

# APPLICATION STORY



## FLIR CAMERAS ENSURE QUALITY OF PLASTIC AUTOMOTIVE PARTS

IR welding is a relatively new technique that is used to assemble plastic components. Yanfeng Automotive Interiors, the world's leading supplier of instrument panels and cockpit systems, door panels, floor consoles and overhead consoles, has recently adopted this technique in its facility in Louisville, KY, USA, to join parts of the defroster grille of the Ford Escape vehicle. Thermal imaging cameras from FLIR monitor the whole process and make sure that quality of the IR welds is impeccable and repeatable.

Yanfeng Automotive Interiors, headquartered in Shanghai, has more than 90 manufacturing and technical centers in 17 countries and employs over 28,000 people globally. The company has made it its mission to continuously innovate and leverage its capabilities to enhance its position as a trendsetter in the global automotive industry.

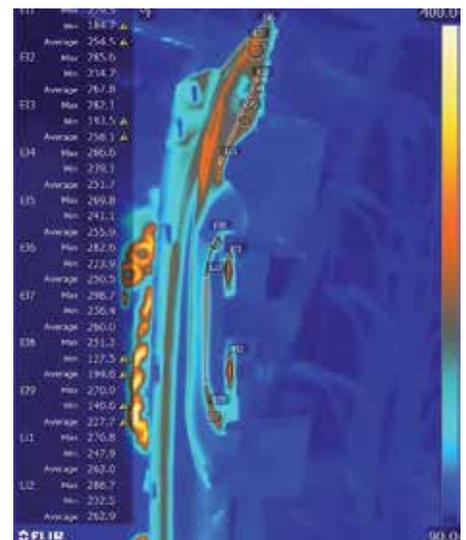
### INFRARED WELDING

Today, plastic plays an increasingly important role in the automotive industry. A few of the reasons for this are that the light weight of plastics makes for more fuel efficient vehicle and that plastics also allow substantial design freedom and flexibility. One

of the first steps in the production process of plastics is the transforming of raw materials, like polymers into plastic parts for cockpit components, instrument panels, door panels, floor consoles, and many more.

In a next stage, the plastic parts need to be assembled. Some of these parts need to be put together very tightly, and one of the best technologies to do this is by infrared welding. This is a relatively new welding technique used for challenging materials and large part assembly with high strength and hermetic requirements. During an infrared welding process, two part halves are held rigidly in position near an infrared emitting platen to melt the

The FLIR A315 is a compact and affordable thermal imaging camera for automation applications, fully controlled by a PC.



If any of the regions of interest fall outside of the upper or lower temperature control limits, the software analytics pass a "fail signal" to the PLC where the machine is faulted and the welding process is stopped.

joining surfaces. The platen is then removed and the part halves are driven together and allowed to re-solidify under pressure.

### PRODUCT QUALITY ASSESSMENT

One of the products for which Yanfeng is using IR welding is the defroster



Emitted Energy was called in by Yanfeng to install four FLIR A315 thermal imaging cameras on the IR welding machine that was set up for the Ford Escape defroster grille.

grille for the Ford Escape vehicle. Kevin Germain, Manufacturing Engineer at the Yanfeng plant in Louisville comments on the recent set-up of the IR welding machine on the production floor: "Product quality is of utmost importance at Yanfeng, so we try to assess this to the best of our possibilities." However, shortly after installing the new IR welding machine, there was no real way of telling how well the weld had succeeded, except by doing a visual check after the heat cycle of the welding machine.

"This visual check also meant that we had to stop the production flow and pull the welded plastic parts apart," says Kevin Germain. "Usually, we were taking out one to two pieces per hour as a way of sample inspection. Clearly this was insufficient and no guarantee for 100% product quality. That's why we needed to look out for an alternative quality monitoring solution, one that does not interrupt the production flow, and also one that catches possible problems before they can occur."

## THERMAL IMAGING FOR QUALITY CONTROL

The Yanfeng team discovered the power of thermal imaging through Emitted Energy, a certified FLIR automation camera distributor and system integrator. Thermal imaging cameras can be used for non-destructive testing and evaluation

of IR welds by looking at subsurface features (i.e. subsurface defects, anomalies, etc.) observed on the investigated surface.

"We already experimented with the use of a small, handheld thermal imaging camera from FLIR, so we knew what thermal imaging could do," says Kevin Germain. "But for this check with the thermal imager, we had to stop the machine to look at the plastic part after the heat cycle in the welding process. This was also not reliable enough."

Fortunately, Emitted Energy came with a solution that allows for continuous quality monitoring and 100% reliability. Roy Ray, Vice President of Emitted Energy comments: "Thermal imaging cameras can give an accurate image in non-contact mode of the temperature of the plastic parts during the welding process inside the IR welding machine. These cameras trigger an alarm when a temperature threshold is exceeded and by means of advanced analytics software, they can differentiate between a good and a bad weld pattern."

## MONITORING THE IR WELD

Emitted Energy was called in by Yanfeng to install four FLIR A315 thermal imaging cameras on the IR welding machine that was set up for the Ford Escape defroster grille. The cameras are monitoring 40 regions of interest on the plastic parts after

the heat cycle. In combination with Emitted Energy's dedicated analysis software, they recognize when a temperature is within the upper and lower control limits.

If they fall within the limits, a pass signal is sent to the machine PLC and the welding process is continued. If not, the software analytics pass a "fail signal" to the PLC where the machine is faulted and the welding process is stopped. An operator can then remove the rejected part, do a visual check and restart the operation.

Kevin Germain comments on the installation of the FLIR A315 cameras: "The FLIR thermal imaging cameras allow us to continually monitor the IR weld quality without interrupting the welding process, even when nobody is attending the IR welding machine, and we can catch possible issues before they actually happen. Since we no longer have to take the welded plastic components apart, we have also been able to significantly reduce the scrap rate."

The IR analysis software also enables Yanfeng to map out heat trends over time and even combine that information with additional data generated by other sensors, like squeeze pressure and voltage power of the IR heaters.

"With the FLIR cameras installed, we can now ensure more repeatable welding quality, and whenever an issue does occur, we can increase our response time whenever the maintenance team needs to be called in."

For more information about thermal imaging cameras or about this application, please visit:

[www.flir.com/automation](http://www.flir.com/automation)

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