

PC-DMIS Gear

Version 1.1

by

Wilcox Associates, Inc.

<http://www.wilcoxassoc.com>

Last Updated: Oct 4, 2005

Table Of Contents

PC-DMIS Gear.....	5
Introduction	5
Getting Started	5
Using the Gear Control Dialog.....	7
Define Gear	9
Parameters Tab.....	9
Pitch/Runout Tab.....	11
Profile Tab.....	13
Helix/Lead Tab	15
Tip/Root Tab.....	17
Open Existing	19
Qualify Probes	21
Align Gear.....	23
Measure Gear.....	27
Analyze Gear	29
How the Report Relates to the Measured Gear.....	30
Sample Pitch Runout Layout.....	31
Sample Profile & Helix Measurement Analysis	32
Using the Menu Bar	33
File Menu	33
Edit Menu	33
Measure Menu	33

Printed Documentation

View Menu	34
Help Menu	34
Performing a Gear Measurement.....	35
Step 1: Start the Gear Program	35
Step 2: Define your Gear	35
Step 3: Calibrate your Probe(s)	35
Step 4: Align the Gear	35
Step 5: Measure the Gear	35
Step 6: Analyze the Gear Measurement.....	35
Glossary.....	37
Index.....	39

PC-DMIS Gear

Introduction

PC-DMIS™ Gear is a completely independent software package that, through automation, uses PC-DMIS 3.6 or higher to measure External Spur, Helical, and Internal Spur gears.

PC-DMIS Gear is designed for simplicity and to give you a straight forward measurement experience.

This documentation covers the following topics:

- [Getting Started](#)
 - [Using the Gear Control Dialog](#)
 - [Define Gear](#)
 - [Open Existing](#)
 - [Qualify Probes](#)
 - [Align Gear](#)
 - [Measure Gear](#)
 - [Analyze Gear](#)
 - [Using the Menu Bar](#)
 - [Performing a Gear Measurement](#)
-

Getting Started

To start PC-DMIS Gear, follow these instructions:

1. Make sure you have a portlock attached to the serial (printer) port of your computer. Some newer portlocks may attach to your USB port.
2. If PC-DMIS 3.5 or later is not already installed, follow your PC-DMIS installation guide to install it.
3. Log on to the Wilcox ftp site: [ftp.wilcoxassoc.com](ftp://ftp.wilcoxassoc.com). Browse to PcDmisGearHX directory. Download the sub directory containing the designated version into a specified directory on your hard drive.
4. Install PC-DMIS Gear by double-clicking the setup.exe file.



5. An installation wizard appears that will guide you through the installation process.

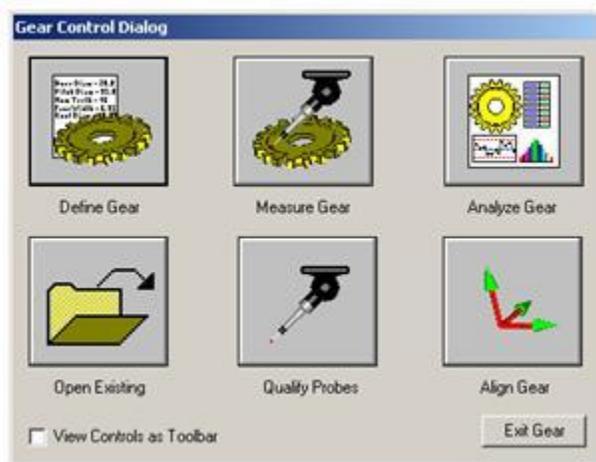


PcDmisGear Setup Wizard

6. Follow the on-screen instructions to install PC-DMIS Gear. By default the setup application will install PC-DMIS Gear to the **PcDmisGear** directory on your **C:** drive.
7. Double-click the **PcDmisGear** shortcut icon from the resulting program group (or select **Start | Programs | PcDmisGear** and then select the **PcDmisGear** shortcut icon).

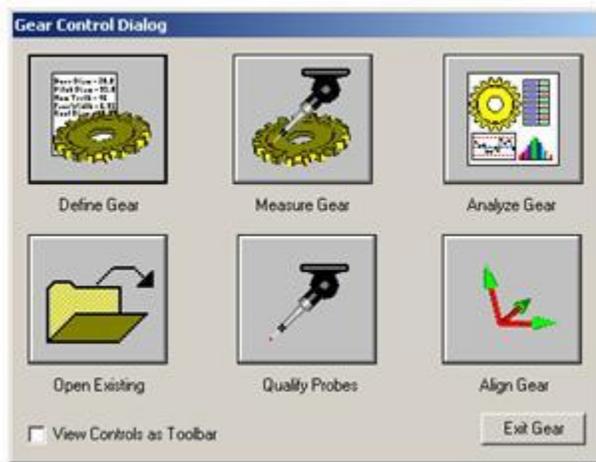


8. PC-DMIS Gear launches and **Gear Control Dialog** appears. You will use this dialog box for the bulk of your PC-DMIS Gear operations. The rest of this manual discusses the operations you can perform using the **Gear Control Dialog**.



[Gear Control Dialog](#)

Using the Gear Control Dialog



Gear Control Dialog

The **Gear Control Dialog** has all the functionality you need to in one convenient, easy to see location. This dialog box lets you perform the following functions:

	<p>Define Gear – Defines the gear you will measure. See “Define Gear”.</p>
	<p>Measure Gear – Uses PC-DMIS in the background to perform the actual gear measurement. See “Measure Gear”.</p>
	<p>Analyze Gear – Analyzes the gear measurement, providing statistical data. See “Analyze Gear”.</p>
	<p>Open Existing – Opens a previously saved <i>gear file</i>. See “Open Existing”.</p>

Printed Documentation

	Qualify Probes – Defines and calibrates any probes you plan on using to align or measure the gear. See “Qualify Probes” .
	Align Gear – Aligns the selected gear to your measuring machine. See “Align Gear” .
<input type="checkbox"/> View Controls as Toolbar	View Controls as Toolbar – This check box places all the controls on this dialog box into a toolbar at the top of your PC-DMIS Gear application.
Exit Gear	Exit Gear – Closes the PC-DMIS Gear application.

Define Gear



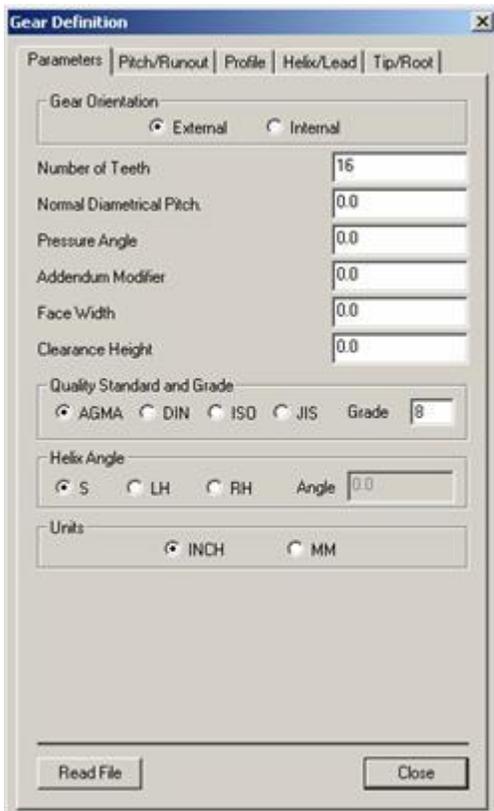
Define Gear icon

Clicking the **Define Gear** icon displays the **Gear Definition** dialog box. This dialog box lets you define the measurement parameters of the gear. PC-DMIS Gear uses these parameters to create the PC-DMIS part program. The part program will then measure and collect the data to be analyzed.

The **Gear Definition** dialog box has five tabs which represent the possible aspects of measurement. Only the *Pitch* and *Runout* measurements are required; all other measurements are optional.

Parameters Tab

This tab defines the general gear parameters used for measurement. PC-DMIS Gear requires these parameters to perform accurate measurements.



Gear Definition dialog box – Parameters tab

Gear Orientation: The options in this area let you specify whether the gear is **External** (teeth on the outside) or **Internal** (teeth on the inside).

Number of Teeth: This box specifies the number of teeth around the gear.

Normal Diametrical *Pitch* (INCH)/Norm Module (MM): Please consult the *gear standard* for the definition of this parameter. The heading for this box changes between “(Inch)” and “Norm Module (MM)” depending on whether you selected **Inch** or **MM** as your Units of Measurement.

Pressure Angle: Please consult the gear standard for the definition of this parameter.

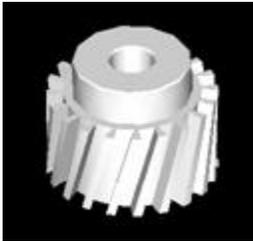
Addendum Modifier: Please consult the gear standard for the definition of this parameter.

Face Width: This box specifies the width from the top of a single gear tooth to the bottom of the same gear tooth. It is always a positive number.

Clearance Height: This box defines the clearance height used to measure the gear alignment and the clearance height used at the beginning and end of the gear measurement.

Quality Standard and Grade: The options in this area define the standard used to create the gear and the standard against which you will measure the gear.

Helix Angle: This area contains options that define the orientation and angle of the helix of the gear. If you are measuring a spur gear, you would select the **S** option and type 0 in this box. **S** stands for Spur. **RH** stands for right hand. **LH** stands for left hand.



Right Hand Helix



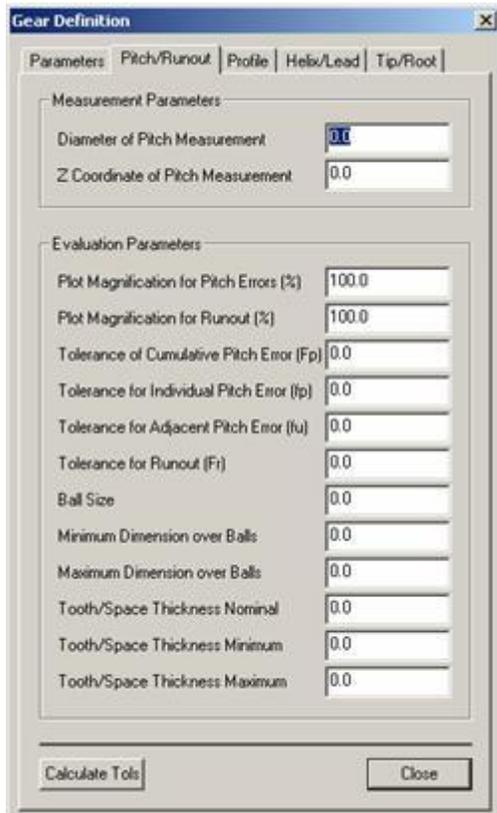
Left Hand Helix

Units: The **Inch** and **MM** options define the units of measurement to use in the created part program and for any typed distance values in PC-DMIS Gear.

Read File: Clicking the **Read File** button allows you to import a gear definition file (a file with a .def filename extension) created from Brown and Sharpe’s gear program. While data is not imported, the gear definition is and PC-DMIS Gear will automatically populate your **Gear Definition** dialog box with the imported values.

Pitch/Runout Tab

This tab lets you specify the required data for the measurement of the *Pitch* and *Runout* as well as the analysis parameters for each measurement. The two boxes in the **Measurement Parameters** section are required. Every time you use PC-DMIS Gear to measure, it will also measure the Pitch and Runout.



Gear Definition dialog box – Pitch/Runout tab

Diameter of Pitch Measurement: This is the diameter at which the pitch point measurements will be taken. This value isn't necessarily the same as the Pitch Circle Diameter defined in your *gear standard*, although it usually is.

Z Coordinate of Pitch Measurement: This value is the Z coordinate value where the pitch points should be measured. This value is usually negative.

Plot Magnification for Pitch Errors: This value is a percentage that all Pitch errors will be magnified by for display in the analysis.

Plot Magnification for Runout Errors: This value is a percentage that all Runout errors will be magnified by for display in the analysis.

Tolerance of Cumulative pitch error (*Fp*): Please see the appropriate standard for a definition of this value.

Tolerance of Individual pitch error (*fp*): Please see the appropriate standard for a definition of this value.

Tolerance of Adjacent pitch error (*fu*): Please see the appropriate standard for a definition of this value.

Tolerance of Runout (*Fr*): Please see the appropriate standard for a definition of this value.

Ball size: This is the size of the ball over which the **Minimum Dimension over Balls** and **Maximum Dimension over Balls** is measured. Please see the appropriate standard for an explanation of how this is measured. If you leave this value at zero, PC-DMIS Gear calculates the ball size at the time of analysis.

Minimum Dimension over Balls: Please see the appropriate standard for a definition of this value.

Maximum Dimension over Balls: Please see the appropriate standard for a definition of this value.

Tooth/Space Thickness Nominal: Please see the appropriate standard for a definition of this value.

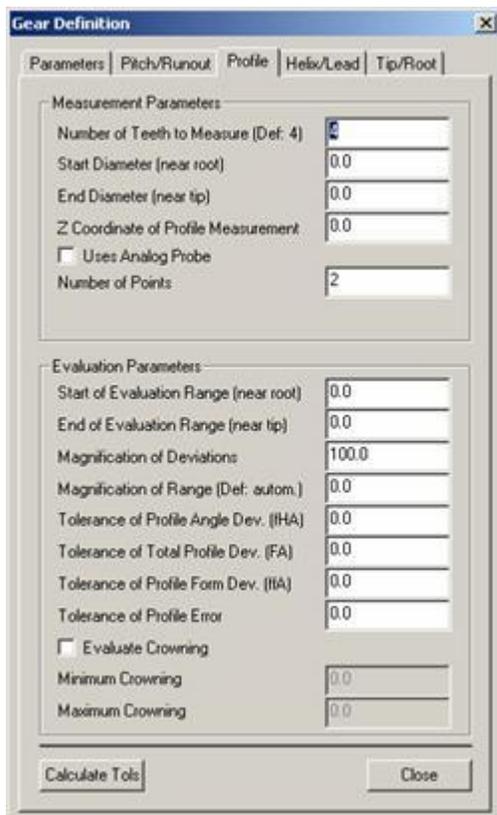
Tooth/Space Thickness Minimum: Please see the appropriate standard for a definition of this value.

Tooth/Space Thickness Maximum: Please see the appropriate standard for a definition of this value.

Calculate Tols: This button causes PC-DMIS Gear to use the values input on this tab as well as the **Parameters** tab to calculate the tolerances of the Pitch and Runout based on the standard specified.

Profile Tab

This tab lets you specify the required data for the measurement of the *Profile* as well as the analysis parameters for each measurement. Profile measurement is optional; if you don't want to measure the profile, type a zero value in the **Number of Teeth to Measure** box.



Gear Definition dialog box – Profile tab

Number of Teeth to Measure: This value is the number of teeth of the gear on which you want to measure the profile. The teeth measured will be as close to equally spaced around the gear as possible starting with tooth #1.

Start Diameter (near root): This value is the diameter of the circle which represents where the profile scan should start.

End Diameter (near tip): This value is the diameter of the circle which represents where the profile scan should end.

Z Coordinate of Profile Measurement: This is the Z coordinate value where the profile should be measured. This value is normally negative but positive values are allowed. This is not a depth value.

Uses Analog Probe: This check box lets you determine whether or not PC-DMIS Gear uses an Analog Probe to measure the profile. If you deselect this check box, PC-DMIS Gear assumes that you will use a touch trigger probe.

Printed Documentation

Number of Points: This value determines the number of points to measure for the profile scan. This box becomes enabled if you do not select the **Use Analog Probe** check box.

Scan Point Density: This value determines the number of points per millimeter to measure for the profile scan. This box becomes enabled if you select the **Use Analog Probe** check box.

Scan Speed: This value determines the percentage of the maximum scan speed at which you want to measure the profile scan. This box becomes enabled if you select the **Use Analog Probe** check box.

Start of Evaluation Range: This diameter value determines where on the profile scan you want to begin the evaluation. You should use a value slightly larger than the profile start diameter value.

End of Evaluation Range: This diameter value determines where on the profile scan you want to end the evaluation. You should use a value slightly smaller than the profile end diameter value.

Magnification of Deviations: This value is a percentage that all errors will be magnified by for display in the analysis.

Magnification of Range (*Def. autom*): This value is percentage that all errors will be magnified by for display in the analysis. If you type a zero, PC-DMIS Gear calculates the value internally.

Tolerance of Profile Angle Dev. (*fHA*): Please see the appropriate standard for a definition of this value.

Tolerance of Total Profile Dev. (*FA*): Please see the appropriate standard for a definition of this value.

Tolerance of Profile Form Dev. (*ffA*): Please see the appropriate standard for a definition of this value.

Tolerance of Profile Error: Please see the appropriate standard for a definition of this value. This value is for the AGMA *gear standard* only.

Evaluate *Crowning*: This value determines if crowning should be evaluated. If it is checked then crowning will be evaluated and if it is not checked then crowning will not be evaluated.

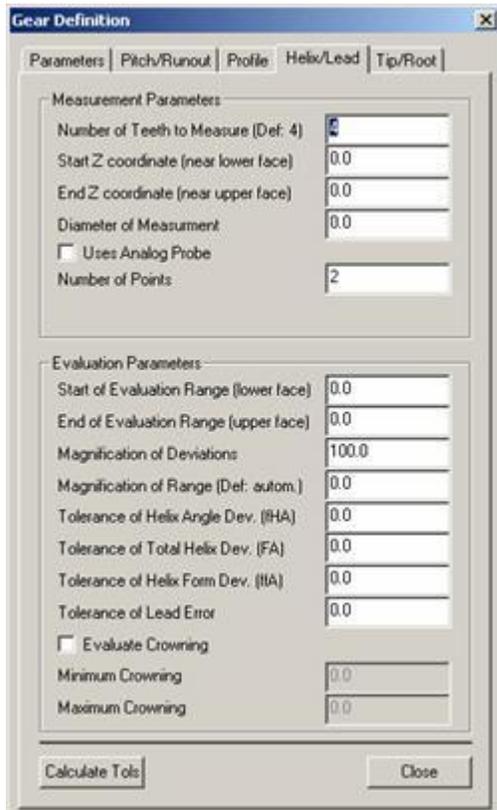
Minimum Crowning: Please see the appropriate standard for a definition of this value.

Maximum Crowning: Please see the appropriate standard for a definition of this value.

Calculate Tols: This button causes PC-DMIS Gear to use the values input on this tab as well as the **Parameters** tab to calculate the tolerances of the *Pitch* and *Runout* based on the standard specified.

Helix/Lead Tab

This tab lets you specify the required data for the measurement of the *Helix/Lead* as well as the analysis parameters for each measurement. Helix/Lead measurement is optional; if you don't want to measure the *profile*, type a zero value in the **Number of Teeth to Measure** box. All the values in the **Measurement Parameters** area are required for measurement.



Gear Definition dialog box – Helix/Lead tab

Number of Teeth to Measure: This value is the number of teeth of the gear on which you want to measure the Helix/Lead. The teeth measured will be as close to equally spaced around the gear as possible starting with tooth #1.

Start Z Coordinate (near lower face): This value is Z coordinate location where the Helix/Lead scan begins. The Helix/Lead scans always start at the bottom and moves upward.

End Z Coordinate (near upper face): This value is Z coordinate location where the Helix/Lead scan ends. The Helix/Lead scans always start at the bottom and move upward.

Diameter of Measurement: This value is the Diameter at which the Helix/Lead scans are measured.

Uses Analog Probe: This check box lets you determine whether or not PC-DMIS Gear uses an Analog Probe to measure the Helix/Lead. If you deselect this check box, PC-DMIS Gear assumes that you will use a touch trigger probe.

Number of Points: This value determines the number of points to measure for the Helix/Lead scan. This box becomes enabled if you do not select the **Use Analog Probe** check box.

Scan Point Density: This value determines the number of points per millimeter to measure for the Helix/Lead scan. This box becomes enabled if you select the **Use Analog Probe** check box.

Scan Speed: This value determines the percentage of the maximum scan speed at which you want to measure the Helix/Lead scan. This box becomes enabled if you select the **Use Analog Probe** check box.

Start of Evaluation Range: This Z coordinate value represents where on the Helix/Lead scan you want to begin the evaluation. You should use a value slightly larger than the Helix/Lead **Start Z Coordinate** value.

End of Evaluation Range: This Z coordinate value represents where on the Helix/Lead scan you want to end the evaluation. You should use a value slightly smaller than the Helix/Lead **End Z Coordinate** value.

Magnification of Deviations: This value is a percentage that all errors will be magnified by for display in the analysis.

Magnification of Range (*Def. autom*): This value is percentage that all errors will be magnified by for display in the analysis. If you type a zero, PC-DMIS Gear calculates the value internally.

Tolerance of Helix/Lead Angle Dev. (*fHB*): Please see the appropriate standard for a definition of this value.

Tolerance of Total Helix/Lead Dev. (*FB*): Please see the appropriate standard for a definition of this value.

Tolerance of Profile Form Dev. (*ffB*): Please see the appropriate standard for a definition of this value.

Tolerance of Helix/Lead Error: Please see the appropriate standard for a definition of this value. This value is for AGMA only.

Evaluate *Crowning*: This value determines if crowning should be evaluated. If it is checked then crowning will be evaluated and if it is not checked then crowning will not be evaluated.

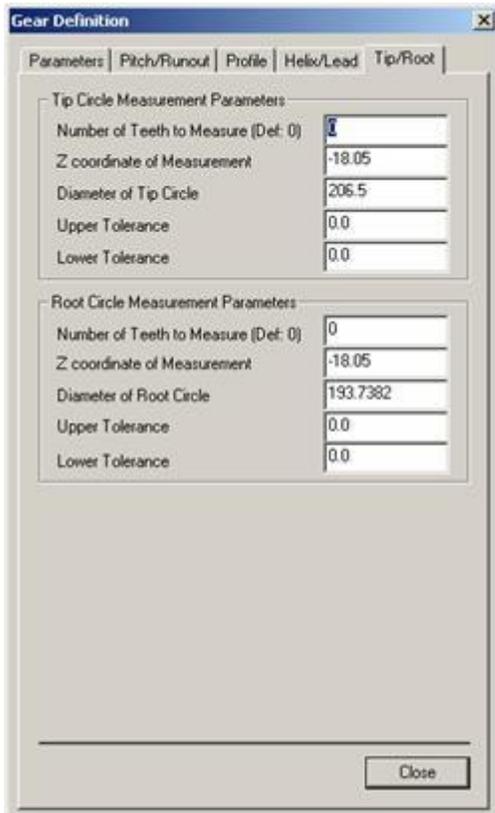
Minimum Crowning: Please see the appropriate standard for a definition of this value.

Maximum Crowning: Please see the appropriate standard for a definition of this value.

Calculate Tols: This button causes PC-DMIS Gear to use the values input on this tab as well as the **Parameters** tab to calculate the tolerances of the *Pitch* and *Runout* based on the standard specified.

Tip/Root Tab

This tab lets you specify the required data for the measurement of the *Tip circles* and *Root circles*. *Tip/Root* measurement is optional; if you don't want to measure the Tip/Root, type a zero value in the **Number of Teeth to Measure** box. All the values in the **Measurement Parameters** areas are required for measurement.



Gear Definition dialog box – Tip/Root tab

This tab contains two areas, the **Tip Circle Measurement Parameters** area and the **Root Circle Measurement Parameters** area. The definition of the boxes for both areas is given below:

Tip Circle Measurement Parameters:

The Tip circle is the circle measured by taking points on the outer most part of the gear teeth.

Number of Teeth: This value is the number of teeth of the gear on which you want to measure the Tip circle. The teeth measured will be as close to equally spaced around the gear as possible starting with tooth #1.

Z Coordinate of Measurement: This is the Z coordinate value where the Tip points should be measured. This value is usually negative.

Diameter of Tip Circle: This value is the theoretical diameter of the Tip circle.

Upper Tolerance: This value is the upper tolerance for the diameter of the measured Tip circle.

Printed Documentation

Lower Tolerance: This value is the lower tolerance for the diameter of the measured Tip circle.

Root Circle Measurement Parameters:

The Root circle is the circle measured by taking points on the root space between two adjacent gear teeth.

Number of Teeth: This value is the number of teeth of the gear on which you want to measure the Root circle. The teeth measured will be as close to equally spaced around the gear as possible starting with tooth #1.

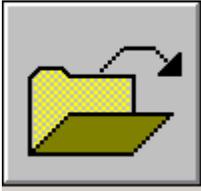
Z Coordinate of Measurement: This is the Z coordinate value where the Root points should be measured. This value is usually negative.

Diameter of Root Circle: This value is the theoretical diameter of the Root circle.

Upper Tolerance: This value is the upper tolerance for the diameter of the measured Root circle.

Lower Tolerance: This value is the lower tolerance for the diameter of the measured Root circle.

Open Existing



Open Existing icon

Clicking the **Open Existing** icon displays an **Open** dialog box from which you can open a stored *gear file* (a file with a *.gear filename extension). Gear files contain setup information for your gear as well as stored measured data from your last measurement. You can open the gear file to use and analyze this data without re-measuring the gear.



Open dialog box

Qualify Probes



Qualify Probes icon

Clicking the **Qualify Probes** icon displays the **Probe Setup** dialog box. This dialog box lets you specify or define and calibrate the *probe file* to be used for the gear measurement.



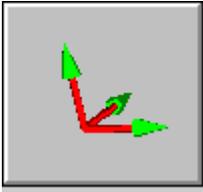
Probe Setup dialog box

User Defined: This icon opens the **Probe Utilities** dialog box inside PC-DMIS, allowing you to manually define and calibrate the probe you want to use in the gear measurement. Once you define a probe, PC-DMIS creates a probe file. For information on using the **Probe Utilities** dialog box, press F1 on that dialog box to access its Help topic.

Probe Wizard: This icon launches the PC-DMIS probe wizard. This wizard takes you through the steps to create and calibrate a probe configuration. The wizard accomplishes the same thing as if you created and calibrated the probe by using the **Probe Utilities** dialog box.

From File: This icon displays an **Open** dialog box from which you can select an existing probe file. A probe file contains a probe's definition and is created anytime you define a probe using the **Probe Utilities** dialog box or if you use the **Probe Wizard**. Once you select a probe file, PC-DMIS Gear asks if you want to calibrate it. If you click **Yes**, PC-DMIS starts and calibrates the probe file.

Align Gear

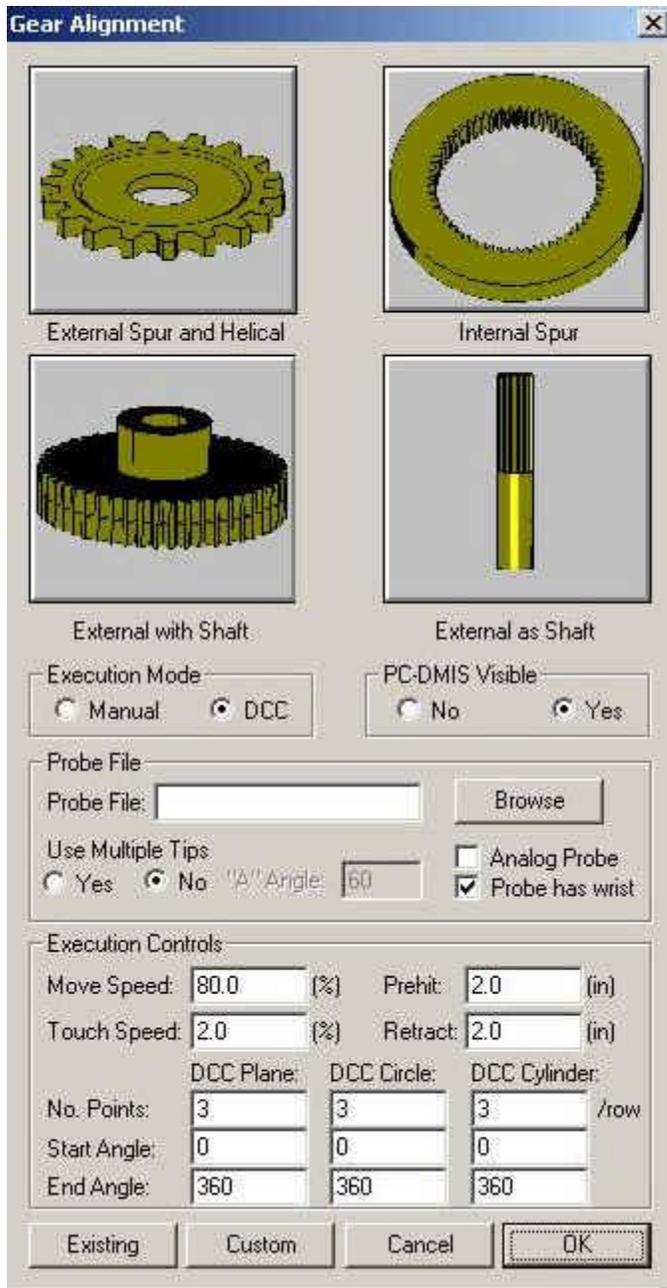


Align Gear icon

The **Align Gear** icon displays the **Gear Alignment** dialog box. This dialog box allows you to choose from one of four routines to align the gear you are about to measure. These include:

- External Spur and Helical
- Internal Spur
- External With Shaft
- External As Shaft

You can also use an existing PC-DMIS part program to create the alignment, or you can create a custom alignment.



Gear Alignment dialog box

External Spur and Helical: This option creates a complete PC-DMIS part program to measure the alignment of the External Spur and Helical gear. The alignment consists of a plane to level the alignment, a circle for the origin of the alignment, and two points for the *clocking* of the alignment. If you select the **DCC** option from the **Execution Mode** area, then the routine will also execute a DCC alignment on the gear.

Internal Spur: This option creates a complete PC-DMIS part program to measure the alignment of an Internal Spur gear. The alignment consists of a plane to level the alignment, a circle for the origin of the alignment, and two points for the clocking of the alignment. If you select the **DCC** option from the **Execution Mode** area, then the routine will also execute a DCC alignment on the gear.

External with Shaft: This option creates a complete PC-DMIS part program to measure the alignment of an External with Shaft gear. The alignment consists of a cylinder to level the alignment and set the center origin, a point to define the Z axis zero location, and two points for the clocking of the alignment. If you select the **DCC** option from the **Execution Mode** area, then the routine will also execute a DCC alignment on the gear.

External as shaft: This option performs a simple manual alignment on an External Spur or Helical gear which is part of a shaft. If you select the **DCC** option from the **Execution Mode** area, then the routine will also execute a DCC alignment on the gear. *This option is not yet implemented.*

Execution Mode: This area contains two options that allow you to determine the execution mode for the alignment. You can choose a manual alignment by selecting the **Manual** option, or you can choose to have the alignment repeated if you select the **DCC** option.

PC-DMIS Visible: This area lets you specify whether or not PC-DMIS is visible during the execution of the alignment. Until you become comfortable with PC-DMIS and the Gear module, select the **Yes** option to have it visible.

Probe File: This box displays a complete pathway to a *probe file* you select for the gear alignment. You can specify a different probe file than that used for the actual gear measurement.

Browse: The browse button allows you to browse to and select the probe file to use for the alignment. The pathway to this probe file will appear in the **Probe File** box.

Probe has wrist: This check box lets you specify whether or not the probe configuration you are using contains a wrist. In PC-DMIS a probe configuration with a wrist uses the tip naming format "T1AXBY" where X & Y are the angles of the wrist (i.e. T1A90B180). Without a wrist PC-DMIS uses "TIPX" where X is simply the TIP #. PC-DMIS Gear needs to know whether or not the probe has a wrist so that it uses the correct tip naming format.

Execution Controls:

This area contains values that control the movement of the machine while executing the DCC portion of the alignment.

Move Speed: This value determines the speed the machine will use to move from point to point and to and from the clearance plane.

Touch Speed: This value determines the speed the machine will use when taking a point measurement or approaching the first point of an analog scan.

Prehit: This value determines the distance from the theoretical point that the machine changes from Move Speed to the slower Touch Speed. For further information on any of these values consult the main PC-DMIS manual.

Retract: The distance away from the measured point location that the machine changes from Touch Speed to the quicker Move Speed.

DCC Plane: If you choose to execute a DCC alignment then PC-DMIS Gear will measure a DCC plane. This plane is defined by the following three values as well as the first point of the manual plane. The XY location of the first point of the manual plane from the manual alignment origin will define the radius of a circle of points which will be measured as a plane.

This plane is only measured for the “External Spur and Helical” and “Internal Spur” canned alignments.

No. Points: This determines the number of points that will be measured for the DCC plane.

Start Angle: This determines the polar coordinate location of the first point of the DCC plane. The angles are defined as 0 being equal to the clocking axis of the manual alignment and increasing as you move counter-clockwise around the center of the origin. Negative numbers are not allowed.

End Angle: This determines the location of the last point of the DCC plane. The angles are defined as 0 being equal to the clocking axis of the manual alignment and increasing as you move counter-clockwise around the center of the origin. Negative numbers are not allowed.

DCC Circle: If you choose to execute a DCC alignment for the **External Spur and Helical** and **Internal Spur** alignment routines, then PC-DMIS Gear will measure a DCC Circle. This circle is defined by the following three values as well as the first point of the manual circle. The Z location of the first point of the manual circle from the manual alignment origin defines the depth of the DCC circle.

No. Points: This determines the number of points that will be measured for the DCC circle.

Start Angle: This determines the location of the first point of the DCC circle. The angles are defined as 0 being equal to the clocking axis of the manual alignment and increasing as you move counter-clockwise around the center of the origin. Negative numbers are not allowed.

End Angle: This determines the location of the last point of the DCC circle. The angles are defined as 0 being equal to the clocking axis of the manual alignment and increasing as you move counter-clockwise around the center of the origin (Negative numbers are not allowed).

DCC Cylinder: If you choose to execute a DCC alignment and are using the **External as Shaft** alignment routine then a PC-DMIS Gear will measure a DCC cylinder. This cylinder is defined by the following three values as well as the first point of each of the two rows of the manual cylinder. The Z location of the first point and the fourth point of the manual cylinder from the manual alignment origin will define the depth and length of the DCC cylinder.

No. Points: This determines the number of points to measure for each row of the DCC cylinder.

Start Angle: This determines the location of the first point of the DCC cylinder. The angles are defined as 0 being equal to the clocking axis of the manual alignment and increasing as you move counter-clockwise around the center of the origin. Negative numbers are not allowed.

End Angle: This determines the location of the last point of the DCC cylinder. The angles are defined as 0 being equal to the clocking axis of the manual alignment and increasing as you move counter-clockwise around the center of the origin. Negative numbers are not allowed.

Existing: Clicking this button displays an **Open** dialog box that allows you to select and execute an existing PC-DMIS part program which contains the alignment to use for the gear measurement.

Custom: If none of the above alignment options work for your gear, clicking this button launches PC-DMIS and lets you manually create a custom alignment to fit the specific needs of your gear.

Measure Gear

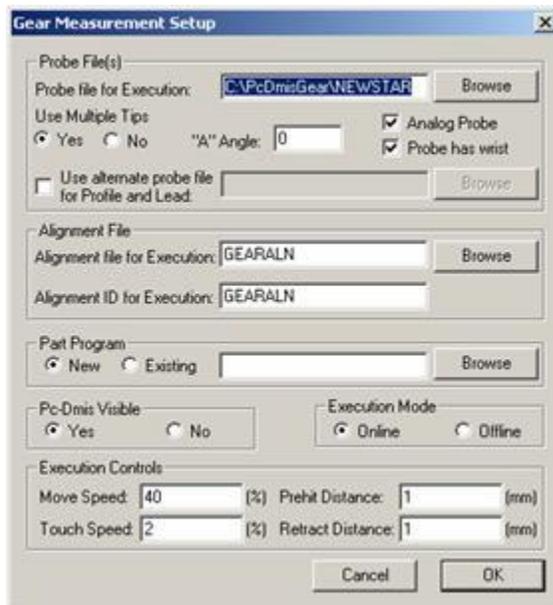


Clicking the **Measure Gear** icon displays the **Gear Measurement Setup** dialog box. This dialog box allows you to actually start the measurement process for your gear.

[Measure Gear icon](#)

Before measuring ensure you have first:

- [Defined your probe](#)
- [Calibrated your probe](#)
- [Defined your gear](#)
- [Aligned your gear](#)



Gear Measurement Setup

Probe file for Execution: The pathway in this box defines what probe file you want to use for the gear's measurement. Click the **Browse** button to easily navigate to and select the *probe file* to use for the gear's measurement.

Use Multiple Tips: You can select the **Yes** or **No** option buttons to determine whether or not PC-DMIS Gear should use multiple tips to measure your gear. If you have an indexing probe and you want to use more than one probe tip, select the **Yes** option.

“A” Angle: If you selected **Use Multiple Tips** and your probe uses an indexing probe head, this value defines the “A” angle that will be used for the measurements. The “A” angle of the probe remains constant while the “B” angle rotates to the best tip angle for each tooth. If you use a star probe and you don’t want any probe head rotation, type zero into this box.

Analog Probe: This check box tells the gear program whether or not you will use an analog probe head for the measurement. The type of scan used while measuring the *Profile* and *Helix/Lead* will be determined by this value.

Probe has wrist: This check box lets you specify whether or not the probe configuration you are using contains a wrist. In PC-DMIS a probe configuration with a wrist uses the tip naming format “T1AXBY” where X & Y are the angles of the wrist (i.e. T1A90B180). Without a wrist PC-DMIS uses “TIPX” where X is simply the TIP #. PC-DMIS Gear needs to know whether or not the probe has a wrist so that it uses the correct tip naming format.

Use alternate probe file for Profile and Lead: This check box lets you determine whether or not PC-DMIS Gear should use a different probe configuration for the Profile and Lead measurement than the probe configuration used for the *Pitch* measurements. If you select this check box the associated box and **Browse** button become enabled allowing you to select the appropriate probe file.

Alignment File: This box lets you determine the alignment file to be recalled and used in the gear measurement program. By default, PC-DMIS Gear automatically selects the alignment you performed using the **Align Gear** icon. Use the **Browse** button to select the alignment file (file with an .aln filename extension). For more information on alignment files, see the topics on saving and recalling alignment files in the main PC-DMIS manual.

Alignment ID: This box specifies the alignment ID from the selected Alignment File that you will use as the main alignment in the gear measurement program.

Part Program: The **New** and **Existing** options let you specify whether PC-DMIS Gear should create a new PC-DMIS program to measure the gear or if it should use an existing PC-DMIS part program.

PC-DMIS Visible: This area lets you specify whether or not PC-DMIS is visible during the gear measurement. Until you become comfortable with PC-DMIS and the Gear module, select the **Yes** option to have it visible.

Execution Mode: This area lets you decide to create the PC-DMIS measurement program with or without executing it.

If you select **Offline**, PC-DMIS Gear will generate the PC-DMIS part program and then access the part program in PC-DMIS Offline mode so you can view it. You can then save the program and execute it later using PC-DMIS Gear to actually collect the measurement data.

If you select **Online**, PC-DMIS Gear will generate the PC-DMIS part program and then execute it.

Move Speed: This value determines the speed the machine will move when moving around the gear.

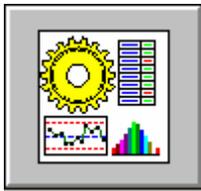
Touch Speed: This value determines the speed the machine will move when it reaches the **Prehit Distance** for the current measurement point.

Prehit Distance: This value determines the distance from the theoretical point that the machine changes from Move Speed to the slower Touch Speed. For further information on any of these values consult the main PC-DMIS manual.

Retract Distance: This value determines the distance away from the measured point location that the machine changes from Touch Speed to the quicker Move Speed.

OK: Clicking **OK** begins the gear measurement program.

Analyze Gear



Analyze Gear icon

Clicking the **Analyze Gear** icon accesses the **Analysis Setup** dialog box. Once you complete the gear measurement, you can use this dialog box to produce a graphical report of the measurement (see the sample reports below).

Analysis Setup dialog box

Pitch/Runout: This check box determines whether or not PC-DMIS Gear should produce a graphical report for Pitch and Runout.

Profile/Helix: This check box determines whether or not PC-DMIS Gear should produce a graphical report for Profile and Helix. This option is only available if the user measured the profile and helix

Printed Documentation

Tip Circle: This check box determines whether or not PC-DMIS Gear should produce a graphical report for the Tip Circle measurement. This functionality is not yet available.

Root Circle: This check box determines whether or not PC-DMIS Gear should produce a graphical report for the Root Circle measurement. This functionality is not yet available.

Parameters: The four **Parameters** buttons allow you to change the analysis parameters for its associated analysis option. These parameters are the same as those discussed in the **Parameters** tab of the **Gear Definition** dialog box. See "[Parameters Tab](#)".

Plot Information: This area allows you to include general purpose information appear in your analysis report, such as:

- Program Number
- Notation
- Serial Number
- Inspector
- Machine ID
- Date/Time
- Drawing Number
- Part/Mach

Create Report: Clicking this button creates the report based on the different options and values set in the **Create Report** dialog box. It sends the report to the output device specified in the **Display/Print** list.

Display/Print: This list tells PC-DMIS Gear where to display the analysis report. If you select **Display**, it appears on the screen in a separate window and the **Analysis Setup** dialog box remains open. Once it appears on the screen, you can choose to send it to your printer. If you select **Print**, it only goes to your printer.

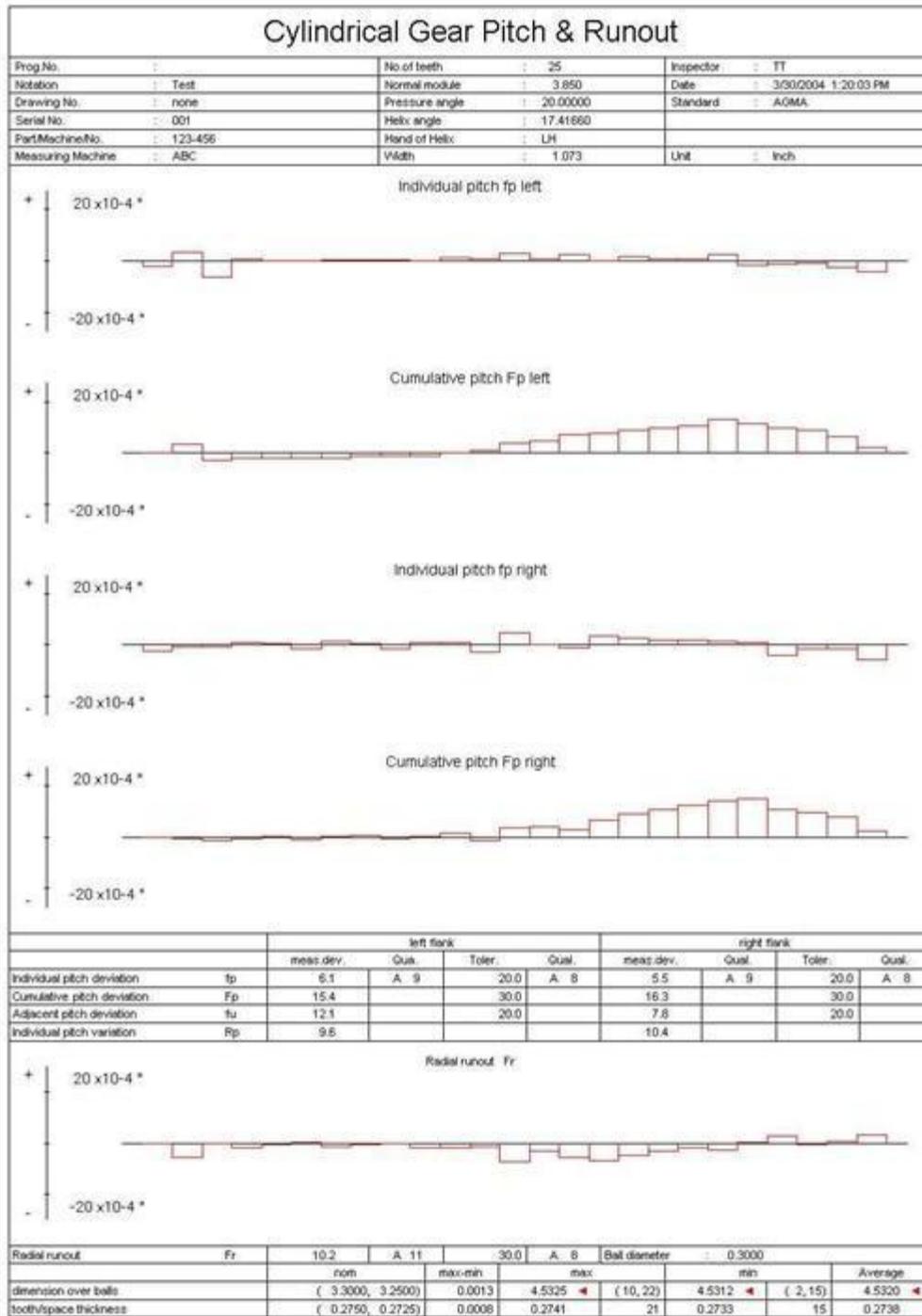
Done: Clicking this button closes the **Analysis Setup** dialog box. It also closes any open analysis display screen.

How the Report Relates to the Measured Gear

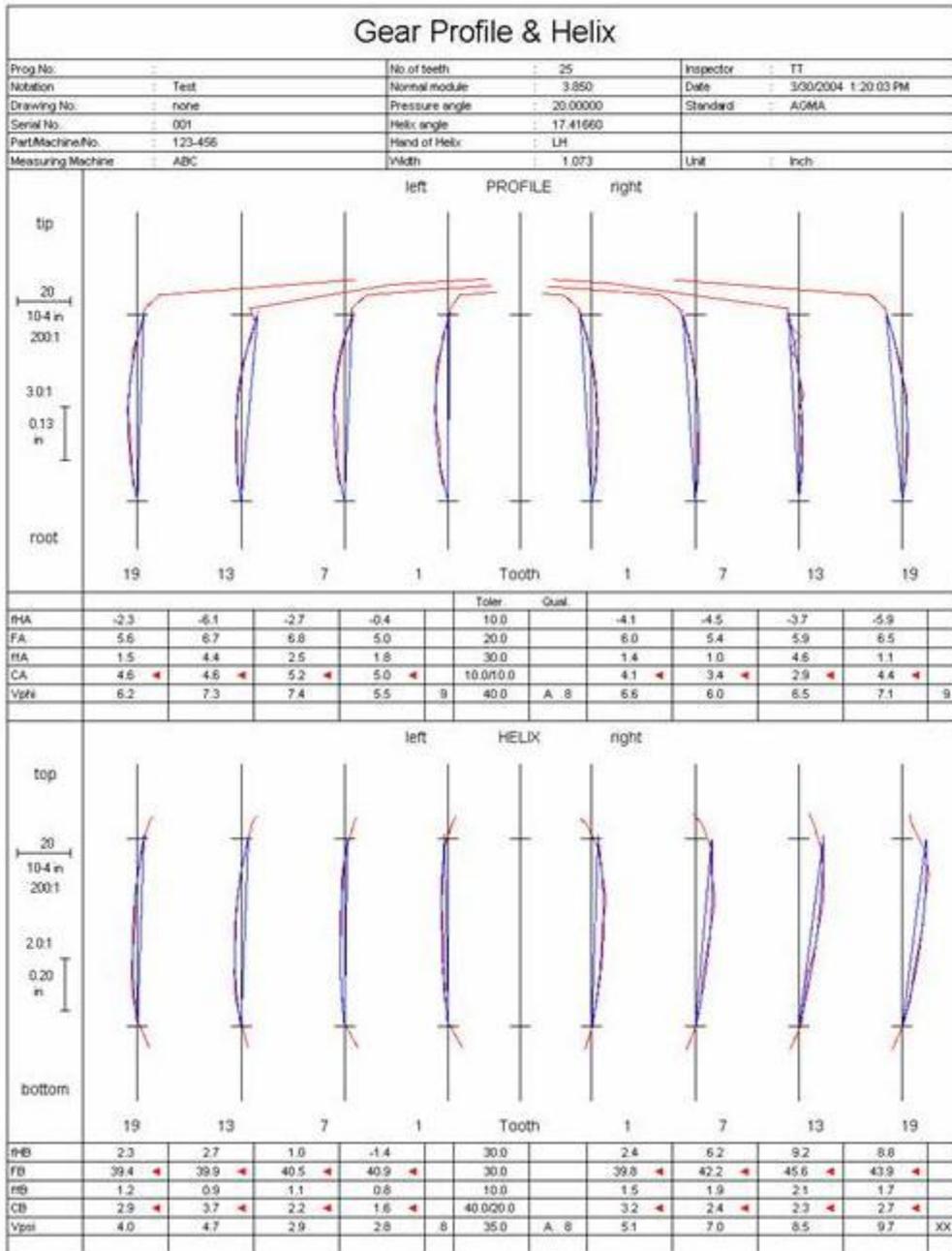
It is helpful to not the relation of how the teeth are numbered and what part of each tooth is considered left and right. Tooth #1 is the gear where measurement begins based upon the start angle. Subsequent teeth are numbered according to the order that measurements are taken.

The left and right sides of each tooth is based upon the gear as viewed from the center axis of the gear. That is also true for the left and right side of a gap.

Sample Pitch Runout Layout

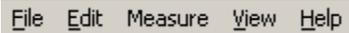


Sample Profile & Helix Measurement Analysis



Using the Menu Bar

PC-DMIS Gear contains a menu bar with these menus:



File Edit Measure View Help

PC-DMIS Gear Menu Bar

You can use these menus to perform many of the operations already discussed in “[Using the Gear Control Dialog](#)”. Consult that topic for in-depth information on many of these menu operations.

File Menu

File | New – Selecting **New** creates a new *.gear file*.

File | Open – Selecting **Open** opens an existing *.gear* file. See “[Open Existing](#)”.

File | Save – Selecting **Save** allows you to save whatever parameters or other information about your current Gear measurement to use later. PC-DMIS Gear saves Gear files with a *.gear* filename extension.

File | Save As – Selecting **Save As** works the same as the **Save** menu option, but it allows you to save the current Gear file with a new file name.

File | Exit – Selecting **Exit** closes the PC-DMIS Gear application.

Edit Menu

Edit | Gear Definition – Selecting **Gear Definition** accesses the **Parameters** tab of the **Gear Definition** dialog box. See “[Define Gear](#)”.

Measure Menu

Measure | Gear | Execute – Selecting **Execute** accesses the **Gear Measurement Setup** dialog box, allowing you to setup and execute the measurement of your gear. See “[Measure Gear](#)”.

Measure | Gear | Setup – Selecting **Setup** accesses the **Gear Measurement Setup** dialog box. See “[Measure Gear](#)”.

Measure | Probe – Selecting **Probe** accesses the **Probe Setup** dialog box. See “[Qualify Probes](#)”.

Measure | Alignment – Selecting **Alignment** accesses the **Gear Alignment** dialog box. See “[Align Gear](#)”.

View Menu

View | Analysis – Selecting **Analysis** shows or hides the analysis for the completed measurement. See “[Analyze Gear](#)”.

View | Status Bar – Selecting **Status Bar** shows or hides the **Status Bar** at the bottom of the screen.

View | Gear Control Dialog – If this dialog box is hidden, selecting **Gear Control Dialog** displays it. See “[Using the Gear Control Dialog](#)”.

View | Tool Bar – Selecting **Tool Bar** displays the items on the **Gear Control Dialog** as a toolbar at the top of the screen. The toolbar will contain the **Save** and **New** icons, as well as icons to access items from the **Help** menu.

Help Menu

Help | Help Topics – Accesses the Help file for the PC-DMIS Gear.

Help | About Gear – Displays the **About Gear** dialog box, showing Gear’s current version.

Performing a Gear Measurement

This topic details the steps you should take inside PC-DMIS Gear to automatically generate and execute a part program that will measure your defined gear.

Step 1: Start the Gear Program

See "[Getting Started](#)" for information on how to do this.

Step 2: Define your Gear

See "[Define Gear](#)" for information on how to do this.

Step 3: Calibrate your Probe(s)

See "[Qualify Probes](#)" for information on how to do this.

Step 4: Align the Gear

See "[Align Gear](#)" for information on how to do this.

Step 5: Measure the Gear

See "[Measure Gear](#)" for information on how to do this.

Step 6: Analyze the Gear Measurement

See "[Analyze Gear](#)" for information on how to do this.

Glossary

B

Ball: This is the ball that fits in between the teeth and touches at the pitch diameter. Consult your gear standard for more information.

C

Clocking: Clocking sets the positive X axis of the alignment on the symmetry point of the two points.

Crowning: This is defined in your gear standard.

D

Def. autom: Default automatic calculation.

F

FA: This is a symbol used by your gear standard.

FB: This is a symbol used by your gear standard.

ffA: This is a symbol used by your gear standard.

ffB: This is a symbol used by your gear standard.

fHA: This is a symbol used by your gear standard.

fHB: This is a symbol used by your gear standard.

Fp: Fp and fp are symbols used by your gear standard.

Fr: This is a symbol used by your gear standard.

fu: This is a symbol used by your gear standard.

G

Gear File: A Gear file contains information that defines a gear inside PC-DMIS Gear. It also contains data from your last measurement. It has a “.gear” filename extension.

Gear standard: The four widely-used gear standards are AGMA, DIN, ISO, and JIN. While similar, they also differ from each other. Because of their differences this documentation cannot cover the details of these standards. You will need to know the information about your particular standard in order to measure your gear and properly analyze your data.

H

Helix: This type of gear has twisted teeth. Instead of the teeth being straight up and down like a spur gear these are twisted.

Helix/Lead: It is a scan from the bottom to the top of the gear at the same radius from the center of the gear.

P

Pitch: Consult your gear standard for a definition of this term.

Probe File: A probe file defines your current probe configuration so that PC-DMIS Gear can understand and use it. The information is stored inside file with a .prb filename extension.

Profile: This is a profile scan.

R

Runout: Consult your gear standard for a definition of this term.

T

Tip/Root: The tip is the “peak” of a gear tooth. The root is the “valley”.

Index

P

PC-DMIS Gear

Align Gear 21

Analyze Gear..... 31

Define Gear 7

Gear Control Dialog..... 4

Getting Started 3

Helix/Lead Tab 12

Introduction 3

Measure Gear 27

Parameters Tab 7

Pitch Runout Report 32

Pitch/Runout Tab 8

Probe Setup..... 19

Profile & Helix Report 33

Profile Tab 10

Steps to Perform a Gear
Measurement 37

Tip/Root Tab 14

Using the Menu Bar 35

PC-DMIS Gear 1