

### **Company History**

- 1956 Established to measure moisture in cashmere.
- 1965 Expanded into pulp industry.
- 2008 Facility moved to Taunton, MA.
- Present Serving clients worldwide in over 40 countries.

Experienced in a wide variety of applications including:

- Pulp
- Textiles

• Rubber

• Tobacco

• Food

• More

### Why Measure Moisture?

**Quality Control** 

- An even moisture distribution can help prevent sheet breaks.
- Ensure that your customers are shipped pulp that meets their needs.

#### **Increased Profits**

- Your customers will never complain if the pulp you sell is dryer than expected.
- They will complain, however, if it is too wet.
- If you never get customer complaints, chances are, you are giving away pulp.

Accurate moisture measurement can increase profits!

### Functions Lead to Increased Profit

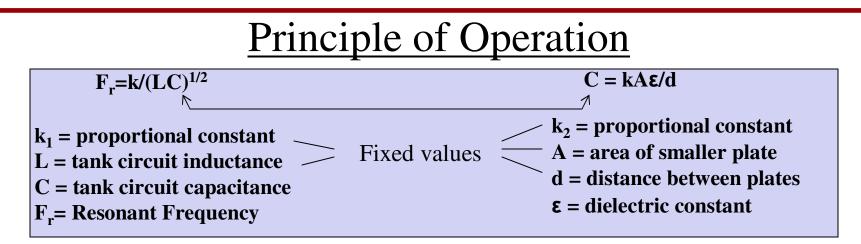
- Accurate Invoice Weights allow precise billing so you can invoice every kilogram of pulp that you ship.
- Real time measurements allow adjustments to be made within minutes instead of hours.
- Reduce energy costs by not over drying.
- Reduce sample collecting and testing which corresponds to reduced operations labor.

### Other Benefits of the Forté System

- 1. Instantaneous, non-destructive measurement test.
- 2. Automated testing with minimal human interface.
- 3. 100% of product tested for accurate determination of Invoice Weight.
- 4. A reliable solution for delivering more consistent bales to customers.
- 5. Provides archived data for identifying changes in moisture over time.
- 6. User friendly and configurable.

### Forté Series 8760 Functions

- Calculates Moisture, Air-dry, and Invoice Weight for every bale produced.
- Builds units and lots to track production.
- Assigns bale serial numbers and lot numbers.
- Tracks bale origin and designates count.
- Records gross and net weights of each bale.
- Provides production reports, graphs and data for trend reports that can be analyzed for future production control.



- Bale moisture is determined by the change in resonant frequency  $(\mathbf{F}_r)$ .
- The resonant frequency changes based on the dielectric constant of the bale.
- Water has a high dielectric constant of about 80. A dry bale of pulp has a dielectric constant of about 2-7.
- The electrode in the press constitutes a portion of the tank circuit capacitance.
- Forte electronics create a non-destructive RF field. The different dielectric constants create a shift in the resonant frequency. Two frequency readings are taken. The first reading is taken when the bale is slightly compressed. The second reading is taken after the bale has been compressed 4 inches (101.6 mm) more than the first reading.
- The second reading is subtracted from the first reading , obtaining the Forté number. This two step method reduces the effects of oscillator drift.
- The Forté number can be correlated into a moisture reading with these equations and several lab air-dry data points determined by oven tests.

### Forté 8760 Hardware

### **Bale Press Electronics**

- 1. Pulp Oscillator
- 2. Electrode/Cover plate assembly with Bleeder Resistor
- 3. Photo Control unit
- 4. Vane (customer supplied)
- 5. Photo Reset Switch with reflector
- 6. Remote Power Supply

### Forté Main Console\*

- 1. Industrial Computer
- 2. DC Power Supply
- 3. Rack with Opto-isolated Discrete I/O Modules
- 4. I/O Connectors
- 5. Communication Interface
- 6. Uninterruptable Power Supply (UPS)

\*Items can be supplied in a console or separately. If separately, industrial computer needs to be kept in a control room.

### Forté Main Console

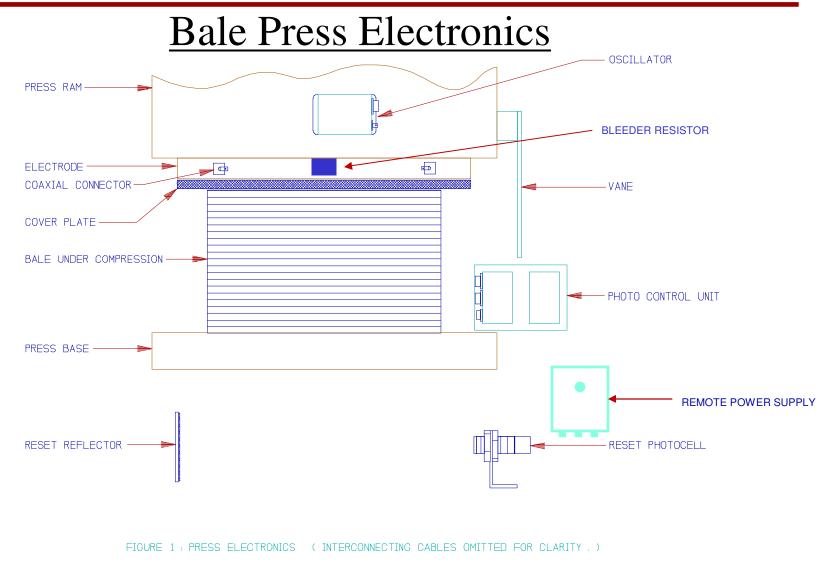




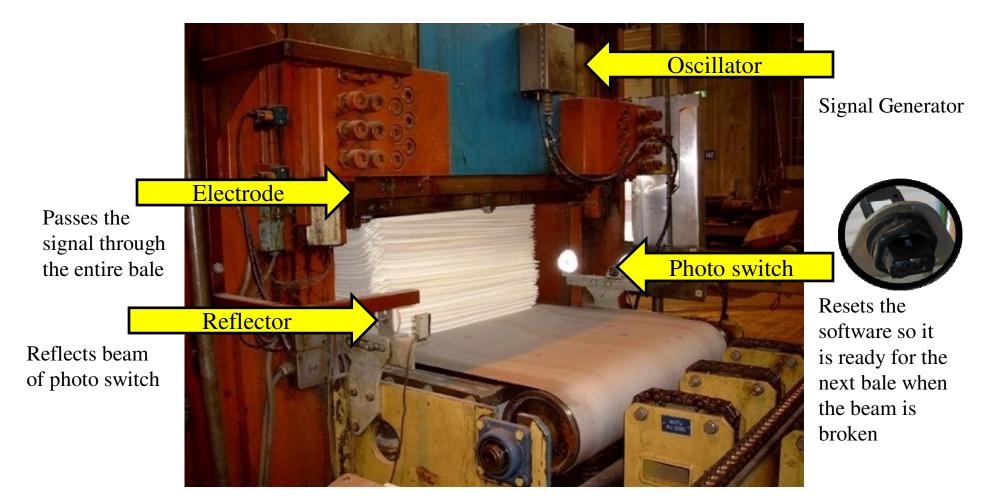
### Forté Main Console - Components



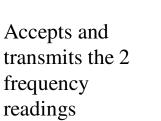
- 1. Industrial Computer
- 2. Uninterruptible Power Supply
- 3. Communications Interface with DC power supply and Opto rack with modules
- 4. I/O Connectors
- 5. LCD Display
- 6. Rocket Port Interface

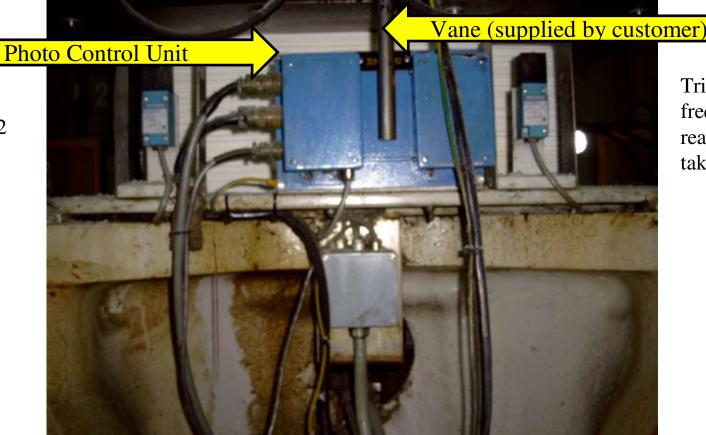


### **Typical Bale Press**



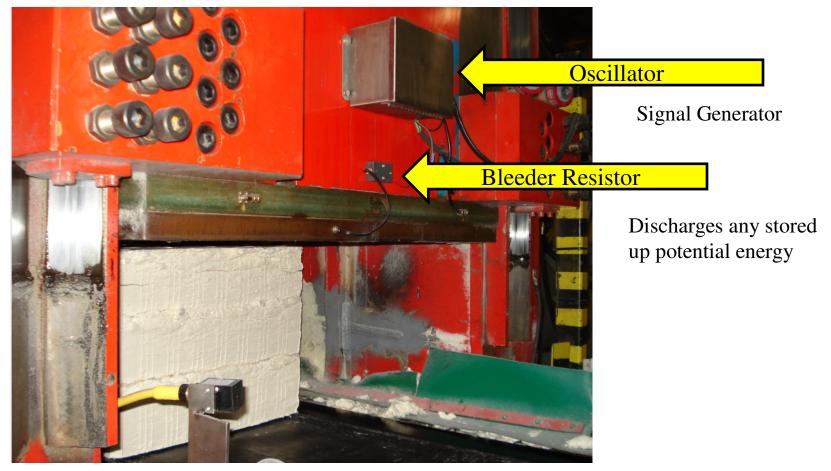
### **Typical Bale Press**





Triggers 2 frequency readings to be taken.

### **Typical Bale Press**



### Remote Power Supply



Supplies voltage to other Forté Equipment.

### Industrial Computer Components

- Windows XP Professional operating system
- Dual hard drives RAID 1
- AC5 Interface Card
- Rocket Port Interface Card
- Optional Analog Interface

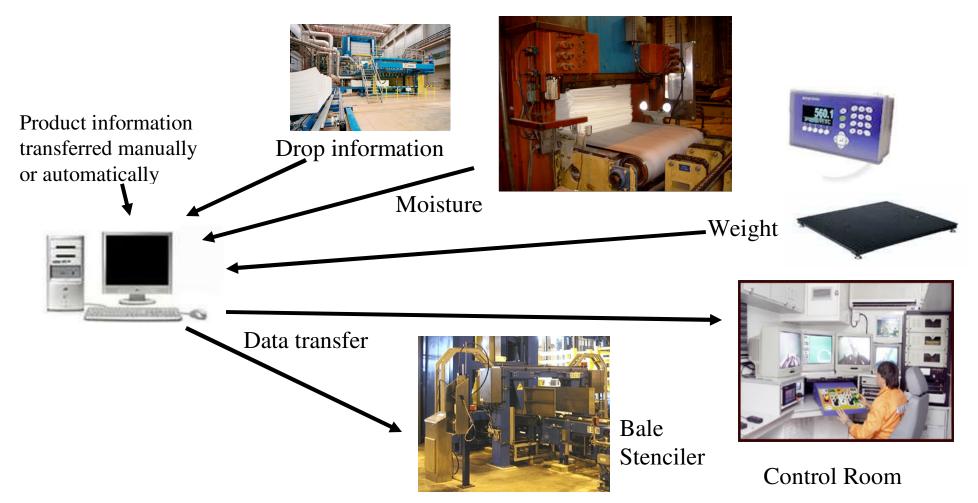
### Rocket Port Interface - RS232/RS422



### Features of the Forte Software Application

- Easy to learn and use.
- Familiar Windows pull down menus.
- User definable fields.
- Configurable summaries, reports, screen displays.
- Several methods of output to mill-wide information system.
- Utilizes SQL databases.
- Archives bale and measurement data for two years.
- Remote displays available.
- Optional input of Quality data.
- System log for ease of troubleshooting.

### Mill Interface

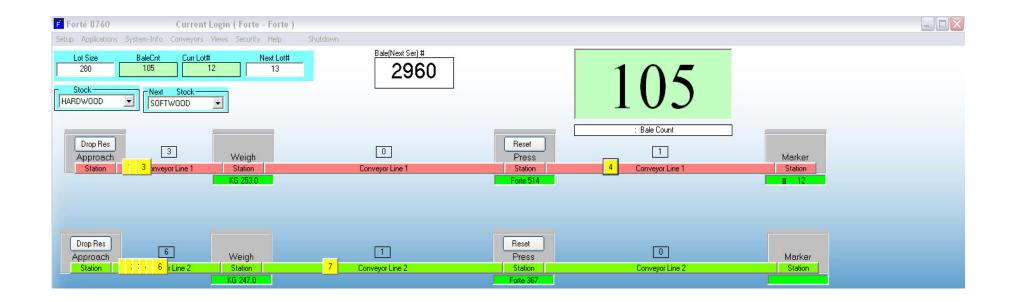


### Main Application

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gurat ale	ion Summaries			Cal H70S30	Serial# 003059	Bale# in L	ot Vvtkg 248.0	%AD 91.38		Inv Wt kg 228.7	VVt Limits	Forte 412			
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CurrentLot/Bale Bale Summary Lot Summary Day Summary Shift Summary Period Summary Prior Totals Alarms Quality Summary

### Schematic View of Measuring Window



User configurable display includes Stock, Bale and Lot data.

### Console View of Measuring Window



Optional view includes large number displays for ease of viewing.

### Summary Window

ale	Time	Stock	Lot	Cal	Serial#	Bale# in Lot	Vvt kg	%AD		Inv Wt kg	Wt Limits	Forte
ed	10:13:24	HARDWOOD	12	H70S30	003057	202	251.0	92.11		233.3		403
_	Time	Stock	Lot	Cal	Serial#	Bale# in Lot	Wtikg	%AD	Inv Wt k	.g Wt Limits	Forte	
B A	10:08:41	HARDWOOD	12	H70S30	003043	188	251.0	91.90	232.8		407	
ĩ	🥸 10:09:16	HARDWOOD	12	H90S10	003044	189	253.0	81.58	208.5		536	
Ē	10:09:22	HARDWOOD	12	H70S30	003045	190	249.0	90.51	227.5		431	
	10:09:57	HARDWOOD	12	H90S10	003046	191	250.0	84.69	213.8		461	
	10:10:02	HARDWOOD	12	H70S30	003047	192	252.0	94.36	239.9		364	
	10:10:37	HARDWOOD	12	H90S10	003048	193	249.0	86.70	218.0		420	
	10:10:42	HARDWOOD	12	H70S30	003049	194	246.0	93.16	231.3		376	
	10:11:17	HARDWOOD	12	H90S10	003050	195	248.0	87.59	219.3		402	
	10:11:22	HARDWOOD	12	H70S30	003051	196	246.0	91.37	226.9		409	
	10:11:58	HARDWOOD	12	H90S10	003052	197	253.0	87.93	224.6		404	
	10:12:03	HARDWOOD	12	H70S30	003053	198	246.0	92.82	230.4		382	
	10:12:38	HARDWOOD	12	H90S10	003054	199	245.0	85.91	212.6		428	
	10:12:43	HARDWOOD	12	H70S30	003055	200	249.0	93.19	234.1		380	
	10:13:18	HARDWOOD	12	H90S10	003056	201	247.0	85.37	213.0		442	
	10:13:24	HARDWOOD	12	H70S30	003057	202	251.0	92.11	233.3		403	
1												
ō	Status	Dt Open	Tm Open	Stock/Grade	Ba	atch Bales		NW kg	Inv	v. Wt.kg SI	hip Wt. Kg	AV %
Т	Open	10/09/08	10:43:43	HARDWOOL				50360.0			0784.2	19.63

#### Displays user configurable bale and measurement data.

### **Stock Operations**

Stock System 80-4003-7.4 Stock Operations Print System Log	Maintenance Grade User
Name HARDW00D KRAFT-17 SOFTW00D HARDW00D	Calibration Cal 1 HARDWOOD Cal 2 SOFTWOOD Tare Wt. 2.1 kg
	Low       88       %AD         Caution Limits       Low       90       %AD         Caution Limits       Caution Low       90       %AD         Caution Limits       Caution Limits       Caution Low       240.0       kg         High       103       %AD       High       260.0       kg
	High     105     %AD     High     270.0     kg       Stock Labels
	Apply Modify Cancel Parameters Defaults Target

•Define Stocks.

•Assign calibrations.

•Enter Tare Weights.

•Define %AD and weight cautions and limits for a digital ouput.

### Defaults

Stock System 80-4003-7.4						
Stock Operations Print System Log	Maintenance Gra	ade User				
Name						
HARDWOOD Name KRAFT-17 SOFTWOOD HARDWOOD	Net Wt. Forte	250 kg 247.9 kg 843 92 %AD	Sheet Cnt. Brightness	Sh Cnt Bright		
	Apply Sy	Undo ystem Defaults Defaults to all Modify	Grade Grading Criteria Done		Y	
< <u> </u>						
	Paran	neters	Defa	ults	Target	

Enter default data in the event that communication is lost.

### **Calibration**

<u>Purpose</u> - As with any secondary measurement, the Forte system requires calibration. This is necessary to convert the Forte number to an accurate Air-Dry.



<u>How</u> - The Forte is calibrated using the oven dry method.

<u>Importance</u> – The better the oven-dry data, the more accurate the moisture, air-dry reading determined by the Forté system.

### Proper Calibration - Samples

- <u>Product</u> Collect samples from standard bale production.
  - Low, medium, and high moisture levels.
  - Use new bales that are the same size.
- Quantity At least 10 bales (preferably from different bale positions).
  - 5-10 samples per bale (including the outside and center while avoiding the top layer and edges).

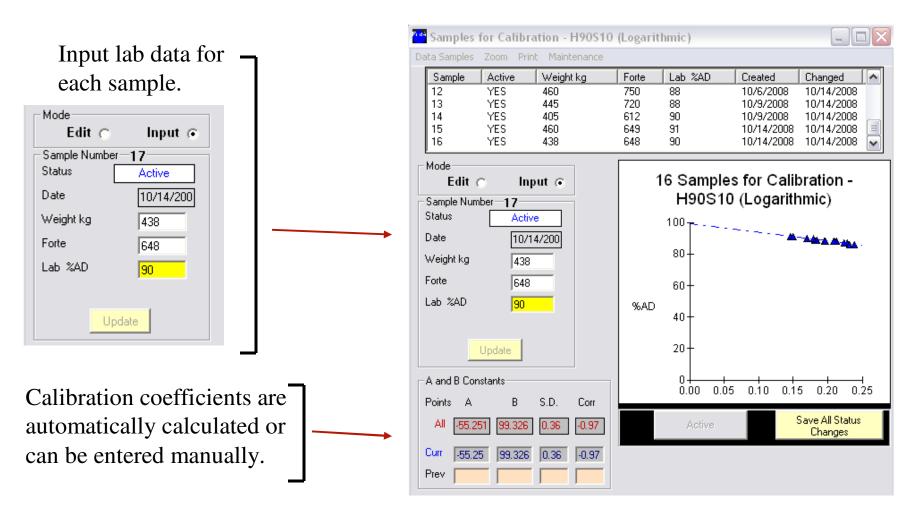
### Proper Calibration - Procedure

- <u>Method</u> Record Forté Number and Bale Weight for each sample bale.
  - Perform standard lab oven-dry tests.
  - Enter Forté Number, Bale Weight, and Air-Dry into Forté calibration program.



- Each material requires a separate calibration. (Example: hardwood, softwood)
- Calibrations are saved on the hard drive by the Forté software.

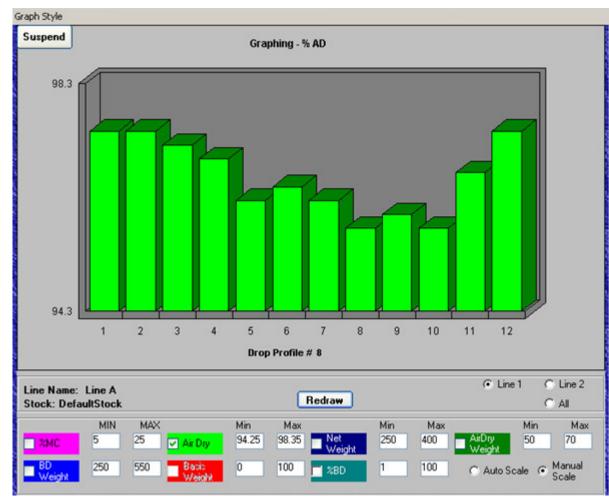
### **Calibration**



### Calibration - Recommendation

- The Forté engineer will help with the initial calibration during the system installation.
- Forté recommends two calibration samples be collected every month for the first year to verify that the calibration continues to be accurate.
- After the first year, a verification calibration once a year is sufficient.
- The additional samples added to the calibration, reduce the standard deviation, ensuring the most accurate moisture content readings.

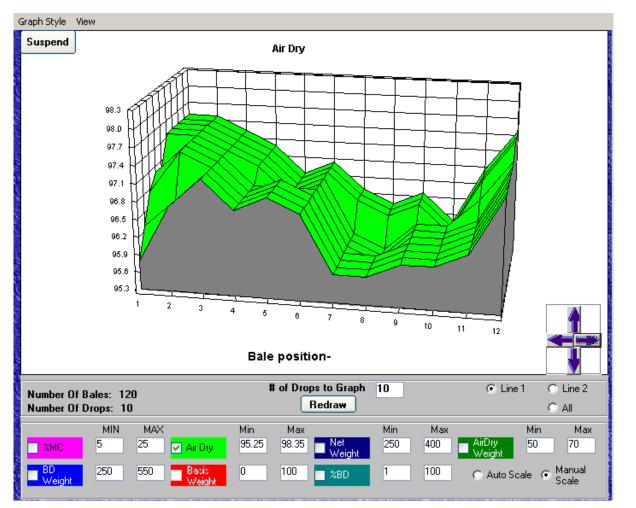
### % Air-Dry Graph across a Drop



This graph displays a drop of twelve bales.

This can be used by the Wet End operator to control the dryer and prevent sheet breaks.

### % Air-Dry Graph by Bale Position and Drop



This carpet graph displays several drops

### Trends by Drop Position



The last 300 bales are displayed by drop position. This allows the user to view trends in moisture or weight both horizontally and vertically across the pulp web.

### Devices

F Device	SCALE					×	
Configure Device Scale Oscillator Stenciller	Line A A A	Station 1 2 3	Port 3 4 6	Baud,Parity,Start Bits,Stop Bits 2400,E,7,2 1200,N,8,1 9600,N,8,1	Device State Display Online ?.? Online ?.? Online ?.? Online ?.?	Format	
Reset	Fest essage	🗖 Log Tes	st Results			S	view th tatus c onnec
UnParsed						d	evices
ErrorMes	sage						
Enable Lim		Value Min 200	Value Max 600	Alarm Level No Alarm			

### <u>Alarm</u>

	ALARM !	
Silence	Remind me (5 minutes)	

The on screen alarm alerts the user to any system malfunction or, optionally, the alarm will display if bale weight or %AD exceeds the defined limits.

### **Security**

Standard operation does not require anyone to be logged into the system. There are 5 windows that require a user to be logged on in order to access restricted areas. There are 9 different access levels. The Forté system automatically logs every user off after 15 minutes to help prevent unauthorized changes to the Forté system. A user with sufficient access needs to be logged on in order to shut down the Forté system.

🛱 Forte Security	🛱 Forte Security	
User Maintenance	User Maintenance	
Name Submit   Password Cancel   Level Image: Cancel   Please type the user's name.	User       Access Level         Forte       Forte         Administrator       Sys Admin         User       Operator         Cal       Cal Lab         Grade       Supervisor         sim       Super User         GROUP LEAD       Group Leader         Quality Control       QA QC         E&I       E&I	
Actions Users	Actions Users	



# Maintenance



- Electrode and cover plate should be cleaned with ammonium chloride or isopropyl alcohol at least once a year, more often if hydraulic fluid and grease are prevalent at bale press.
- Reset photo switch and reflector need to be kept aligned and free from contaminates.
- Inspect all external cables and ground connections for wear and abuse.
- Clean the conveyor passageway through the test cell, removing stray pieces of product and wrapper material. ...World leaders in moisture measurement

### Troubleshooting

The first place to look if a problem arises is in the System Info Log. This Log shows all of the steps the system has gone through, and any warnings that have occurred. The log may help determine the cause of the problem.

Date/Time	Туре	Source	Text
🔔 10/6/2008 1:26:24 PM	WARNING	Bale Tracking	Default bale created at station 8760Weigh Line2
10/6/2008 1:26:26 PM	CRITICAL	Bale Tracking	Insufficient capacity on conveyor Regular ID = 10
🛕 10/6/2008 1:26:26 PM	WARNING	Bale Tracking	Default bale created at station 8760Press Line1
<u>10/6/2008 1:26:27 PM</u>	WARNING	Device	Device devMarker is off-line. Operation WRITE cancelled
<u>10/6/2008 1:26:28 PM</u>	WARNING	Bale Processing	Not assigned (default) Weight = 246.2 detected in CalculateMoisture
🔥 10/6/2008 1:26:28 PM	WARNING	Device	Device devMarker is off-line. Operation WRITE cancelled
10/6/2008 1:26:28 PM	INFO	Lot Processing	Lot 8 closed
🛕 10/6/2008 2:03:46 PM	CRITICAL	Database	ADODB Error1: Error #-2147217865Invalid object name 'ForteLayer.INFORMATION_SCHEMA.Tables'. No Help fil
🛕 10/6/2008 2:03:46 PM	CRITICAL	Database	ADODB Error2: SELECT TABLE_NAME from ForteLayer.INFORMATION_SCHEMA.Tables
🛕 10/6/2008 2:03:46 PM	CRITICAL	Database	GetSqlTable: Operation is not allowed when the object is closed.
10/6/2008 2:06:06 PM	INFO	Security	######### User Logged out
10/6/2008 2:06:14 PM	INFO	Security	######### User Logged in: Forte
<			

### Troubleshooting

If the System info log does not go back far enough, or the Forté software will not boot up at all, go into the ASCII Log. The ASCII Log can be found in C:\ForteSystem\Realtime\ASCIIlog. The ASCII Log goes back further than the Systems log to help determine the root cause of a problem.

ForteReportPrint_CurrentSystem.L	.0G - Notepad		<b>_ _ X</b>
File Edit Format View Help			
Price         EDR         Format         View         Hep           05/19/2008         23:00:01         -         INFO           05/20/2008         07:00:01         -         INFO           05/20/2008         15:00:01         -         INFO           05/20/2008         23:00:00         -         INFO           05/21/2008         07:00:01         -         INFO           05/21/2008         23:00:00         -         INFO           05/22/2008         23:00:00         -         INFO           05/22/2008         23:00:00         -         INFO           05/22/2008         23:00:00         -         INFO           05/22/2008         23:00:00         -         INFO           05/23/2008         15:00:01         -         INFO           05/23/2008         05:00:01         -         INFO           05/24/2008         15:00:01         -         INFO           05/24/2008         15:00:01         -         INFO           05/25/2008         15:00:01         -         INFO           05/26/2008         15:00:01         -         INFO           05/26/2008         15:00:01         -	<ul> <li>Socket Message</li> </ul>	<ul> <li>ArchiveAndPrintMultiRecSummary Shift3 return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Day return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Shift2 return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Shift3 return code= 0<td></td></li></ul>	
05/26/2008 23:00:01 - INFO 05/27/2008 07:00:01 - INFO	– Socket Message – Socket Message	<ul> <li>ArchiveAndPrintMultiRecSummary Shift3 return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Day return code= 0</li> </ul>	
05/27/2008 15:00:00 - INFO 05/27/2008 23:00:00 - INFO 05/28/2008 07:00:01 - INFO 05/28/2008 15:00:01 - INFO	<ul> <li>Socket Message</li> <li>Socket Message</li> <li>Socket Message</li> <li>Socket Message</li> </ul>	<ul> <li>ArchiveAndPrintMultiRecSummary Shift2 return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Shift3 return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Day return code= 0</li> <li>ArchiveAndPrintMultiRecSummary Shift2 return code= 0</li> </ul>	

### **Recommendations**

- Shut the program and computer down properly, do not just power off or the Forte databases may become corrupted.
- If the "B" value in the calibration needs to be adjusted frequently, there may be another problem. Check to see if the electrode needs to be cleaned.
- Wipe down the photo switch, reflector, and sides of electrode every couple of weeks.
- Create back ups.



Are you using all of the features the Forté system offers?



- 1. Production data input to Forté manually or via barcode, ethernet, etc.
- 2. Output of Forté data to a remote database through a shared file (text or Excel) or through ODBC interface.
- 3. Output of data to existing stenciller device.
- 4. Output to remote display or external alarm.
- 5. SQL database for process control.

FORTÉ SAVES YOU TIME & MONEY BY PROVIDING A RELIABLE SOLUTION FOR FULLY INTEGRATING MOISTURE MEASUREMENT INTO YOUR PRODUCTION AND SALES PROCESSES.

### **Contact Information**



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