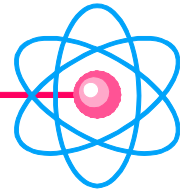


**ADVANCED GAUGING**

**TECHNOLOGIES, L.L.C.**

● **QUALITY INDUSTRIAL INSTRUMENTATION**



**AGT800**

**LASER  
THICKNESS GAUGE AND  
STATISTICAL PROCESS CONTROL  
REPORTING SYSTEM**

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Telephone: (614) 873-6691 Fax: (614) 873-6770  
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# **AGT800 Laser Thickness Measurement and S.P.C. Reporting System**

## **Introduction** -----

The patented AGT800 is designed for measuring metals and virtually any other material that is processed in coil, sheet or strip form. It provides fast and reliable thickness measurements and S.P.C. reporting using the latest in laser triangulation technology. Direct benefits realized through these measurements include documented compliance with ISO9002, QS9000, and other quality specifications, improved process control, increased productivity, and scrap reduction. The standard system also provides disk and/or network data storage and easy recall of all S.P.C. information. This feature eliminates the need to maintain large files of printer paper for long-term record-keeping purposes.



## **Principle of Operation** -----

The AGT800 is an optical based measuring system. For this reason, it is important to keep the polycarbonate (Lexan™) cover over the sensors clean and free of excessive dust, dirt, scale, water and oil mist. Two non-contact, high precision semi-conductor laser sensors are mounted above and below the strip to be measured, and their beams are focused on the same spot on the target material. Each sensor emits a Class II laser beam and receives the beam back on a RS-CMOS pixel array. The gauge determines the distance to the target material and precise material thickness is then calculated. The system is calibrated based on this data allowing it to provide continuous, high speed, non-contact, accurate and reliable thickness measurements.

## Features -----

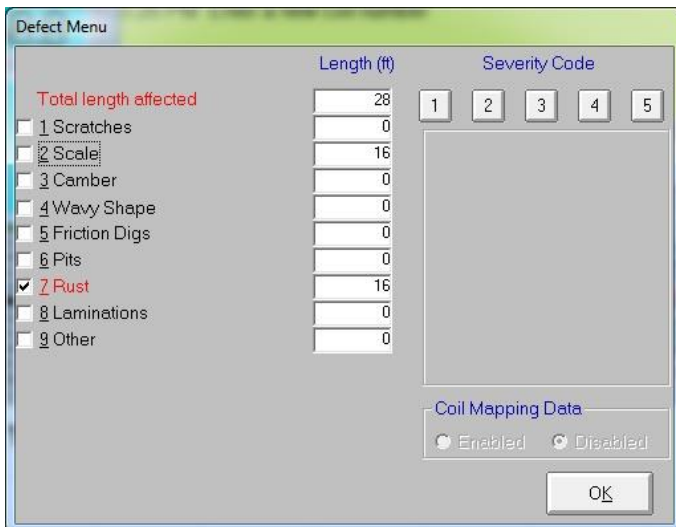
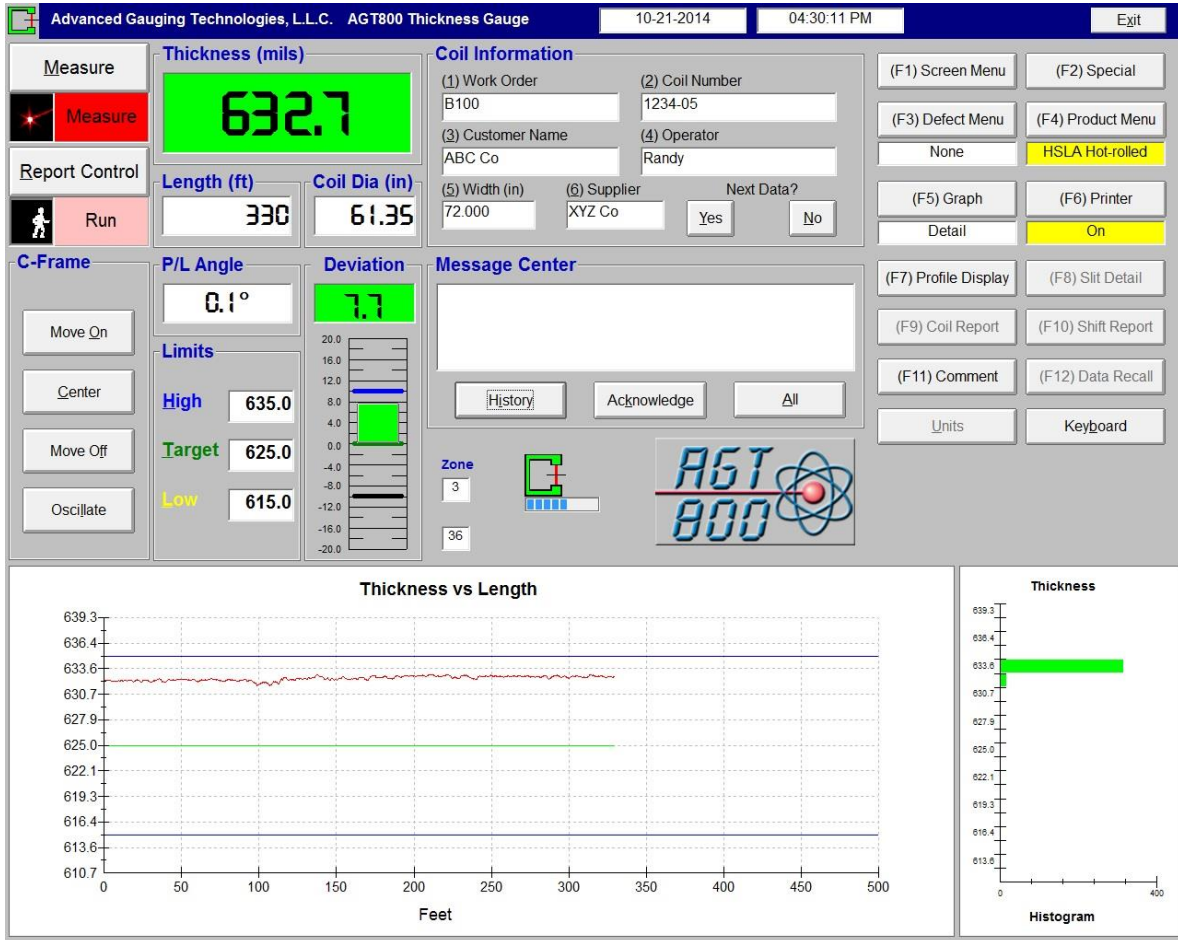
1. **Easy Installation** – C-frames typically mount on two pedestals, and there is no requirement for water.
2. **Keyence Laser Sensors** – our development engineers tested more than a dozen laser sensor models from five different countries and made the decision to manufacture all A.G.T. laser thickness gauges with high-end Keyence sensors. These are the fastest sensors in the world, and they produce the highest possible accuracy and repeatability. This translates to the most consistent and stable thickness measurements possible.
3. **Reliability** – simplified hardware configuration increases the reliability of this gauge. The measurement system utilizes the latest in technology, reducing the requirement for peripheral hardware. This allows us to provide an extremely reliable platform for thickness measurement and S.P.C. reporting.
4. **Calibration Verification** – the system features a fast and accurate calibration verification procedure known as ISOcal™.
5. **Automatic Reporting** – the system automatically generates several reports, providing all the information you need in user friendly formats.
6. **Hassle Free** – there are no licensing or leak test requirements, no risk of terrorism, and no shipping or radioactive source disposal fee issues.
7. **Networking** – the system is fully capable of network data storage, remote printing and control. Auto Data Gathering can be used to automatically position the C-frame, start the measurement and reporting function. Auto Data Entry can be used to automatically enter coil data. Using both functions simultaneously, the AGT800 can run itself with no operator intervention.
8. **Data Storage** – all coil data is automatically stored to disk and/or network. Any desired information can be easily and conveniently accessed at any point in the future, and the respective reports reprinted with relative ease.
9. **Diagnostics** – all digital inputs and outputs, analog inputs, and DC power supplies can be monitored simultaneously in real-time on a single screen. This feature provides for a means of greatly simplified troubleshooting.
10. **Upgradeability** – the unique system design enables future software upgrades to be performed in a matter of minutes.

## S.P.C. Reports -----

1. **Coil Report** – presents a graphic representation of strip thickness over the coil length, in strip chart fashion, and indicates location of out-of-tolerance material. In addition, this report presents a histogram of thickness distribution, footage, weight, average thickness, UCL, LCL, UTL, LTL, X Double Bar, R Bar, Cp, Cpk, and CR. This entire report is automatically scaled to fit on a single page allowing for much neater record-keeping.
2. **Defect Summary Report** – presents a useable summary of each defect type along with its respective location in the coil.
3. **Shift Summary Report** – presents a period summary of production, available automatically at regularly scheduled times, or on demand.
4. **ISOcal™ Report** – this routine allows the gauge to check its own calibration over a range of samples. This report can be sent to the system printer, allowing for regular system performance checks, and providing the necessary documentation to keep you in compliance with quality requirements.
5. **Diagnostic Data Report** – this report shows the real-time status of all digital and analog I/O, nominal and actual power supply voltages, and much more. All of the major test points in the system are displayed simultaneously, making troubleshooting a very straightforward process. This screen can easily be printed and emailed or faxed to Advanced Gauging Technologies for troubleshooting assistance.
6. **System Setup Report** – this report shows all setup parameters for a specific gauging system listed on a single page.

## System Display -----

During normal operation, the interactive Main Screen display shows real-time graphical representations of measured thickness, deviation, and a histogram of thickness values for the current coil. Also displayed are thickness, target, upper and lower tolerance limits, job number, coil number, shutter status, coil footage, coil width, defects if selected, product, and much more. Additional display screens are provided for next coil data, strip profile (thickness versus width), product setup, defect setup, report setup, calibration, diagnostics, message review, and data recall.



*The Defect Menu can be called from on the AGT800 Main Screen, making it easy for Operators to toggle any defects they may want to track.*



## Diagnostic Data -----

Advanced Gauging Technologies is a service oriented company, and for that reason we're proud that all of our thickness gauges have incredibly useful built-in diagnostic features. The Diagnostic Data Screen shows the real-time status of all digital and analog I/O, nominal and actual power supply voltages, and much more. All of the major test points in the system are displayed simultaneously, making troubleshooting a very straightforward process. This screen can easily be printed and emailed or faxed to A.G.T. for troubleshooting assistance.

Advanced Gauging Technologies, L.L.C. AGT800 Diagnostic Data 10-24-2014 01:30:36 PM

<b>Thickness (mils)</b> <div style="background-color: yellow; padding: 5px; font-size: 24px; font-weight: bold;">318.9</div> <p>Average AvgDev Data</p> <p><b>Measure</b> Measure</p> <p><b>C-Frame</b> Move On Center Move Off Oscillate</p> <p>Analog T/C 500 msec</p> <p>English Units (mils)</p> <p>AGT800 v4.00.44 3403</p> <p>Messages</p>	<b>CFrame Data</b> Computer Off Cmd 0 Zone 3 On Cmd 0 Off Timer 20 Osc Cmd 0 On Timer 0 Power Cmd 0 Off Limit 0 Direct Cmd 0 Off Photo 0 CFrameCmd 0 Center 0 Prev Cmd 0 On Photo 0 On Limit 0 Print Data ISOcal™ ISOtemp™	<b>Laser Sensor Data (mm)</b> Reference Dist 150.000 150.000 150.000 Sensor 1 146.471 Sensor 2 152.492 Sensor 3 153.057 Offset -0.727 Range 146.471 152.492 152.330 Air Gap 307.063 Distance 135.000 Range Sum 298.963 2-3 Compare 0.162 Temp CF 0.001 Passline Angle ° 0.1 Raw Thickness 8.099 Passline CF 0.000 Thickness 8.100
<b>Limits</b> High 770.0 Target 760.0 Low 750.0	<b>Lamp Inputs</b> Measure Lamp 1 Off Lamp 0 High Lamp 0 Low Lamp 1	<b>MF Board Digital Inputs</b> MF Test Switch Input #0 0 MF Digital Input #1 0 MF Digital Input #2 0
<b>Analog Inputs</b> Preamp A/D Channel 0 190 Channel 1 10801 Channel 2 11079 Channel 3 41 Channel 4 52531 Channel 5 32857 Channel 6 49259 Channel 7 49341	<b>DC Voltages</b> Channel 0 0.03 Channel 1 1.65 Channel 2 1.69 Channel 3 0.01 +24 Volts 24.05 +5 Volts 5.01 -15 Volts -15.03 +15 Volts 15.06	<b>Temperatures</b> ISOcal™ Temp 53.7 °F C-Frame Temp 53.9 °F E-Shelf Temp 57.2 °F <b>Tach Readings</b> Tach Ctr 65568 Pulses 120 <b>Maint Dates</b> ISOcal™ 10-20-2014

OK



AGT800 Thickness Gauge operating on a 96" Stretch Leveler Line

## Calibration

The AGT800 uses ISOcal™, which is the most advanced calibration routine available on the market today. This procedure can be performed in less than five minutes. N.I.S.T. certified samples are placed on a custom fabricated sample holder. Data is calculated and statistical outliers are automatically removed by the program. The calibration is then determined using all valid data points, and C-frame temperature is stored at that time. Once the calibration is saved, all future measurements are temperature compensated to automatically account for expansion and contraction of the C-frame.

Laser ISOcal™

Sample	Nominal	Calc Air Gap	Measured	Deviation
<input checked="" type="checkbox"/> 1	62.5	307.077	62.6	0.1
<input checked="" type="checkbox"/> 2	100.0	307.090	99.6	-0.4
<input checked="" type="checkbox"/> 3	125.0	307.090	124.6	-0.4
<input checked="" type="checkbox"/> 4	200.0	307.082	199.9	-0.1
<input checked="" type="checkbox"/> 5	300.0	307.072	300.3	0.3
<input checked="" type="checkbox"/> 6	500.0	307.063	500.6	0.6

Averaging Counter 20

ISOcheck™ calculations complete. You can change selected samples and rerun calculations by pressing check again. You can press 'Save Air Gap' to use the recommended air gap.

Check

Print Report Print Screen

Load Set Save Set Check All

Calibration Accuracy  
English Units (mils)  
0.33 mils 99.80%  
Clear Data

Air Gap  
Current 307.063  
Recommended 307.079  
Save Air Gap

Samples  
Add Sample Rename  
Remove Sample

OK



AGT800 Thickness Gauge installed on a 74" EPS Pickle Line

## Options -----

1. **C-frame (required)** – includes an electric drive motor that allows the operator to position the C-frame from the operator's station. Optional oscillating configuration equipped with additional logic and control circuits enable the gauge to automatically sense strip edges and oscillate accordingly. In this configuration, the Profile Display screen and reports are enabled, which show a strip cross-section of thickness versus width.



2. **Certified Samples (required)** – set of six aluminum calibration sample plates which have their thicknesses certified as traceable to N.I.S.T. Also includes a custom sample holder assembly to properly position the samples on the C-frame.

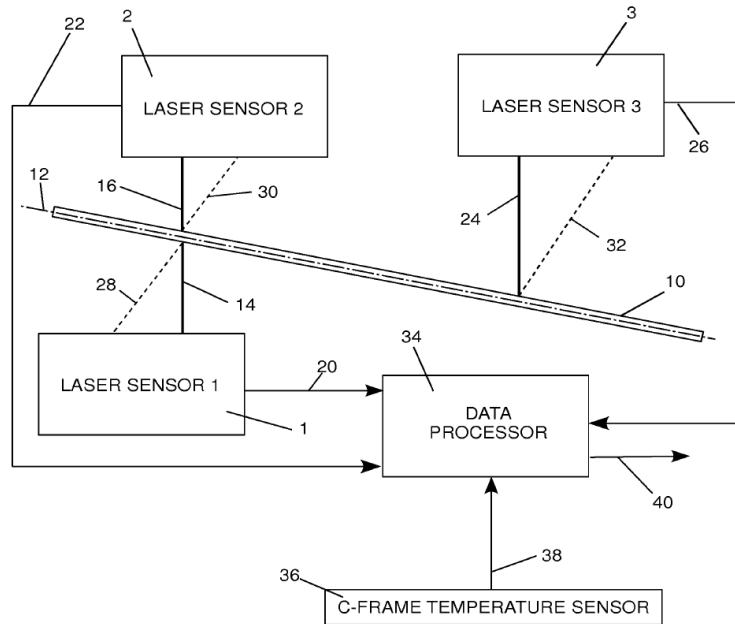


*Calibration takes less than five minutes using six certified samples, which are placed on the custom sample holder.*



**Options (continued)** -----

3. **Patented\* Passline Angle Compensation** – uses a third laser sensor to determine passline angle. Then calculates and applies a correction factor.



**\*U.S. Patent 9,151,595**

4. **Remote Operator Control Station** – includes an additional remote monitor, keyboard, and touchpad mouse.



5. **Offline Data Analysis Software** – allows easier access to coil reports by enabling the recall of reports from a single or multiple gauges simultaneously via a company network or USB stick. Reports can be accessed without interrupting the gauge measurement or line operation. Also allows coil reports to be formatted as PDF files.
6. **TCP/IP HMI Communication** – enables gauge to accept one TCP/IP streaming socket connection on a user defined port for the purpose of requesting information from the gauge or commanding certain actions to the gauge.



	<b>AGT400-SPC Isotope Thickness Gauge</b>	<b>AGT600-RM Laser Thickness Gauge</b>	<b>AGT800-SPC Laser Thickness Gauge</b>
<b>Material Thickness</b>	0.2 to 6.4 mm. steel (.007 to .250" steel)	25 µm. to 6.4 mm. (.001 to .250")	25 µm. to 19 mm. (.001 to .750")
<b>Material Width</b>	10 to 244 cm. (4 to 96")	2.5 to 91 cm. (1 to 36")	10 to 244 cm. (4 to 96")
<b>Air Gap</b>	51 to 305 mm. (2.0 to 12.0")	51 mm. (2.0")	292 mm. (11.5")
<b>Measurement Range</b>	+/- 51 mm. (+/- 2.00")	+/- 7 mm. (+/- 0.28")	+/- 25 mm. (+/- 1.00")
<b>Sampling Cycle</b>	1 ms. to 1 second (adjustable)	50 µs. to 1 ms. (adjustable)	50 µs. to 1 ms. (adjustable)
<b>Calibration Accuracy</b>	+/- 0.2% or 12.5 µm., whichever is > (+/- 0.2% or 0.50 mil, whichever is >)	< 3.3 µm. (0.13 mil)	< 10 µm. (0.39 mil)
<b>Energy Source</b>	Am241 - 37 GBq (Am241 - 1 Curie)	Red semi-conductor laser	Red semi-conductor laser
<b>Energy Level/Wavelength</b>	59.5 keV gamma	650 nm. laser	650 nm. laser
<b>IEC/IFDA (CDRH) Laser Class</b>	N/A	Class 2/Class II	Class 2/Class II
<b>Spot Diameter</b> (at reference distance)	~ 51 mm. (~2")	50 µm. x 2,000 µm.	120 µm. x 4,200 µm.
<b>Ambient Light Resistance</b>	N/A	10,000 lux maximum (incandescent or fluorescent)	5,000 lux maximum (incandescent or fluorescent)
<b>Temperature Range</b>	0 to 50° C (32 to 122° F)	0 to 50° C (32 to 122° F)	0 to 50° C (32 to 122° F)
<b>Relative Humidity Range</b>	35 to 85% (no condensation)	35 to 85% (no condensation)	35 to 85% (no condensation)

AGT400-SPC Isotope Thickness Gauge	AGT600-RM Laser Thickness Gauge	AGT800-SPC Laser Thickness Gauge	Competitive X-ray Thickness Gauge
------------------------------------	---------------------------------	----------------------------------	-----------------------------------

Purchase price	Medium	Low	Medium	High to Extremely High
Air Gap	2 to 12"	2"	2 to 12"	Varies
Measured Materials	Various Metals	All	All	Vary by kV
Alloy Sensitivity	Low	None	None	Varies
Material Thickness	.007 to .250" steel	.001 to .250" any material	.001 to .750" any material	Varies by kV
Material Width	4 to 96"	1 to 36"	4 to 96"	Varies by Brand
Scanning Capability	Yes	No	Yes	Varies by Brand
Strip Edge Proximity	~ 2"	Centerline Only	~ 1/4"	Varies by Brand
Passline Height Sensitivity	Medium	Low	Low	Low
Passline Angle Sensitivity	Medium	Medium	High to Low	Medium
Liquid on Material Sensitivity	Low	High	High	Low
Electronic Noise	High	Extremely Low	Extremely Low	Low
Response Time	Slow	Fast	Fast	Fast
Air Required for Installation	No	Yes	Yes	Yes
Water Required for Installation	No	No	No	Yes
S.P.C. Reporting	Yes	No	Yes	Varies by Brand
Data Storage	Yes	No	Yes	Varies by Brand
Radiation Exposure Risk	Low	None	None	Medium
Federal Licensing Requirements	Yes	None	None	None
State Licensing Requirements	Vary by State	None	None	Vary by State
Leak Test Requirements	Vary by Country	None	None	None
Terrorism Risk	Possible	None	None	None
Reliability	High	High	High	Low
Maintenance Costs	Low	Low	Low	High
Repair Costs	Low	Low	Low	Very High
Disposal Hassle at End of Life	High	None	None	None

**AGT800 Coil Summary Report**

**Smart Steel Company -- 72 Inch Top Name Slitter**

Job Number: A56432    Coil Number: Z456991

Customer Name: ABC Automotive    Customer Tag No: DAN    PO: XYZ Mills

Product: Cold Rolled Steel    Feb-26-03    2:10 PM to 2:13 PM (clock 3.2 min/ run 3.2 min)    Shift: 1

**Average Thickness and Tolerance Data**

Target 0.0878 in    Average\* 0.0872 in    Average - Target -0.0006 in (-0.67%)  
 Standard Deviation\* 0.0002 in (0.22%)

Length 990 ft    Above High Limit 0.0890 in    0 ft (0.0%)  
 Width 60.000 in    In Tolerance 990 ft (100.0%)  
 Weight 17639 lbs.    Below Low Limit 0.0865 in    0 ft (0.0%)

Max Thickness 0.0880 in at 911 ft    Min Thickness 0.0868 in at 852 ft  
 Head Scrap 0 ft    Tail Scrap 0 ft

**Statistical Process Control Data**

Upper Control Limit 0.0877 in    Upper Tolerance Limit 0.0890 in  
 X Double Bar 0.0872 in    R Bar 0.0006 in  
 Lower Control Limit 0.0866 in    Lower Tolerance Limit 0.0865 in

CR 45.6% (Capability Ratio %, 100/CP)  
 Cp 2.193 (Process Capability, HiLim-LoLim/6\*Sigma)  
 Cpk 1.158 (Capability vs Limits)    TMW Ratio 0.992 (Low Limit/Avg)

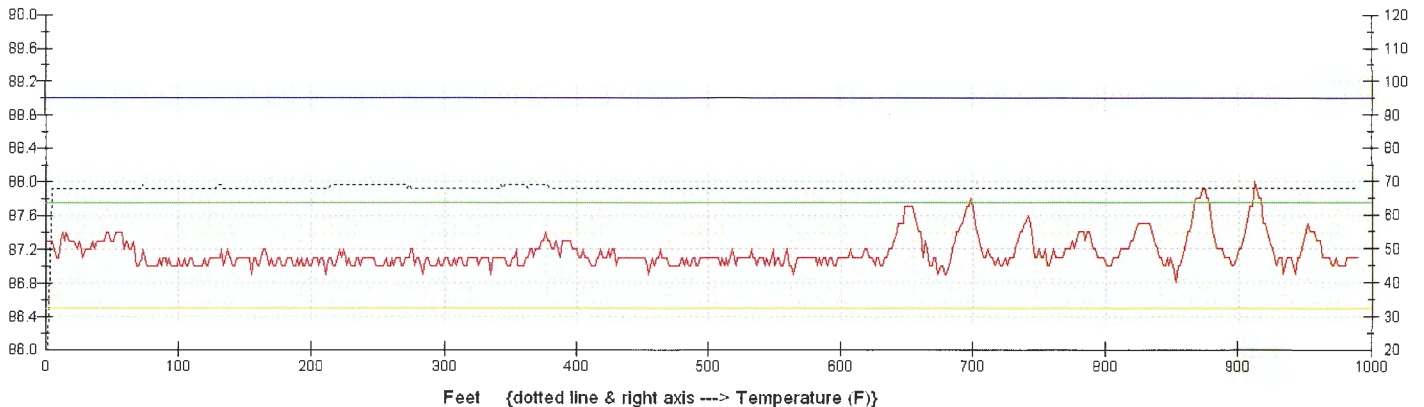
**Thickness Distribution Relative to the Target**

```

+++ 0.0%
+0.0100 0.0%
+0.0090 0.0%
+0.0080 0.0%
+0.0070 0.0%
+0.0060 0.0%
+0.0050 0.0%
+0.0040 0.0%
+0.0030 0.0%
+0.0020 0.0%
+0.0010 0.0%
+0.0000 2.1% ****
-0.0010 97.9% *****>
-0.0020 0.0%
-0.0030 0.0%
-0.0040 0.0%
-0.0050 0.0%
-0.0060 0.0%
-0.0070 0.0%
-0.0080 0.0%
-0.0090 0.0%
-0.0100 0.0%
--- 0.0%
    
```

100.0% is within ± 0.0020 in of the target    100.0% is within ± 0.0050 in of the target  
 100.0% is within ± 0.0100 in of the target    100.0% is within ± 0.0200 in of the target

**Thickness vs Length (Coil Number Z456991)**







*AGT400 Shift Summary Report*

**Smart Steel Company -- 72 Inch Top Name Slitter**

**Shift: 2 Thursday, September 5, 2006 (on demand report, page 1)**

Coil Number	Start hh:mm	Time min	Target in	Average in	R Bar in	Length ft	Width in	Weight lbs	HiLim in	LoLim in
856-51444	14:49	12.1	0.0335	0.0325	0.0002	6970	60.000	46321	0.0355	0.0315
856-51703	15:33	13.6	0.0335	0.0326	0.0002	6639	60.000	44186	0.0355	0.0315
856-51708	16:05	8	0.0335	0.0325	0.0003	7008	60.000	46599	0.0355	0.0315
<b>Job Number: 7780</b>			<b>3 Coils</b>	<b>TOTAL--&gt;</b>		<b>20617</b>		<b>137106</b>		
856-51702	16:46	10.2	0.0335	0.0325	0.0003	7026	60.000	46679	0.0355	0.0315
920-93864	17:15	18.9	0.0335	0.0331	0.0003	7521	51.000	43307	0.0350	0.0320
<b>Job Number: 7947</b>			<b>2 Coils</b>	<b>TOTAL--&gt;</b>		<b>14547</b>		<b>89986</b>		
920-93863	17:49	15.7	0.0335	0.0331	0.0004	7531	51.000	43365	0.0350	0.0320
920-94052	18:16	11.5	0.0335	0.0332	0.0003	8449	50.875	48648	0.0350	0.0320
<b>Job Number: 8020</b>			<b>2 Coils</b>	<b>TOTAL--&gt;</b>		<b>15980</b>		<b>92013</b>		
920-93450	18:38	14	0.0335	0.0332	0.0003	8440	50.875	48331	0.0350	0.0320
920-93271	19:12	12.6	0.0335	0.0331	0.0003	7966	50.875	45704	0.0350	0.0320
920-93270	19:35	15.5	0.0335	0.0331	0.0003	7955	50.875	45651	0.0350	0.0320
920-91308	19:57	11.2	0.0335	0.0331	0.0004	2281	50.875	44165	0.0350	0.0320
920-91309	20:15	10.1	0.0335	0.0331	0.0003	6046	50.875	44795	0.0350	0.0320
<b>Job Number: 7899</b>			<b>5 Coils</b>	<b>TOTAL--&gt;</b>		<b>32688</b>		<b>228646</b>		
920-94575	20:22	11.8	0.0335	0.0332	0.0003	8466	50.875	48660	0.0350	0.0320
920-94574	20:44	15.3	0.0335	0.0332	0.0003	8476	50.875	48720	0.0350	0.0320
920-94573	21:09	12.6	0.0335	0.0332	0.0003	8445	50.875	48483	0.0350	0.0320
<b>Job Number: 8013</b>			<b>3 Coils</b>	<b>TOTAL--&gt;</b>		<b>25387</b>		<b>145863</b>		
970-41659	22:44	21.1	0.0475	0.0472	0.0007	1885	47.625	14382	0.0490	0.0450
970-41659	23:15	16.4	0.0475	0.0473	0.0009	1851	47.625	14144	0.0490	0.0045
<b>Job Number: 7277</b>			<b>2 Coils</b>	<b>TOTAL--&gt;</b>		<b>3736</b>		<b>28526</b>		
<b>Shift Totals:</b>			<b>17 Coils</b>	<b>TOTAL --&gt;</b>		<b>112944</b>		<b>681141 ( 340.6 tons)</b>		

**Smart Steel Company -- 72 Inch Slitting Line**

Tuesday, March 15, 2016 8:52 AM

This ISOcal™ was performed on Friday, March 4, 2016 at 8:13 AM. The calibration was checked using 6 external samples and found to be 99.76% accurate with an average deviation of 0.31 mils.

Lasers at operating temperature during calibration: Yes

**Calibration Details**

	Previous Calibration	Current Calibration
C-Frame Temperature	45.0 °F	45.7 °F
Air Gap	303.097 mm	303.090 mm
Passline Offset	153.428 mm	153.428 mm

**External Sample Results**

	Nominal Value	Measured Value	Deviation
External Sample 1	0.0320 in	0.0321 in	0.0000 in
External Sample 2	0.0627 in	0.0625 in	-0.0003 in
External Sample 3	0.0868 in	0.0869 in	0.0001 in
External Sample 4	0.1251 in	0.1254 in	0.0002 in
External Sample 5	0.1878 in	0.1884 in	0.0006 in
External Sample 6	0.2604 in	0.2597 in	-0.0007 in

**DC Power Supply Checks**

	Nominal Value	Measured Value	Tolerance	Status
Power Supply 1	24.00 volts	23.86 volts	0.50 volts	In
Power Supply 2A	5.00 volts	5.00 volts	0.25 volts	In
Power Supply 2B	-15.00 volts	-14.92 volts	0.25 volts	In
Power Supply 2C	15.00 volts	15.01 volts	0.25 volts	In

# **AGT800 TCP/IP HMI Communication**

Enables the AGT800 to accept a single TCP/IP streaming socket connection on a user defined port for the purpose of requesting information from the gauge or commanding certain actions to the gauge. The gauge software will respond to a specific set of text commands by either performing the requested command or providing the requested information in real time. Current commands allow for the control of the C-frame, measuring and reporting functions as well as the ability to provide thickness, deviation, coil length, coil diameter, C-frame position and digital input status information.

Any client capable of sending and receiving text commands over a TCP/IP socket connection should be able to interface with the gauge software. The software will provide information in a text stream which can then be parsed to collect information in whatever way the client wishes to manipulate the data.

**Please note that each AGT800 must be individually licensed to support this feature. The gauge will then be able to accept one connection.**

SNL-800	Software Network License, 1 copy, 1,995.00 U.S.
SNL-802	Software Network License, 2 to 4 copies, \$1,595.00 U.S. each
SNL-805	Software Network License, 5 or more copies, \$1,395.00 U.S. each

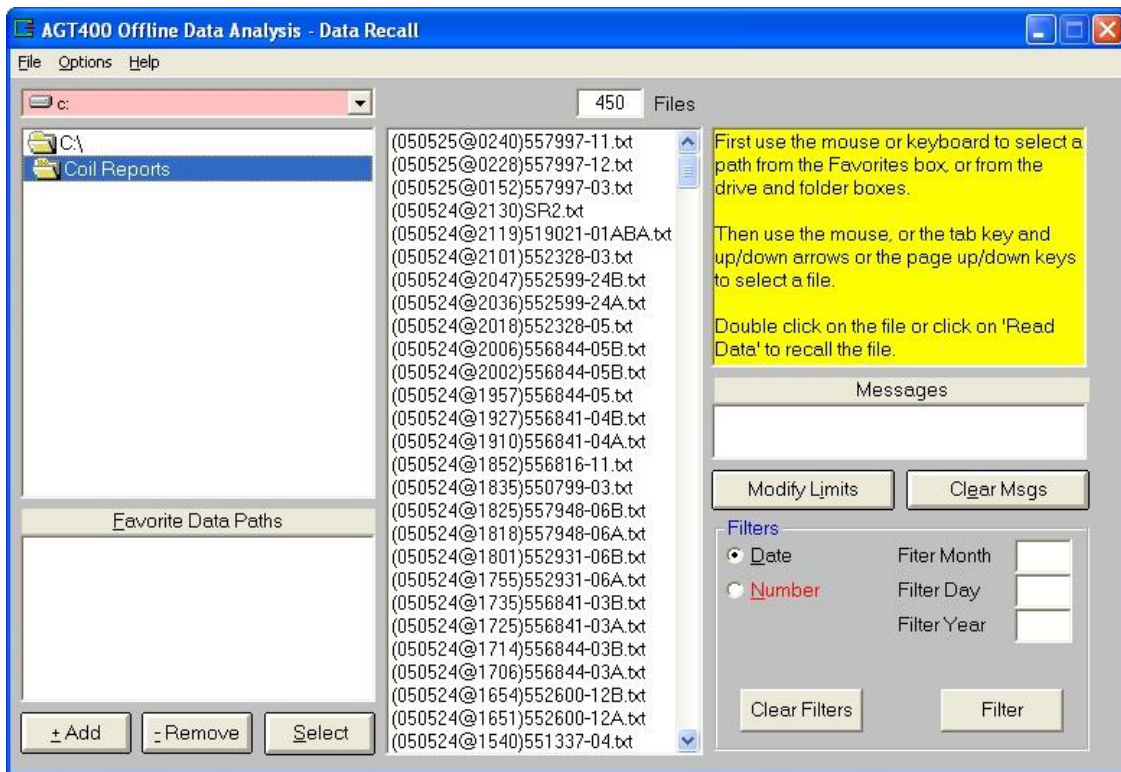
# AGT800 Offline Data Analysis Software

Interested in untethered access to the coil reports generated by your AGT800 Thickness Gauge? Wish you could view coil reports without walking out to the gauge? Want the ability to email reports to customers?

Advanced Gauging Technologies developed Offline Data Analysis (ODA) to allow our customers easier access to their coil reports generated by the AGT800 Thickness Gauge & S.P.C. Reporting System. This software enables customers to recall reports from a single or multiple gauges simultaneously via a company network or USB stick. Coil reports can be accessed without interrupting the gauge measurement or the line operation, and each report can be studied in great detail without printing a single page. In addition, PDF formatted coil reports can be generated by Offline Data Analysis for ease of attachment into customer emails.

The Offline Data Analysis packet includes a software CD, customized AGT800 parameter file, security dongle and installation instructions.

- ODA-401 Offline Data Analysis, 1 copy, \$495.00 U.S.
- ODA-402 Offline Data Analysis, 2 to 4 copies, \$395.00 U.S. each
- ODA-405 Offline Data Analysis, 5 or more copies, \$295.00 U.S. each





*Manufactured, Sold, and Serviced By:*



**8430 Estates Court  
Plain City OH 43064-8015 USA**

**Telephone: (614) 873-6691    Fax: (614) 873-6770**

**Email: [Sales@AdvGauging.com](mailto:Sales@AdvGauging.com)**

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