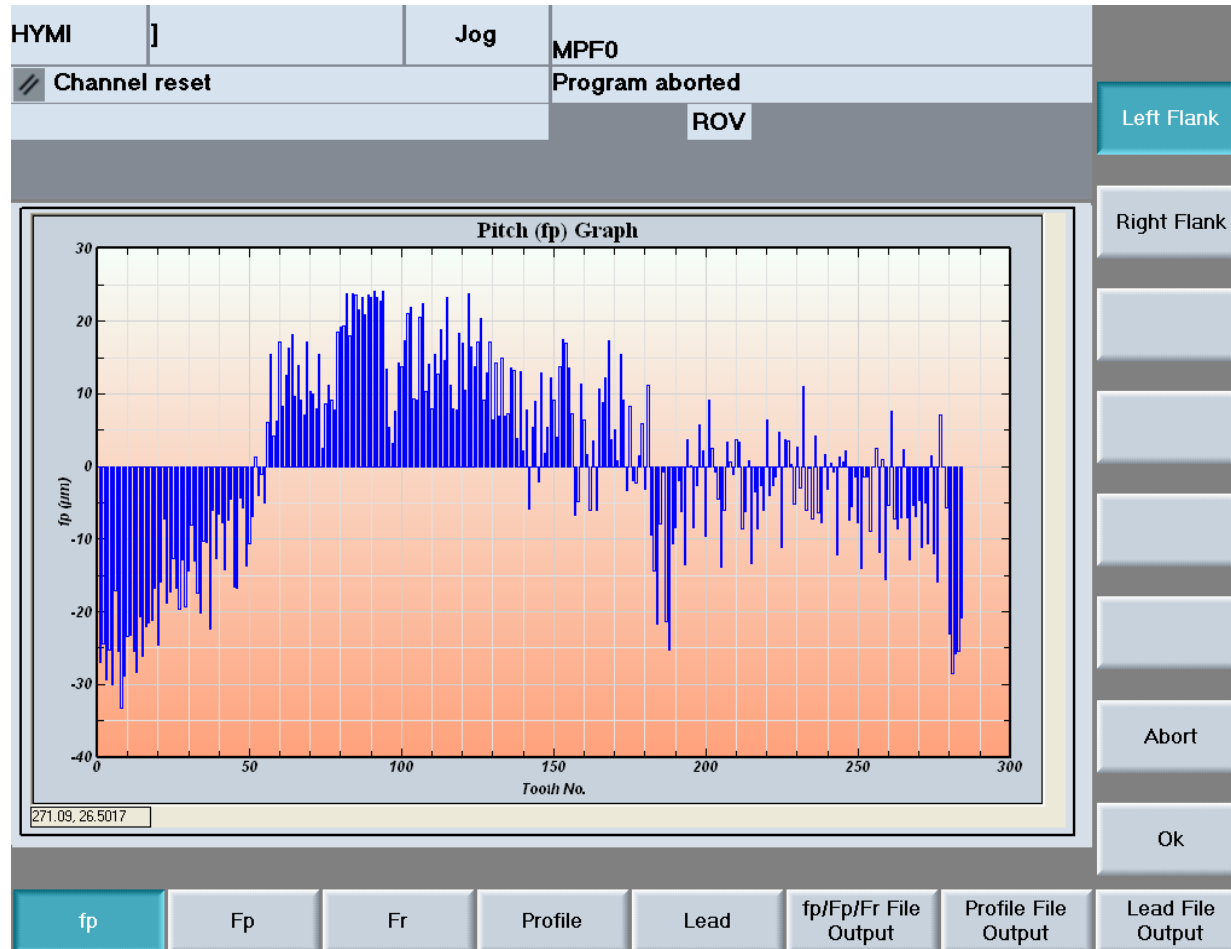
- Old unreliable control
- Operator interface very primitive and inflexible
- If test is interrupted mid way, all data is lost
- Managing of test results in database limited
- Results only output on screen and plotter

# GEARMeasure – new operating interface



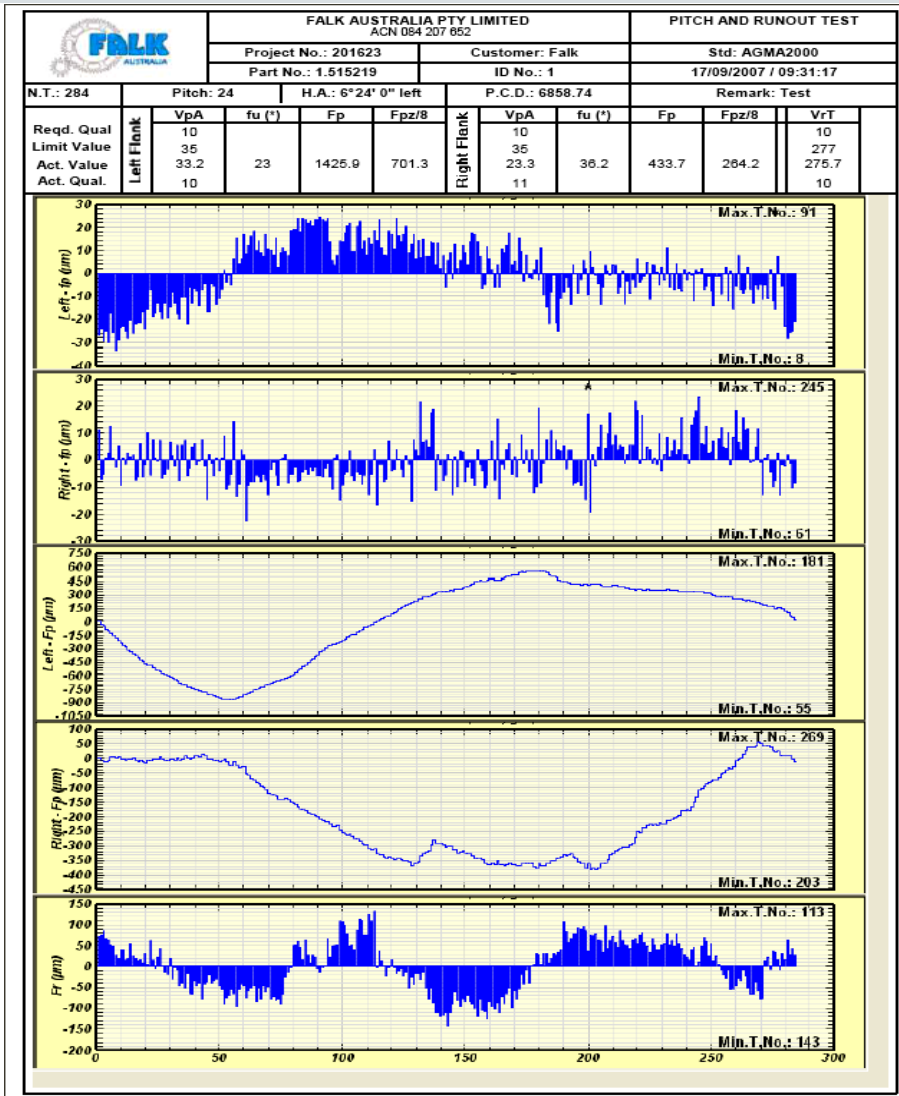
- Customised screens
- Easy creating, changing and deleting of tests
- Test views
- Only entering of gear data once
- Step by step guidance

# GEARMeasure – test results on screen



**Viewing of results directly on the screen**

# GEARMeasure – Reports creation



Reports generation for pitch, runout and profile

Reports in metric or imperial

Reports in PDF format for easy handling

Results analysed with either AGMA2000 or AGMA2015

## GEARMeasure – retrofit results

- Improved reliability
- Improved usability
- Easy recovery
- Improved management of gear/test data
- Improved test report handling
- Increased flexibility
- Customised reports
- Customised features
- Spare parts and service support
- Standard Siemens parts



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## Maag Gear Cutter – Case study Falk Australia

**Falk Australia Pty Ltd**, part of **Rexnord Gear Group**, is a world class industry leader in the design and manufacture of large precision gears and customized gearboxes, as well as being a provider of contract machining and gearbox assembly/overhaul services.

Falk Australia's facility has heavy lift, gearbox assembly and machining capability amongst the largest in the Southern Hemisphere.

CNC Design has upgraded a Hofler mobile measuring machine and installed on-board gear measuring option for two Maag Gear cutting machines at this site while the complete retrofit of a Hofler EMZ laboratory gear measuring machine is on the design stage.



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## CNC Design – Solutions for Gear Industry

- MAAGCut - Gear Shaping Machine – CNC Conversion
- MAAGCut - Gear Shaping Machine – Gear Measuring
- Hofler 5 axis Gear Grinding Machine – CNC Upgrade
- Pfauter 5 axis Gear Grinding Machine – CNC Upgrade
- GEARTest - Gearbox Tester 0.5 to 4.5 MW
- GEARMeasure - CNC retrofit solution for gear measuring machines
- GEARGash - Gashing Head and rotary table for conversion of HBM or Hobber.

# Thank you

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