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Infrared Enhances Powder Coating Efficiency for Steel Dies

At Toyota Motor Manufacturing (UK), an Excelitas short-wave infrared curing system is improving the efficiency of powder coating steel dies used in aluminum engine production. The solution reduces curing times, lowers energy consumption and enhances coating quality through precise temperature control, while supporting Toyota's environmental objectives through on-demand operation.

An electric infrared curing system from Excelitas is helping enhance the efficiency of powder coating processes for steel dies used in the production of aluminum engines at Toyota Motor Manufacturing (UK) Deeside plant. In addition to accelerating the curing process, the system has improved coating quality through precise control of curing temperatures.

Toyota Motor Manufacturing (UK) operates two manufacturing facilities in the UK. Its vehicle assembly plant is located at Burnaston, Derbyshire, while engine production takes place at Deeside, North Wales, where aluminum casting, machining and assembly operations are carried out. Cylinder heads are produced using a low-pressure die-casting process, in which aluminum ingots are melted before the molten aluminum flows into precision-engineered steel dies under low pressure. To maximize the service life of these dies, they are spray-coated with multiple layers of wear-resistant coating. Each layer requires curing before the next can be applied. Previously, the coated dies were transferred to a gas-fired curing furnace before being returned to cool.

As part of Toyota's ongoing commitment to continuous improvement, the company evaluated infrared curing technology to further optimize production efficiency and reduce energy consumption. Following successful on-site trials, a 41kW short-wave infrared system from Excelitas was installed. The surface temperature of each die is monitored using a non-contact pyrometer, ensuring consistent and accurate process control throughout curing. Looking ahead, Toyota plans to introduce automatic closed-loop temperature control, with an integrated thermocouple measuring die temperature and regulating the output of the infrared emitters to maintain the required process temperature.

Kevin Peters, Die Maintenance Group Leader at Toyota Motor Manufacturing (UK)'s Deeside plant, welcomed the results of the project: "The new infrared system has delivered exactly what we set out to achieve. We've reduced cycle times, improved energy efficiency and gained much more precise temperature control, which has also enhanced the quality and consistency of our die coatings. Because the infrared system operates only when required, it supports our environmental objectives while contributing to a more efficient manufacturing process. Overall, it has been an excellent outcome for the team."



FEATURES

- Powder coating of steel dies for engine parts
- Reduced cycle times
- Lower energy consumption through on-demand operation
- Improved coating quality and process consistency

TECHNICAL DATA

- Infrared system power: 41kW
- Electric short-wave infrared system
- Precise temperature control via non-contact pyrometer

