Applications Note
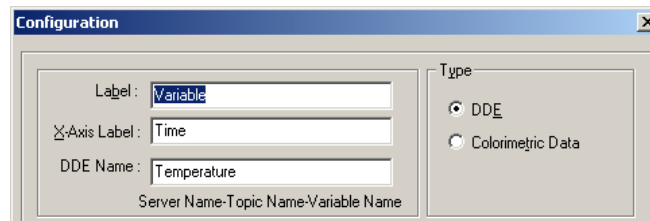
# Temperature Compensation
Using the SpectraProbe XE

The temperature of a product can affect its color. Thermochromism, a change in product color resulting from a change in product temperature, affects many industries, particularly coil coating. By incorporating data from a temperature-sensing device installed at the process, color data obtained from the SpectraProbe XE can be automatically adjusted to compensate for changes due to temperature. These corrected values can then be displayed and stored in EasyMatch OnLine software.

An infrared pyrometer is used to measure the product temperature. The pyrometer and its electronics are mounted inside the SpectraProbe XE sensor enclosure, in line with the z-axis. This means that the same sample area is viewed by both the pyrometer and the SpectraProbe XE. The RS-485 input from the pyrometer is transferred to EasyMatch OnLine as a process variable using dynamic data exchange (DDE).


In order to use the temperature compensation feature, you must first quantify how product color changes with temperature *for each product*. Do so as follows:
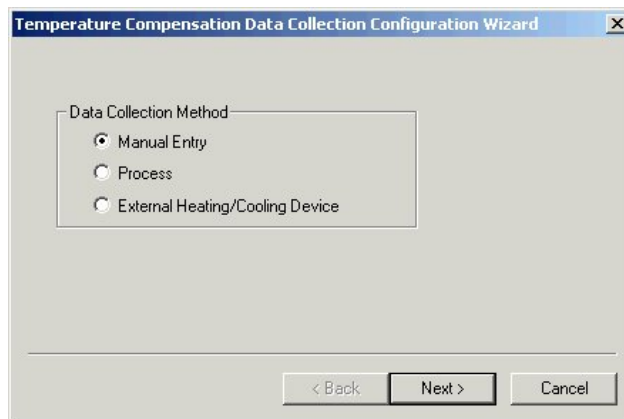
1. Open EasyMatch OL and check Enable Temperature Compensation on the **Options** tab in the System Setup.
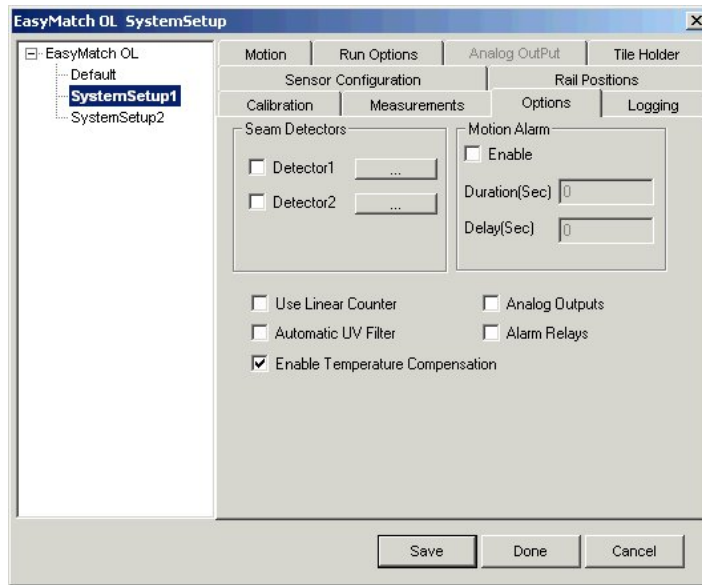
2. On Page 6 of the Product Setup for the first product, click the radio button next to the temperature measurement units you wish to use.
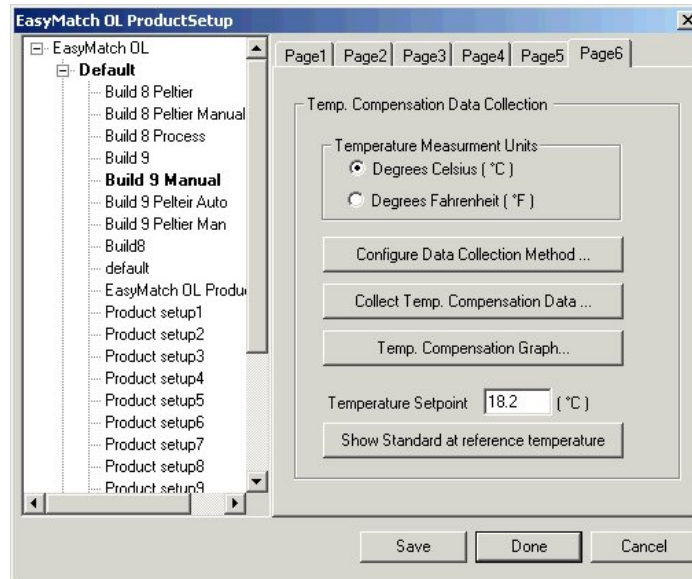
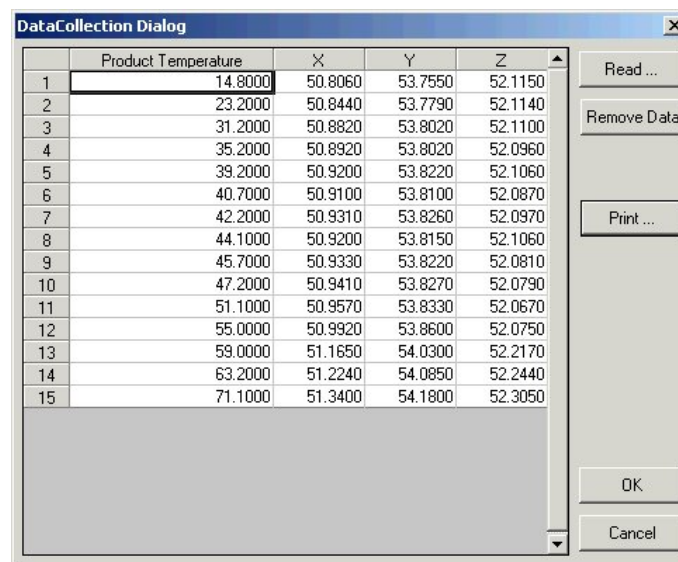3. On the same tab, click **Configure Data Collection Method**. The following screen appears.

4. Choose the method you wish to use for data collection and then click **Next**. The software walks you through configuring the data collection method using a wizard and then returns you to the Product Setup.

   Manual Entry applies when you have already quantified the relationship between temperature and color for this product type or can reference pre-existing tables, such as published thermochromic correction data.

   Process applies when you can use your own equipment to heat samples to different temperature setpoints as the product is processed on the range. This would require fairly precise control of oven temperatures and steam pressures to drying can stacks. The product temperature would then be captured from the system's infrared pyrometer and could be correlated with the corresponding color data either by DDE or direct input.

   External Heating/Cooling Device applies when standard product can be heated to different temperature setpoints in the laboratory and then read with the SpectraProbe XE. At the same time, temperature data would be collected from the infrared pyrometer either by DDE or direct input. This method consumes less product and does not require range down-time.

5. Click **Collect Temp. Compensation Data**. Collect or enter data using the data collection method you chose in Step 4. Please note that the more data points you enter, the better your temperature correction will be. Click **OK** to return to the Product Setup.

DataCollection Dialog

	Product Temperature	X	Y	Z
1	14.8000	50.8060	53.7550	52.1150
2	23.2000	50.8440	53.7790	52.1140
3	31.2000	50.8820	53.8020	52.1100
4	35.2000	50.8920	53.8020	52.0960
5	39.2000	50.9200	53.8220	52.1060
6	40.7000	50.9100	53.8100	52.0870
7	42.2000	50.9310	53.8260	52.0970
8	44.1000	50.9200	53.8150	52.1060
9	45.7000	50.9330	53.8220	52.0810
10	47.2000	50.9410	53.8270	52.0790
11	51.1000	50.9570	53.8330	52.0670
12	55.0000	50.9920	53.8600	52.0750
13	59.0000	51.1650	54.0300	52.2170
14	63.2000	51.2240	54.0850	52.2440
15	71.1000	51.3400	54.1800	52.3050

Read ...   Remove Data   Print ...   OK   Cancel

6. Enter the temperature setpoint to which all color data for this product should be corrected.

7. Repeat Steps 2-6 for each type of product.

EasyMatch OL does the rest. Data obtained using this product setup is then automatically corrected to the temperature setpoint selected. The real-time process temperature, as well as the adjusted color data (indicated with "Adj." in front of each parameter name), may be shown in the Color Data Table (if selected in the Color Data Table Configuration) and stored in both the database and the job file.

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	Pass/Fail	Temperature(°C)	Adj. X	Adj. Y	Adj. Z	Adj. dE*	
Sample 747	Pass	23.85	23.74	22.89	13.62	0.06	
Sample 748	Pass	23.85	23.73	22.88	13.61	0.07	
Sample 749	Pass	23.85	23.74	22.88	13.61	0.07	
Sample 750	Pass	23.75	23.74	22.89	13.62	0.07	
Sample 751	Pass	23.80	23.74	22.88	13.61	0.07	
Sample 752	Pass	23.80	23.75	22.89	13.62	0.06	
Sample 753	Pass	23.75	23.74	22.89	13.62	0.06	
Sample 754	Pass	23.75	23.74	22.89	13.62	0.06	
Sample 755	Pass	23.75	23.74	22.88	13.62	0.08	
Sample 756	Pass	23.75	23.73	22.87	13.61	0.08	
Sample 757	Pass	23.75	23.74	22.89	13.61	0.06	
Sample 758	Pass	23.80	23.74	22.89	13.62	0.06	
Sample 759	Pass	23.75	23.73	22.88	13.61	0.07	
Sample 760	Pass	23.75	23.73	22.87	13.61	0.08	
Sample 761	Pass	23.75	23.74	22.89	13.61	0.06	
Sample 762	Pass	23.80	23.73	22.88	13.61	0.07	
Sample 763	Pass	23.75	23.74	22.89	13.61	0.06	
Sample 764	Pass	23.80	23.74	22.88	13.61	0.07	

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