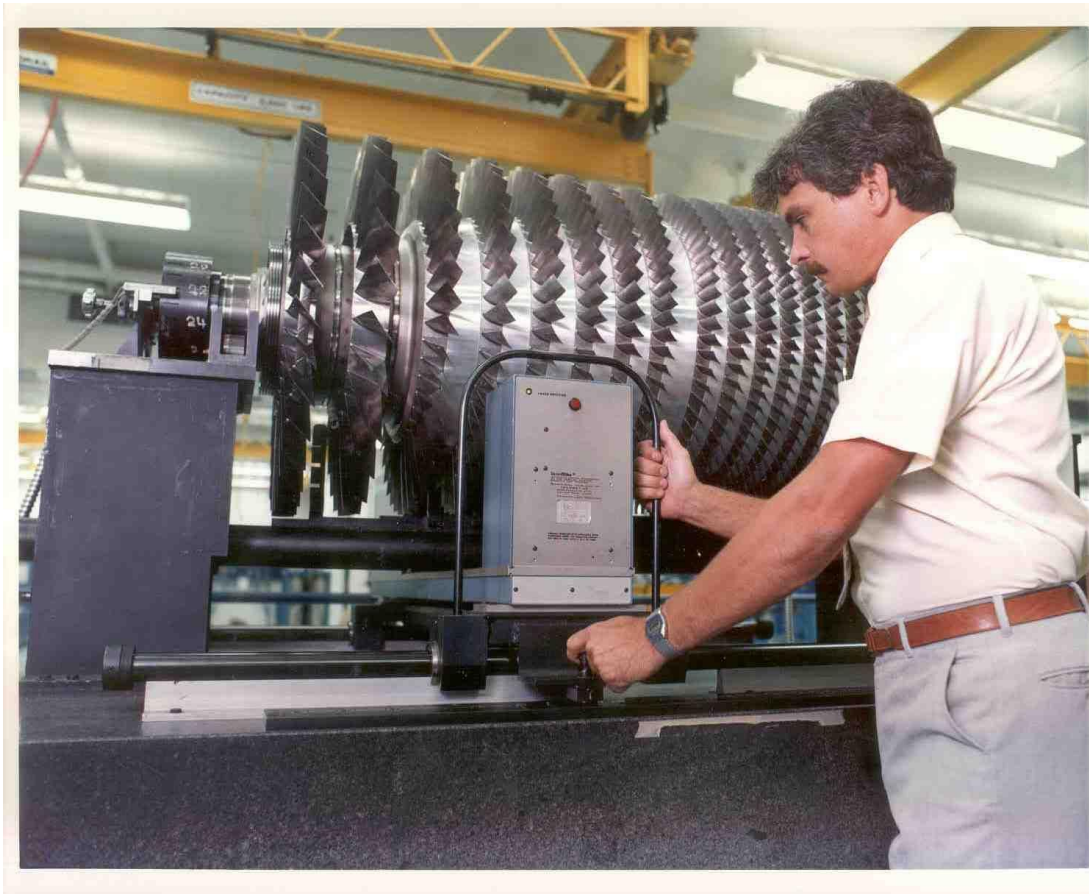


# **Lasertalk Sales Demonstration**

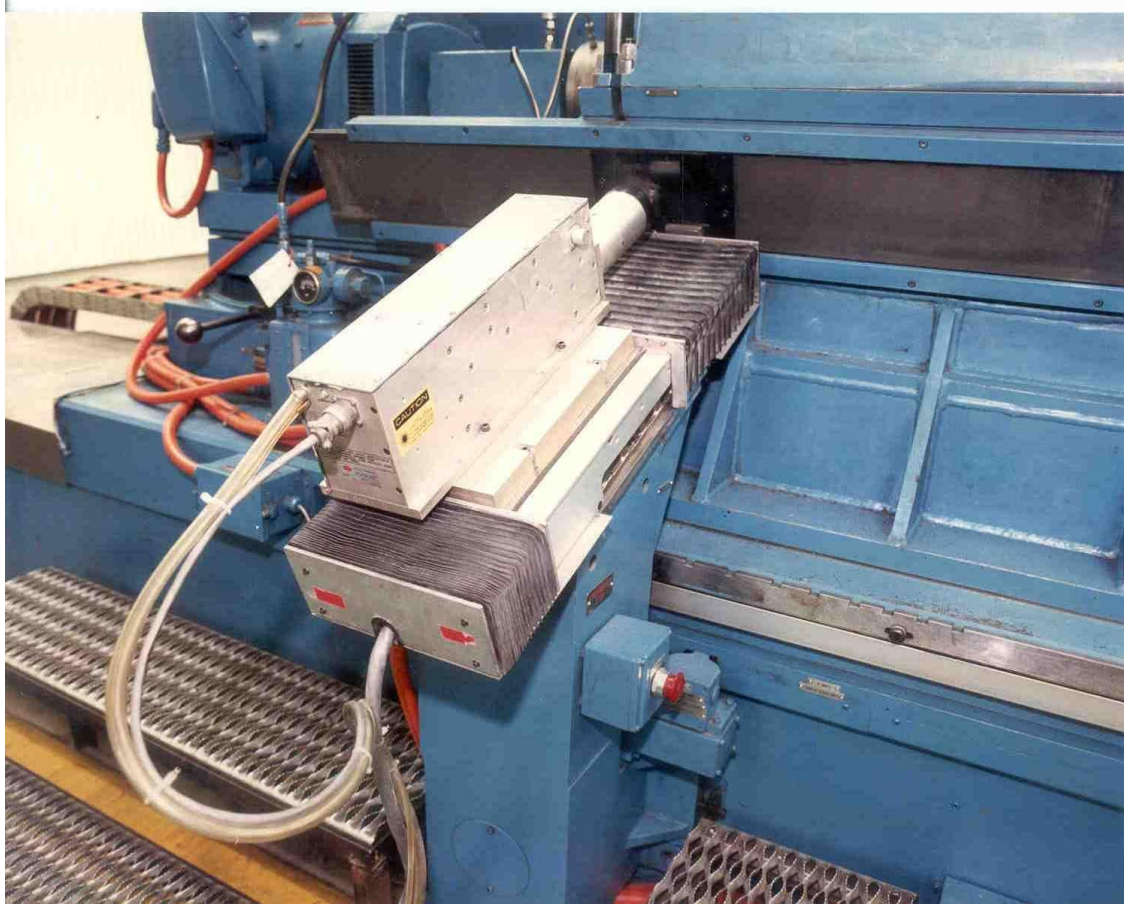
Lasertalk was founded in 1995 some twenty years ago focusing our energies on non-contact measurement instrumentation. Our primary product line is directed to the jet engine industries. Our personnel have been serving this industry for more than 35 years qualifying us as the one of the best companies in the jet engine rotor measurement field.

Our personnel were a part of the original design team that developed the LaserMike “E-rom” measurement system, that was the industry standard for many years.



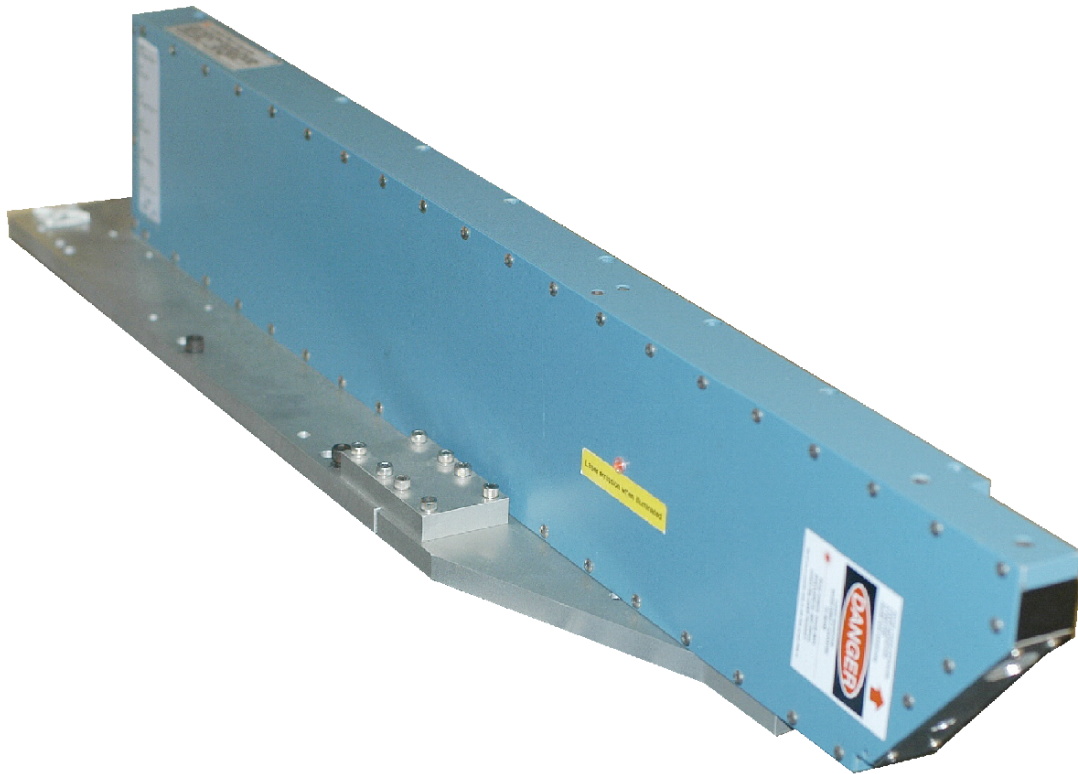
**Original “E-rom” measurement system**

The same design team, working in conjunction with General Electric, went on to develop the next generation gauge a much faster and more accurate gauge, the LaserMike model 81, which continued to dominate the industry as the standard for rotor measurement.



**Original LaserMike model 81 Laser Probe**

Lasertalk, realizing that there are newer technologies that could make major improvements over the, LaserMike model 81, Lasertalk has gone on to develop the next generation laser gauge Model LT81 designed to address the industries needs with significant improvements over the previous LaserMike model 81.



**Lasertalk Model LT81 Laser Probe**

# What is it?

The LT81 is a form, fit, function replacement for the LaserMike Model 81

The LT81 consists of a high speed laser-diode based probe and a PC computer running a windows operating system as the user interface

## Model LT81 Features

### Enhanced Performance

- Improved blade surface finish tolerance
- Improved blade reflection tolerance
- DSP technology
- Significantly faster measurement cycles
- Eliminates need to brush or de-burr before measurement

### Added Capabilities

- Turbine (pocketed blade) measurement
- Automated blade setup program
- Lands and Seals measurement
- Total indicated run out (TIR) detection
- The ability to add and store notes specific to the product under test
- Automatic temperature compensation

### Improved Operation

- User friendly Windows XP-based interface and control program
- Rotor library space virtually unlimited, with ability to organize into families
- Built in Operator's Manual
- Simple and automatic conversions from mm to inch and/or radius to diameter
- Results printed to local or networked Windows printer
- Results exported to Excel or XML formats for remote access and archiving
- Multiple security levels
- Automatic logging of operation or setup events
- Graphic display of measurement results
- Built-in test and diagnostics features
- Be prepared this system will tell you things about your process that

were not possible with the older system

### **Improved Reliability & Serviceability**

- **“Drop-in” replacement for LaserMike Model 81 system (same form, fit, function)**
- **Solid state laser diode source**
- **Utilizes current technologies (eliminates obsolescence issues of LM 81)**
- **Eliminates shop air purging and contamination of optics**
- **Probe package is O-ring sealed to help keep optics clean.**
- **Modular mechanical and electronic design**
- **Software updates performed from PC, locally or remotely (via telephone or Internet connection)**
- **Remote assistance or maintenance via telephone or Internet connection**
- **Built in stop / crash switch**
- **Full set of manuals including operators, and technical**

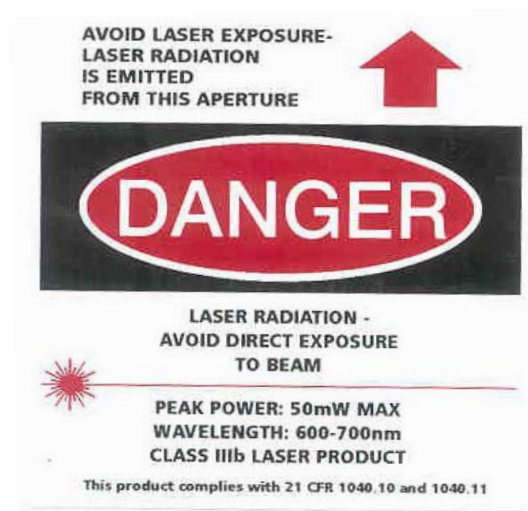
## Product Comparison

The following tables provide a detailed comparison of the specifications between the Model 81 you are currently using (Old System) and the Lasertalk LT81.

Product Comparison		
Specification	Model LT81	Model 81
Servo Positioning Range	10 Inches	10 Inches
Servo Positioning Range	16 Inches	16 Inches
Servo Positioning Range	20 Inches	20 Inches
Minimum Blade Thickness	0.010 Inches / 0.250 mm	0.030 Inches / 0.762 mm
Maximum DSP digitizing rate	2 MHz	NA
Maximum Blade tip velocity for Blades	7,000 inch/per second	
Maximum Blade tip velocity for Turbines	3,500 inch/per second	
Maximum RPM for Blades	10,000 RPM with 10 samples per blade	7000 RPM
Maximum RPM for Turbines		
Resolution per blade	± 0.00005 Inches (rounded to 0.0001) / 0.001 mm*	± 0.0001 Inches / 0.001 mm
Resolution per Stage	± 0.00005 Inches (rounded to 0.0001) / 0.001 mm*	± 0.0001 Inches / 0.001 mm
Repeatability per Blade	± 0.0001 Inches / 0.0025 mm*	± 0.0005 Inches / 0.013 mm
Repeatability per Stage	± 0.0001 Inches / 0.0025 mm*	± 0.0002 Inches / 0.005 mm
Repeatability - TIR	± 0.0001 Inches / 0.0025 mm*	± 0.0005 Inches / 0.013 mm
Repeatability Master Rotor	± 0.0001 Inches / 0.0025 mm*	± 0.0002 Inches / 0.005 mm
Measurement Time	5 Seconds or less	Up to 25 Seconds
Power Required	110 / 120 VAC, 50 / 60 Hz	110 / 120 VAC, 50 / 60 Hz
Operating Temperature	40 °F - 110 °F (4 °C - 40 °C)	40 °F - 110 °F (4 °C - 40 °C)
Specifications apply at	40 °F - 110 °F (4 °C - 40 °C)	70 °F ± 3 °F / 21 °C ± 2 °C
Temperature compensation	Yes	N / A
Humidity	90% Maximum non-condensing	90% Maximum non-condensing
Focused Laser Spot size	0.001 Inches X 0.003 Inches at probe focal point	0.005 inches diverging at measurement point

Laser Source	Pulsed Solid state Laser Diode, 680 nm - 695 nm, 35 mW maximum output power, CDRH certified Class IIIb Laser product	CW Helium - Neon gas laser, 632 nm, 2.5 mW maximum output power, CDRH certified Class II laser product
--------------	--	---

Using a significantly higher power laser diode as a light source we are able to overcome most surface finish issues that were a problem with the older model 81 gauges. We have doubled the laser safety features to prevent any unwanted laser emission from the laser gauge and we are in compliance with CDRH class IIIb product certification 21 CFR 1040.10 and 1040.11.



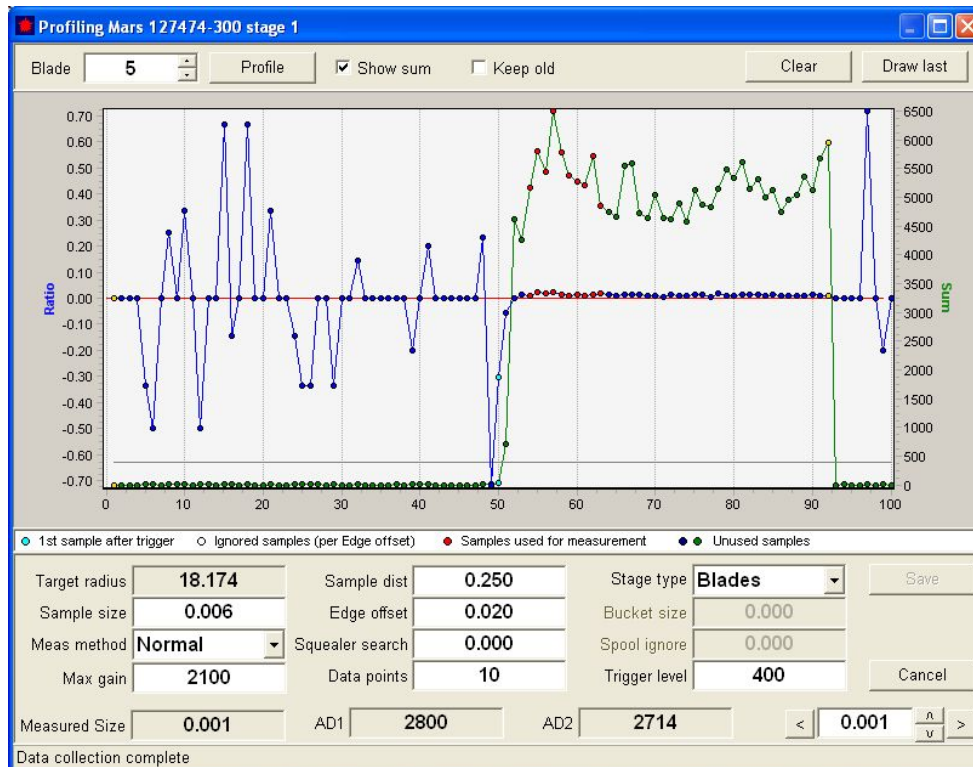
With the implementation of DSP technologies we are able to significantly increase the measurement speed, greatly reducing the cycle time, as a result increasing the through put of the grinding operation and at the same time improving the resulting accuracy of the



system. Another benefit of this technology is that you as the engineer of the process are able to select where you would like to take the samples over the blade tip ignoring any leading or trailing burrs that may develop during the grinding process. Elimination of the debarring process before measuring further improves the measurement process as the blade seating remains undisturbed prior to and during the measurement. Process time is further reduced by the fact that only one debarring process need be completed at the end of the grind cycle.

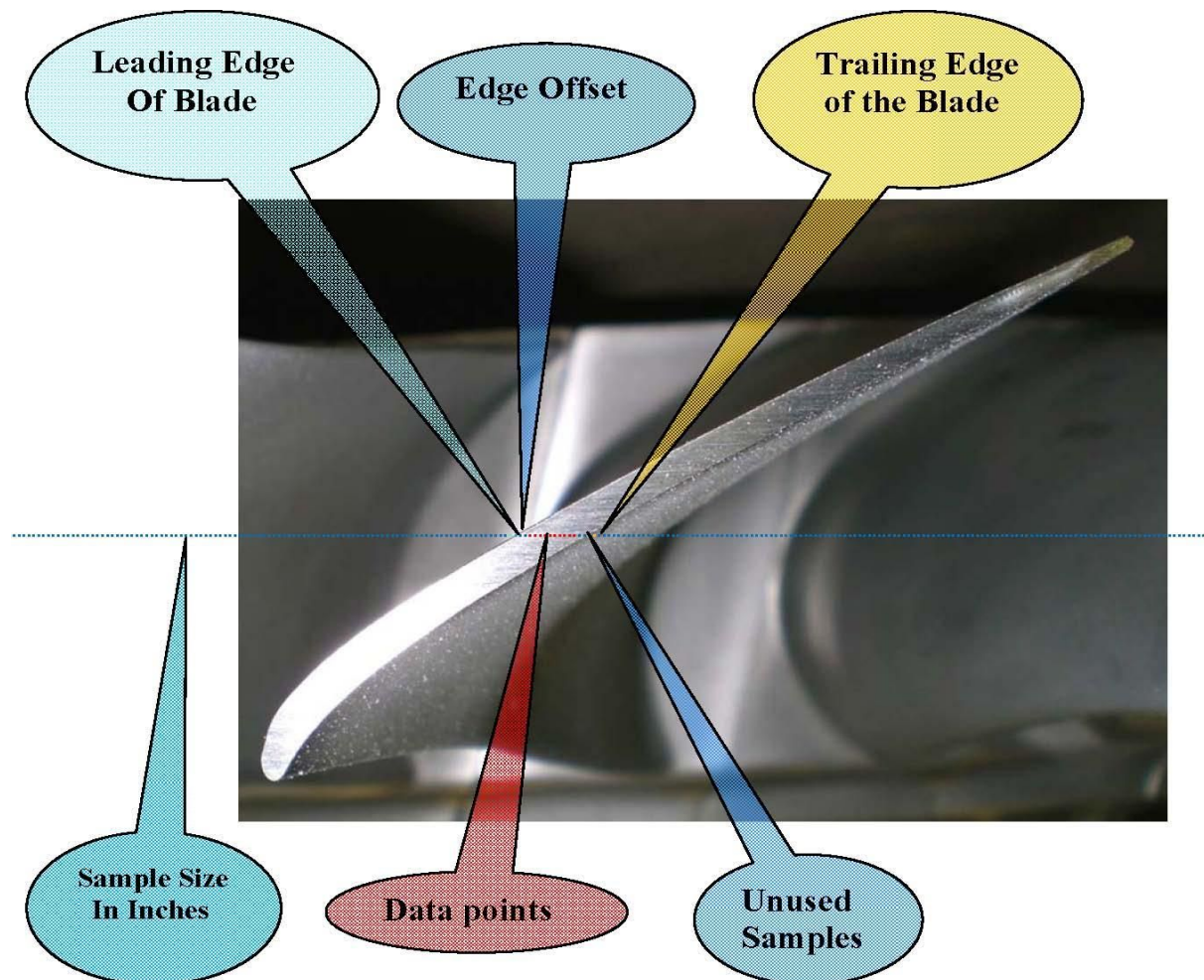
## What you are looking at on a standard blade

This is our Profiling page where the measurement area of the blade tip is selected by the Engineer during the initial setup, this is a onetime setup procedure and is stored within the rotor tables and is recalled from memory every time the product part number is called up to run. This is a very powerful tool to be used by your staff to evaluate the product properly. With this tool we can eliminate the need to de-burr before the measurement is taken, there by greatly reducing the grind cycle time.



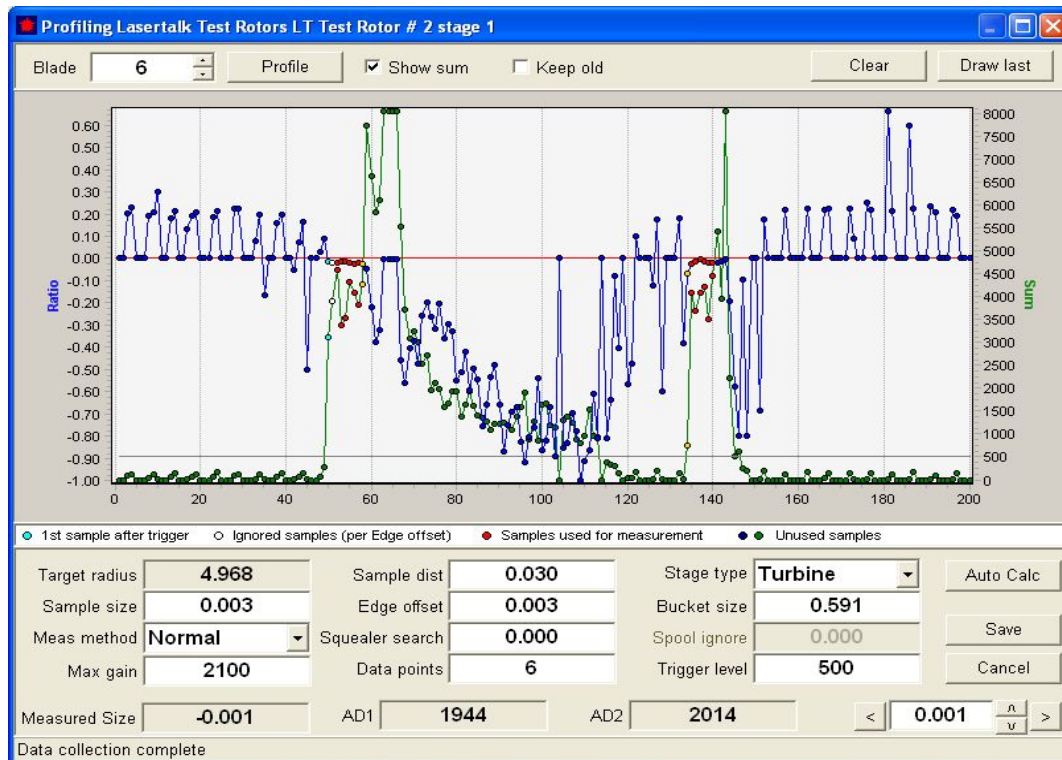


 **Direction of blade rotation**



We have added measurement options for turbine / pocketed blade's, you now have the option of selecting the leading, trailing, or the average of both edges of the blades.

We have further enhanced the blade profiling tools of our software by making provisions to automatically calculate the needed parameters and at the same time giving the engineer to manually select the blade tip detail that they want to capture for the measurements.



Before Auto calculation



After auto calculation

**Trigger  
Level**

**Bucket  
size  
In  
Inches**



.....

**Data  
Points  
for side  
"B"**

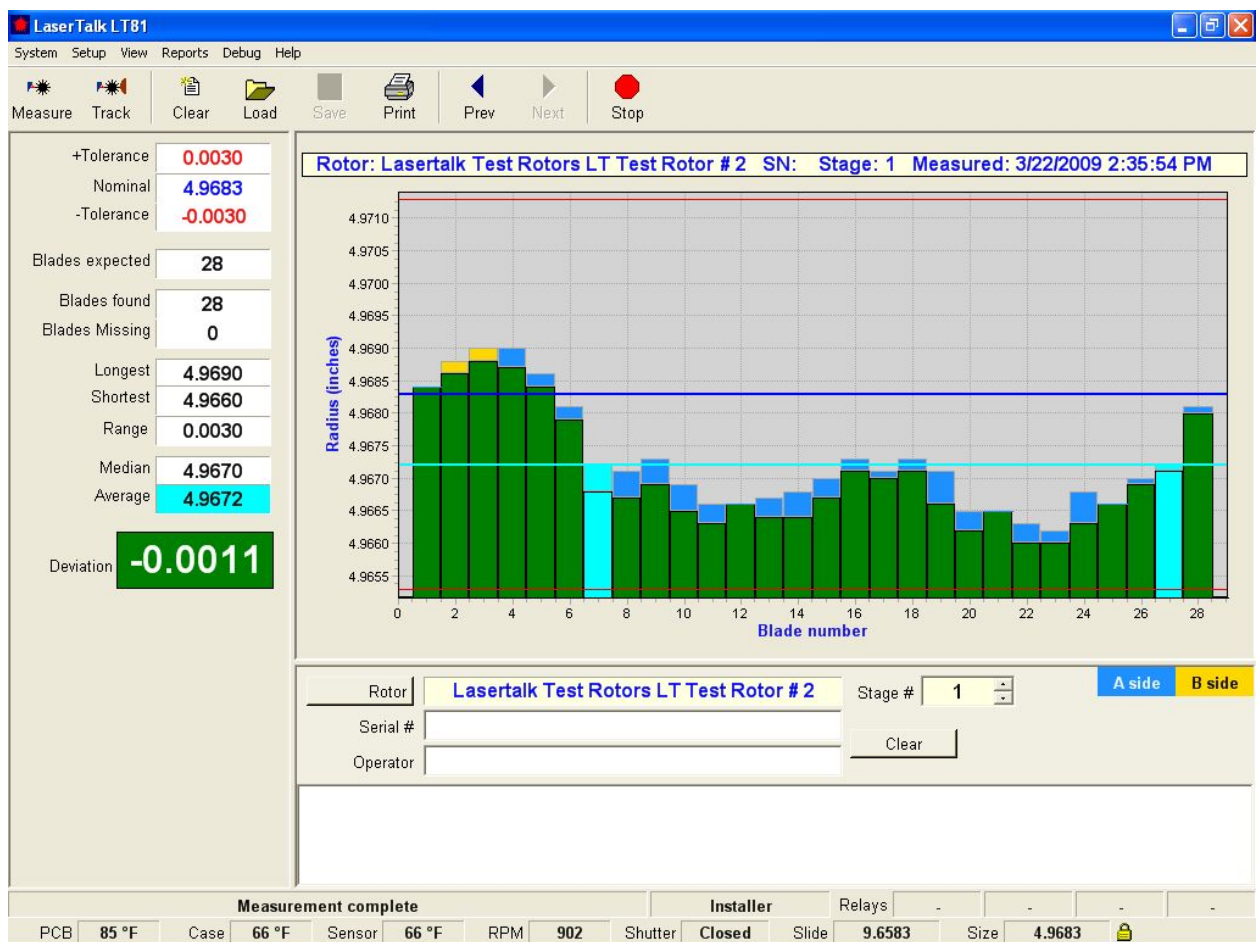
**Sample  
Size  
in  
Inches**

Edge  
Offset

Data  
Points  
for side  
"A"



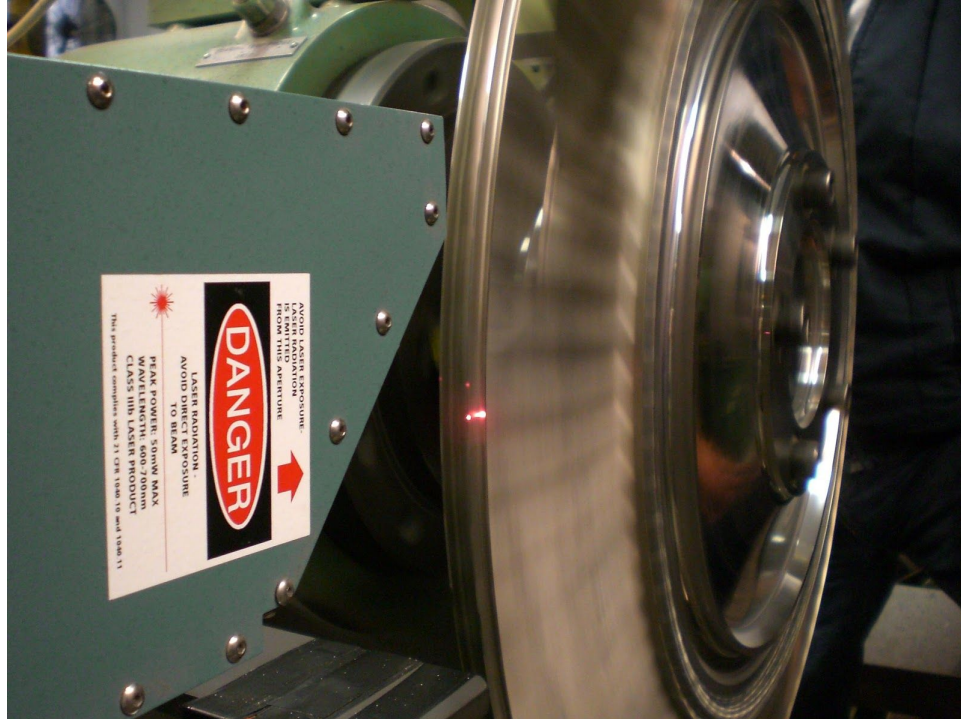
Direction of blade rotation







With the incorporation of a very small laser spot size and having reduced the package profile we now have the capability to measure lands and seals where space permits. In addition we can now measure rotating seals / shrouded blades.



Measuring rotating seals / shrouded blades

Trying to comply with our customers request we have added a note / comment area for production notes to be added to the measurement report and to follow the report to the archived storage of the measured product.

Using a propriety optical design we are able to minimize any optical reflections that would radiate from the product under test that would otherwise affect the measuring process.



In an effort to eliminate a concern with the older laser gauge we have incorporated temperature compensation into the design of the laser gauge, when this feature is setup and activated the temperature coefficient of the system is so low that we have not been able to measure it.

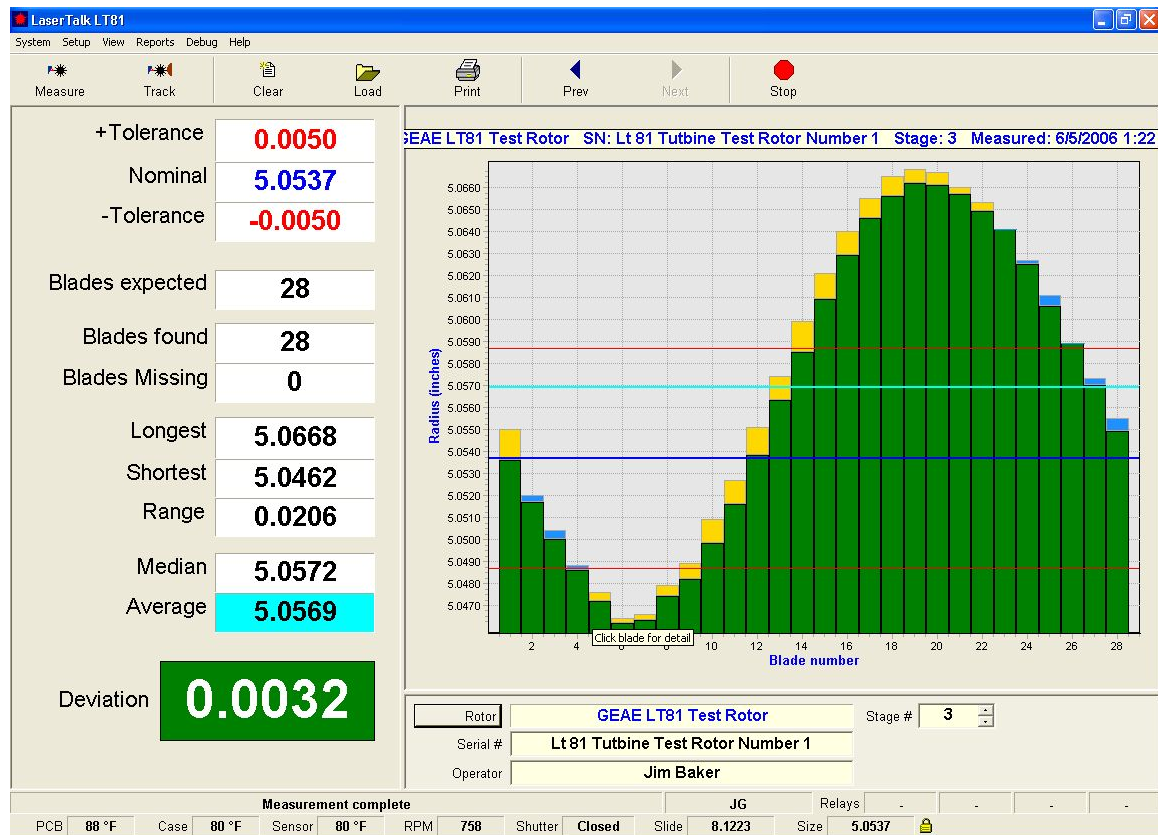
Preferences	
Operation   Measurement   System   Relays   Slide defaults   <b>Probe defaults</b>   Test	
Target radius	18.320
Sample size	0.003
Blades	58
Sample dist	0.080
Bucket size	0.000
Edge offset	0.008
Blade meas method	Normal
Squealer search area	0.000
Turbine meas method	Normal
Spool meas method	Normal
Spool ignore area	0.000
Temp comp 0	0.0
Temp comp 1	0.0
Temp comp 2	0.0
Temp comp sensor	0
Temp target 0	0.0
Temp target 1	0.0
Temp target 2	0.0
Spool angle	0
Max gain	2000
Trigger level	700
Data points	10

Loaded from rotor configuration

Calibrate laser    Reset DSP    Reload    Save in Flash    Apply    Close

We have incorporated three temperature sensors in the design of the laser probe one in the optical block assembly, the second is embedded in the electronics, and the third is to monitor the temperature of the probe housing. Our testing has indicated that the greatest change in the readings with respect to temperature is caused by the probe housing. If we chose to activate the automatic compensation we would select that sensor to control the compensation.

This system provides an inherit ability to detect “Total indicated run out” from our main display screen at a glance when looking at the bar graph section of the display screen. As indicated by the sin wave of the bar graph.



This display page view illustrates what a typical TIR indication will look like, notice the Sin wave shape outline.

# Improved Operation

## User friendly Windows XP-based interface and control program

Our user interface is a standard PC allowing us to utilize the flexibility of the windows interface for the control of the process and provide your operators the familiarity of the operation and navigation through our powerful software.

- At power on before any action can take place the operator must log on to verify operational access to the system.

The screenshot displays the LaserTalk LT81 software interface. The window title is "LaserTalk LT81". The menu bar includes "System", "Setup", "View", "Reports", and "Help". The toolbar contains icons for "Measure", "Track", "Clear", "Load", "Save", "Print", "Prev", "Next", and "Stop".

On the left side, there are several input fields and labels:

- +Tolerance:** 0.0025
- Nominal:** 5.0500
- Tolerance:** 0.0025
- Blades expected:** 0
- Blades found:** 0
- Blades missing:** 0
- Longest:** 0
- Shortest:** 0
- Range:** 0
- Median:** 0
- Average:** 0
- Deviation:** 0

On the right side, there is a large empty box labeled "Rotor type" and "Blade number". Below this box, there are fields for "Rotor" (GEAE LT81 Test Rotor), "Serial #", and "Operator". A "Clear" button is next to the "Operator" field. A "Stage #" dropdown menu is set to "1".

At the bottom, there is a status bar with the following information:

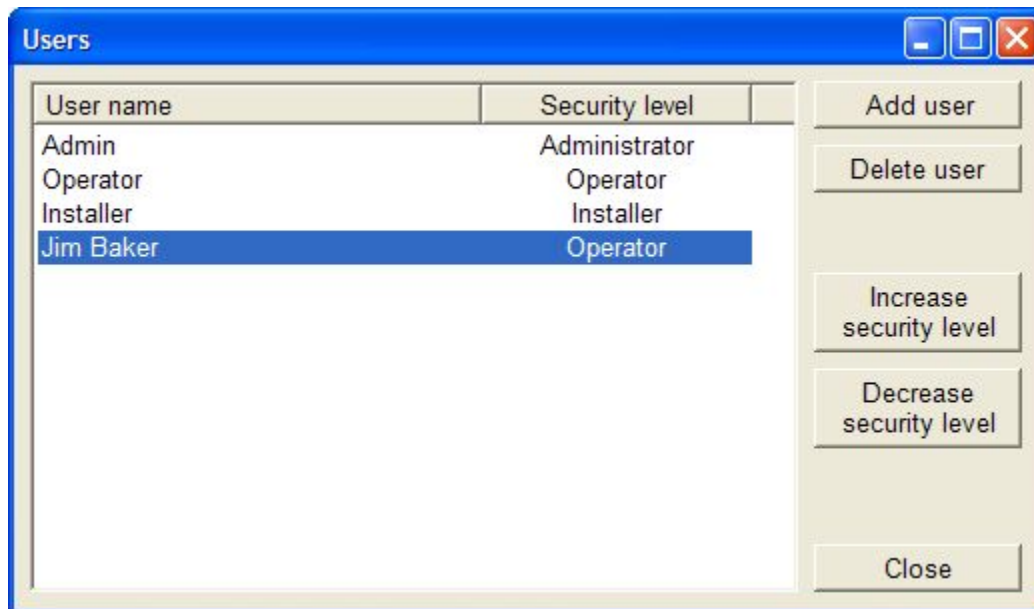
Ready									
PCB	76 °F	Case	58 °F	Sensor	58 °F	RPM	0	Shutter	Closed
Slide	-0.0002	Size	13.6498	Relays	-	-	-	-	-

To log on one must select the SYSTEM tab then select USER, then the LOG IN

The screenshot shows a "Security" dialog box with a blue title bar and a red close button. It contains two input fields: "User name" with the text "Jim Baker" and "Password" with masked characters "\*\*\*\*". Below the fields are two buttons: "Log in" and "Cancel".

- **Multiple security levels**

- a. There are three levels of security each controlling various levels of access to the software operations.
  - The first and most used level is the operator; this level provides access to all of the necessary functions that is necessary for the normal operation of the system for day to day operation.
  - The second is administrator; this level allows access to all functions needed to set up the system rotors and various programming / diagnostic functions.
  - The third is the installer; this level is used during the installation to set up the machine interface parameters for the system installation.



Managing user screen page

When the user is logged in and ready to run a given rotor, they select the proper rotor type by there standard process be it by loading a floppy disk, selecting from the library, or via a remote host PLC by assigning a CODE number from the PLC program. The library capacity is virtually unlimited with the ability to organize into families.

The screenshot shows a software window titled "Select rotor". On the left is a tree view of the rotor library. The right pane shows the configuration for the selected "LT81 Test Rotor".

**Tree View:**

- 219648-100, 219650-101
- 219680-103
- test
- 70's
  - 199393-102, 101
  - 199400-102
  - 330202-100
  - 330393-104
  - 330403-102, 330603-102
- Cat Master
  - Large
  - Small
- GE100
  - F119A in diam
  - F119A in radius
  - F119A mm diam
  - F119A mm radius
- GEAE
  - CFM56-5BC
  - CFM56-7B
  - Copy of master test
  - LT81 Test Rotor**
  - Master rotor
  - Master test DK
- Lasertalk Test
  - Test Fixture 2
  - Test Wheel 1
- More

**Configuration for LT81 Test Rotor:**

Number of stages:  ☐ Radius ☐ Diameter ☐ Inches ☐ mm Code:

Stage	Type	Count	Setpoint	Tol +	Tol -	Offset	Chord Width	Bucket Size	'At Size'
1	Blades	28	5.0500	0.0025	0.0025	0.0000	0.0000	0.0000	0.0000
2	Blades	150	5.0381	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
3	Blades	150	5.0381	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
4	Turbine	28	5.0600	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
5	Spool	30	5.1830	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
6	Blades	142	5.0151	0.0020	0.0020	0.0000	0.0300	0.0000	0.0000

- Simple and automatic conversions from mm to inch and/or radius to diameter

The 'Edit rotors' window displays a tree view of rotors on the left, including LT81 Test Rotor, Master rotor, Master test DK, Lasertalk Test, Test Fixture 2, Test Wheel 1, Mars, 127472-400, 127473-200, 127474-300, 191497-102, 191497-103, 102, 191497-103, 102, 200, Mercury 50, 243701-103, 245750-150, T-65, 209202-100, 209203-100, 209393-100, Titan, and 204202-300, 201. The main area shows the configuration for the 'LT81 Test Rotor'. The rotor type is 'LT81 Test Rotor'. The number of stages is 6. The units are set to Radius (mm). The configuration table is as follows:

Stage	Type	Count	Setpoint	Tol +	Tol -	Offset	Chord Width	Bucket Size	'At Size'
1	Blades	28	5.0350	0.0025	0.0025	0.0000	0.0000	0.0000	0.0000
2	Blades	150	5.0381	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
3	Blades	150	5.0381	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
4	Turbine	28	5.0359	0.0050	0.0050	0.0000	0.0300	0.4300	0.0010
5	Spool	30	5.1830	0.0050	0.0050	0.0000	0.0100	0.0000	0.0000
6	Blades	142	5.0151	0.0020	0.0020	0.0000	0.0300	0.0000	0.0000

When in the edit pages of the setup you can select radius or diameter simply by checking the desired parameter. The same holds true with Millimeter or Inch units of measurement. When you change a given function all of the settings for this rotor table will be changed automatically and at the same time with no calculating from the operator.

When you have selected the proper rotor for the product to grind and have preformed all of the production preparation, and are ready for a measurement the first step is to do a calibration of the laser gauge.

The 'Measurement calibration' window displays calibration parameters and a graph. The parameters are as follows:

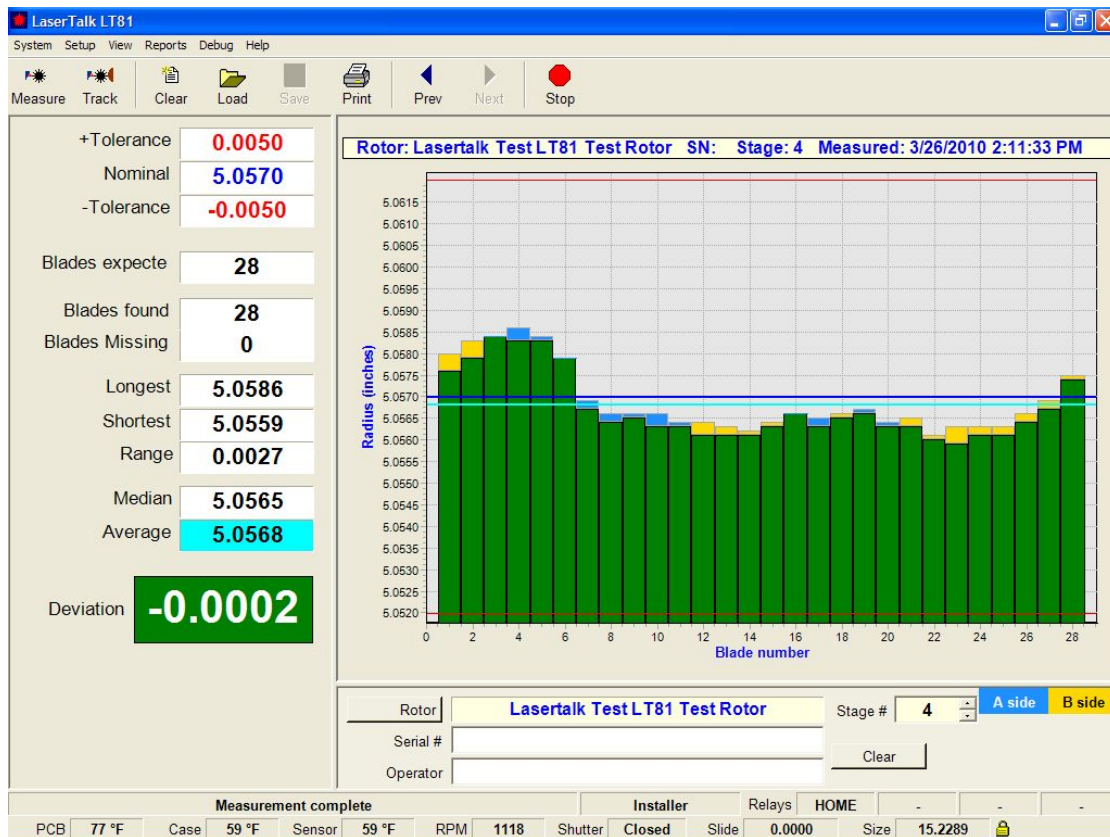
Parameter	Value
Home radius	13.6245
Cal block	5.4000
High tolerance	0.0005
Low tolerance	0.0005
Count	17
Average	0.0000
Max	0.0000
Min	0.0000
Range	0.0000
Measured	5.4000
Deviation	0.0000

The graph shows a horizontal line at 0.0000 on the y-axis, with data points plotted at regular intervals along the x-axis. The x-axis is labeled with time values: 04:03:50, 04:03:55, 04:04:00, 04:04:05, 04:04:10, 04:04:15, 04:04:20, and 04:04:25. The graph area is shaded gray.

Calibration display page depicting 17 continuous calibration readings on the calibration block, note the measurement stability of the readings.

- **Results printed to local or networked Windows printer**

Up on completion of a measurement the measured data is saved and sent to a file for retrieval at a later time be it for the operator to review, to be printed for production requirements, or for archive storage for process requirements, all of this is on the system computer. The date can also be sent out to a local area network to be integrated into the plants data system.

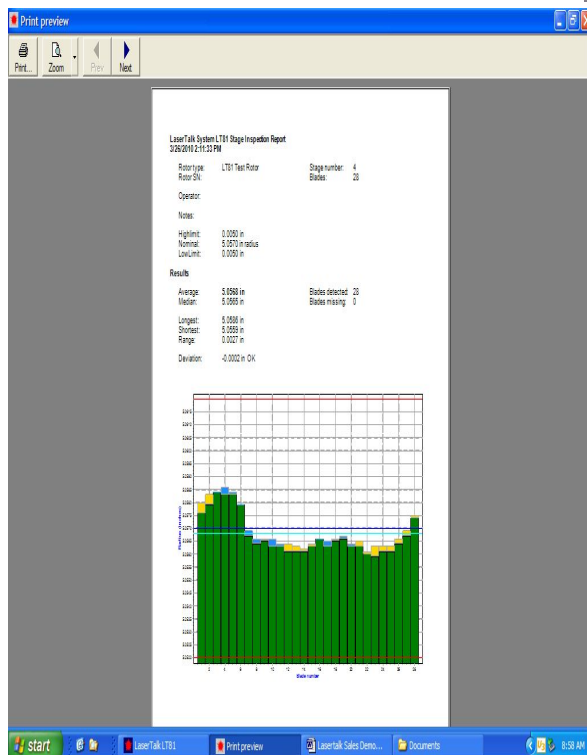




**LaserTalk System LT81 Stage Inspection Report**  
3/26/2010 2:11:33 PM

**Stage Details**

A side 1	5.0576	5.0579	5.0584	5.0586	5.0584
A side 6	5.0579	5.0569	5.0566	5.0566	5.0566
A side 11	5.0564	5.0561	5.0561	5.0561	5.0563
A side 16	5.0566	5.0565	5.0565	5.0567	5.0564
A side 21	5.0563	5.0560	5.0559	5.0561	5.0561
A side 26	5.0564	5.0567	5.0574		
B side 1	5.0576	5.0579	5.0584	5.0586	5.0584
B side 6	5.0579	5.0569	5.0566	5.0566	5.0566
B side 11	5.0564	5.0561	5.0561	5.0561	5.0563
B side 16	5.0566	5.0565	5.0565	5.0567	5.0564
B side 21	5.0563	5.0560	5.0559	5.0561	5.0561
B side 26	5.0564	5.0567	5.0574		



- Results exported to Excel or XML formats for remote access and archiving

The measurement results can also be exported to Excl or XML formats for archiving, transmitting to other computer systems or for graphing.

- **Automatic logging of operation or setup events**

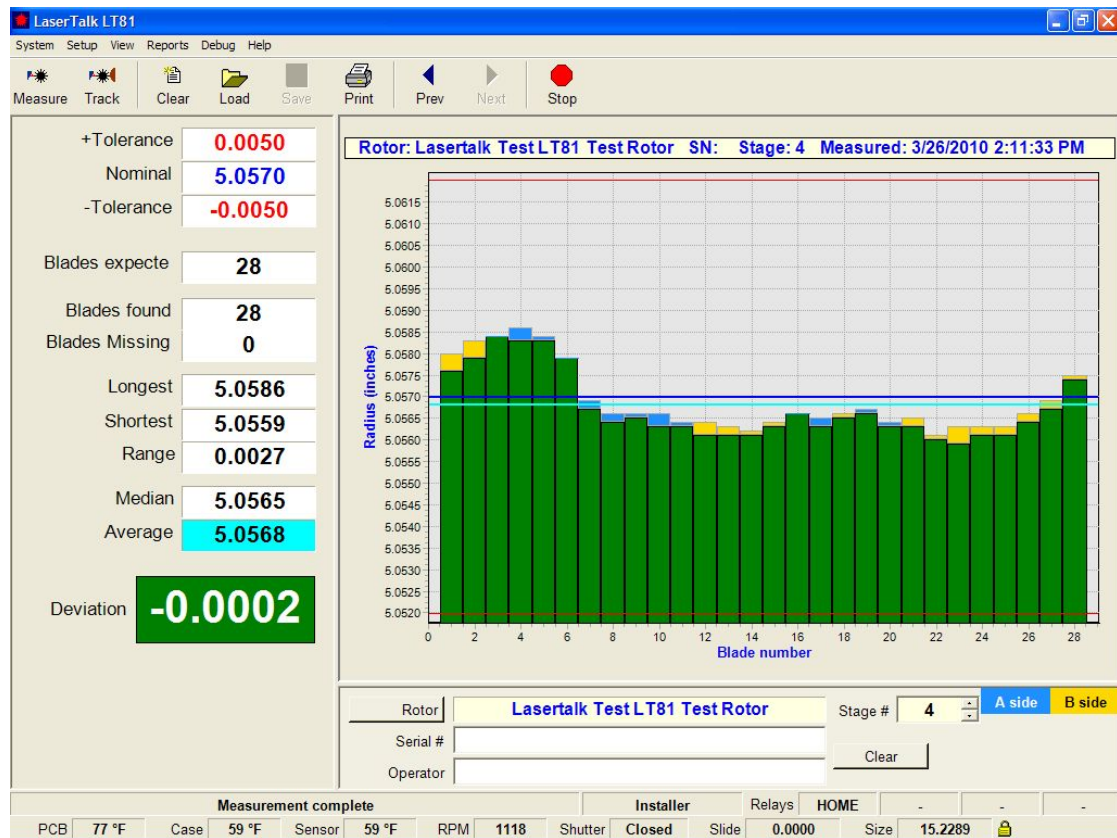
You will find built into the system an event log that record all of the operations that the system is performing.

Type	Time	User	Description
● Operation	02:11:30	Installer	Tracking stopped by operator
● Operation	02:11:30	Installer	Tracking stopped
✱ Debug	02:11:29	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:24	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:20	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:16	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:12	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:08	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:04	Installer	Inspecting at slide position 10.1709
✱ Debug	02:11:00	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:56	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:52	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:48	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:44	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:40	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:36	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:32	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:28	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:25	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:20	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:16	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:12	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:08	Installer	Inspecting at slide position 10.1709
✱ Debug	02:10:06	Installer	Opening shutter
● Operation	02:10:03	Installer	Tracking started by operator
✱ Debug	02:09:54	Installer	Inspecting at slide position 10.1719
✱ Debug	02:09:52	Installer	Opening shutter
● Operation	02:09:52	Installer	Measurement started by operator
✱ Debug	02:08:57	Installer	Inspecting at slide position 10.1719
✱ Debug	02:08:55	Installer	Opening shutter
✏ Config	02:08:50	Installer	Rotor stage 4 selected
✱ Debug	02:08:50	Installer	SetProfileParms: V1:5.036 V2:0.001 V7:0.030 V9:0.003 V8:0.43

☒ Info
 ☒ Warning
 ☒ Error
 ☒ Config
 ☒ Operation
 ☒ Debug
 ☒ ProbeDebug
 ☒ Color code entries

☐ Auto refresh

- Graphic display of measurement results



- Built-in test and diagnostics features
- Built in Operator's Manual
- Be prepared this system will tell you things about your process that were not possible with the older system

Measurement calibration

Home radius13.6245

Cal block5.4000

High tolerance0.0005

Low tolerance0.0005

Measured5.4000

Deviation0.0000

Single check

Continuous check

☐Retract each time

☐T bar check

Rezero calibration

Close

Count17

Average0.0000

Max0.0000

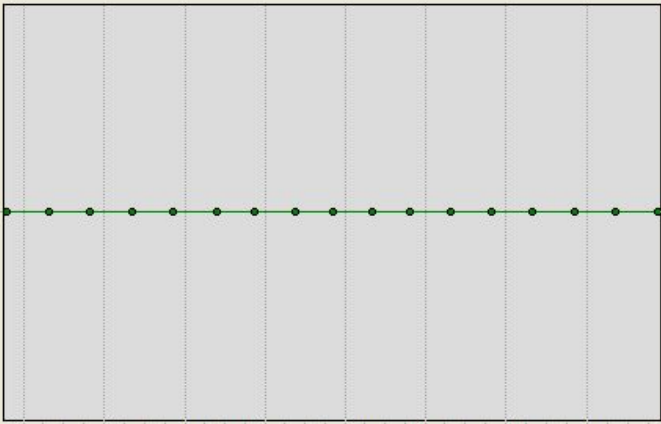
Min0.0000

Range0.0000

Clear

Save

0.0000



04:03:5004:03:5504:04:0004:04:0504:04:1004:04:1504:04:2004:04:25

☐ Show temperatures