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# PAINTING BY NUMBERS

## ..... Efficient Live Product Cure Temperature Monitoring

Large OEM automotive paint lines are all closely monitored and controlled by sophisticated monitoring systems. Such systems are generally based on monitoring of control thermocouples within zones of the various ovens. Although giving 24/7 monitoring capability obviously such data does not give actual product temperature. For years process engineers have been striving to achieve continuous live product temperature monitoring through the process.

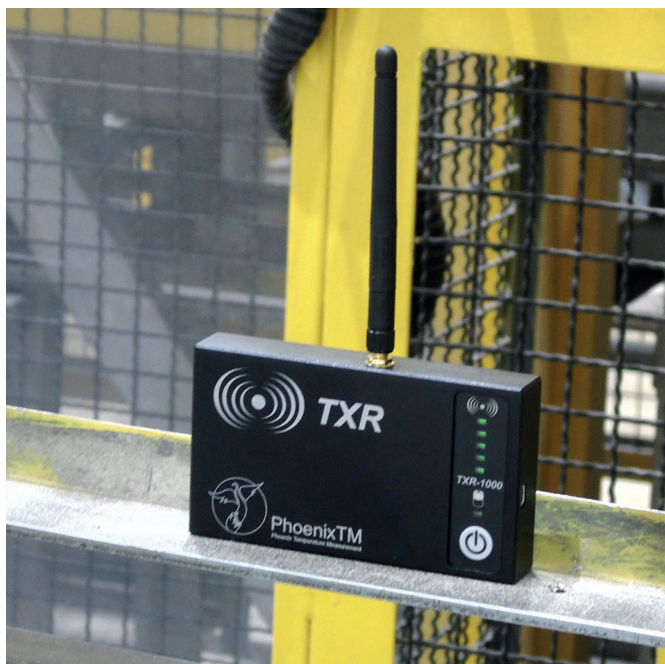


Radio telemetry as a technology allows in theory direct data transfer from a data logger out of an oven to a monitoring PC providing such live monitoring. Although well known the technology has rarely been applied to temperature profiling in the automotive paint market. The reasons for this are generally down to the distance over which the signal needs to be transmitted (Oven to QA Office), number of receivers needed to detect a signal out of the oven and the costs associated with configuring receiver units hard linked by cable and needing external power to

operate. Even with expensive RF configuration any data gaps in the process, due to large ovens, faraday gage effects and transient RF interferences can make comprehensive monitoring difficult and non-conclusive.

To overcome the inherent technical limitations of existing RF system on the market PhoenixTM has developed its own unique RF telemetry system. The system has been designed in such a way as to overcome the inherent challenges of the automotive paint line. The two-way RF

system not only monitors temperature data recorded by the data logger but allows direct control of the data logger itself. The data logger can be reset or downloaded direct from the oven without any need to access the data logger inside the thermal barrier. The RF signal transmitted out of the oven is passed along a series of repeater units back to the main coordinator connected to the monitoring PC. The repeater units are powered by battery and are not physically linked by any cable. As such they can be positioned where needed and moved with



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ease (No expensive infrastructure installation costs). For a paint line it is possible therefore that each oven has its own allocated repeater(s). A very valuable feature of the system is a unique 'catch up feature'. Any missed data from RF black spots is automatically re-transmitted as soon as the RF signal is re-established ensuring that profile data is complete.

Combining RF telemetry with the

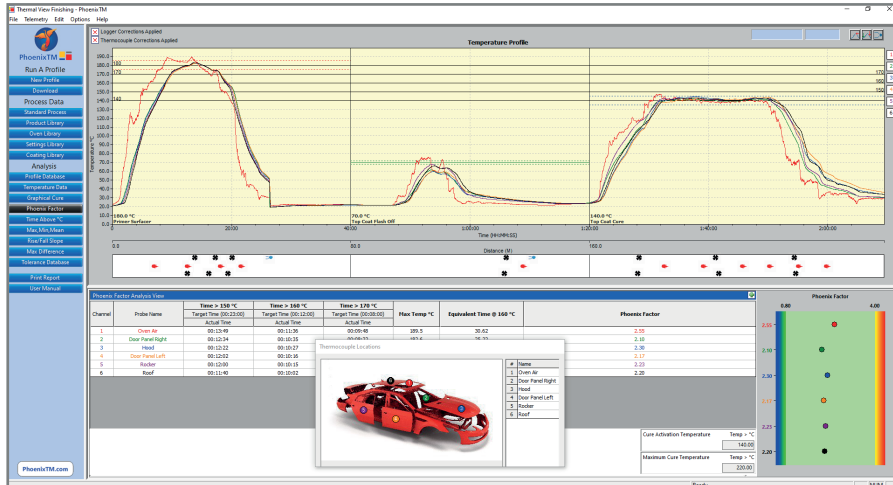
performance of the profiling system it is possible to monitor the complete paint process in one continuous run. This approach eliminates a lot of the intensive labour required for traditional manual profiling of each oven. System set-up installation and retrieval for each oven is tedious, time consuming, not forgetting the travel time from oven back to the QA office to download the profile data.

The Thermal barrier (TS04-135) provides up to 5 hours protection @ 200 °C. So, with the delays between ovens (cooling period) it has enough thermal protection to allow all coating ovens to be run in one profile pass. With RF operation the data is collected automatically, and process issues can be detected immediately. With a battery life of up to 1000 hours and 3.8 M data point memory in theory the system could run continuously in RF mode for a complete manufacturing week (6.5 days).

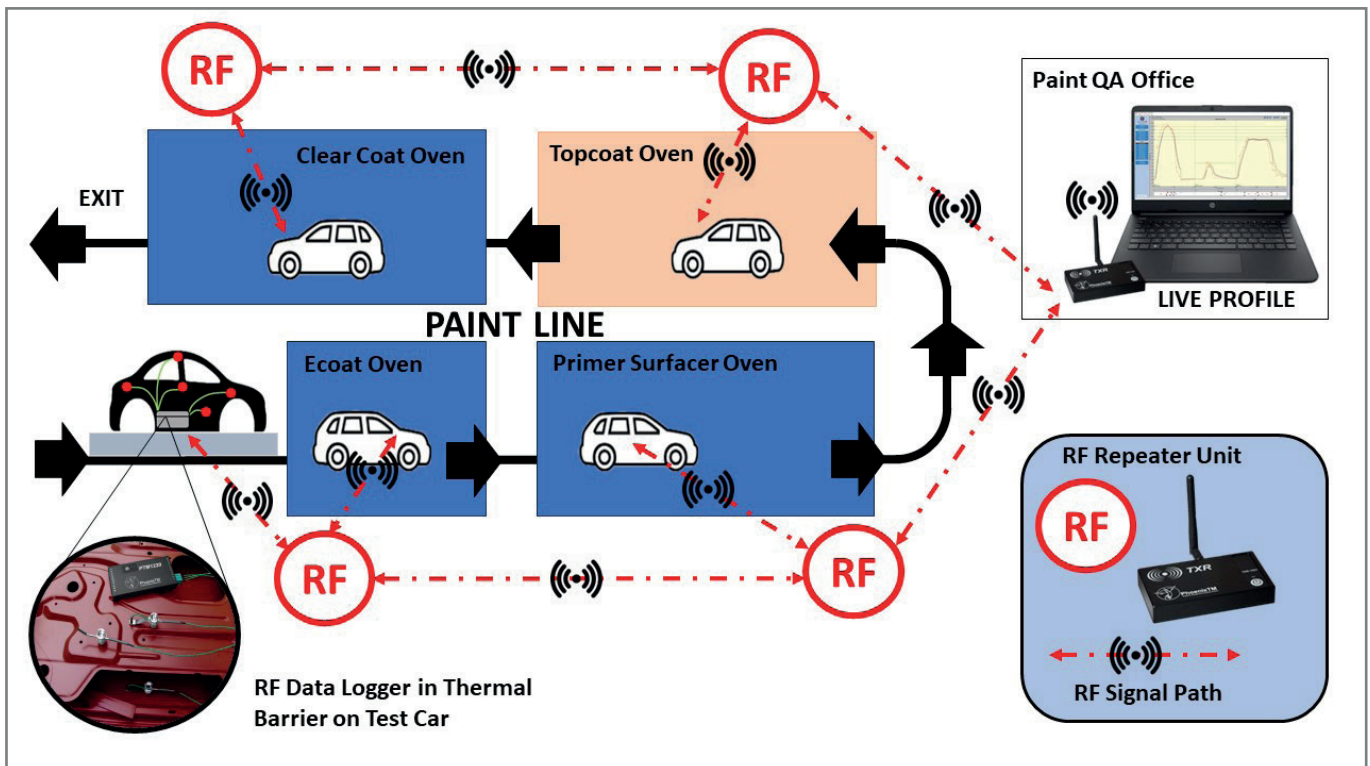
It is potentially feasible that a car test body, fitted with a RF system and thermocouples permanently fixed in place could run continuously around automated paint cure loop, performing a daily profile of all cure ovens without any operator intervention, other than programming the insertion of the test body into the product stream. Why not consider RF technology as a means of automating your thru-process product temperature monitoring making it easier, quicker, less labour intensive and live!

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▲ PhoenixTM RF telemetry temperature monitoring system key components:  
 (i) Multi-channel data logger protected in the TS04-135 Thermal Barrier  
 (ii) Remote repeater(s) used to transfer data logger RF data signal back from Ovens to monitoring PC (iii) Thermal View Finishing software designed to manage real time data collection, full analysis and reporting.



▲ Schematic: The continuous pass of the test car carrying the RF Telemetry PhoenixTM Temperature Profiling system allowing live monitoring of the product temperature profile information direct from the different sequential coating cure oven in a single run.



**PhoenixTM**  
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*...where experience & choice counts!*

## Thru-process Monitoring Solutions for Paint & Powder Coating Ovens

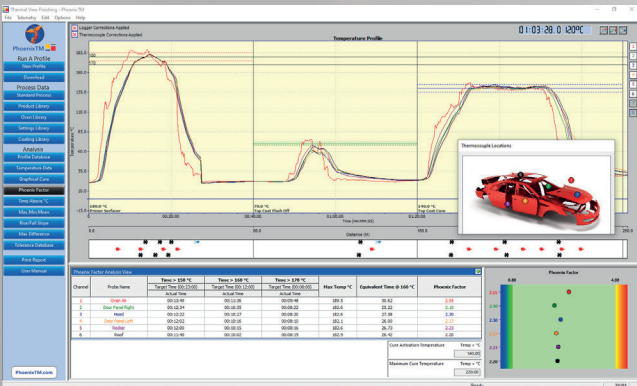
### Temperature Profiling Systems



### Comprehensive Range

- Data Logger and Thermal Barrier choice (6 to 20 Thermocouples)
- Extensive Thermocouple range
- Real Time RF Telemetry options
- ATEX approved options
- Full UK service and calibration support

### Oven Profile and TUS software



### Software Packages to Suit

- Thermal View or enhanced Thermal View Finishing software
- Match Analysis Tools to suit.
- CQI-12 Temperature Uniformity Survey solution options

### Optic Video Profiling System



### Innovative Video Capture Thru the operating oven

- Detect paint runs, chips and defects
- Spot transport problems
- Identify oven damage
- Locate dust and inclusion risk areas

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