

Application Note

Spray Painting Control On Vehicle Production Lines Using WindObserverIS

Reference: AN0056

Introduction

Vehicle production lines have had to become increasingly efficient over the last few decades as manufactures fine tune operations to reduce time and wastage, whilst improving build quality. Mass car production is now mainly the work of robots as they can be programmed and controlled to repeat tasks with a much lower risk of failure or errors.

One of those areas is on paint spray lines where a good quality finish is required, as a lot of manufacturers offer long warranties on their paintwork (anything up to 10-years) and do not want to be suffer with large repair bills at a later date.

Application

This application note focusses on the paint spray process where the 2-axis WindObserverIS (Intrinsically Safe) is used to monitor airflow around the paint spray area. The spray painting process varies between vehicle manufacturers, however, there is normally a common goal to produce a good quality finish, using the minimum amount of paint and only spraying a particular vehicle rather than the whole area and cars around it.

Often paint spray areas are considered hazardous due to the chemicals used in the paint process and therefore the WindObserverIS is chosen and this is more prevalent with the metallic paints (especially the expensive, near natural colour metal ones) as they are the most flammable.

Process

Whilst most people are aware that a clean area is probably the most important requirement for a paint spray area on a vehicle production, also keeping airflow at a minimum is a key factor.

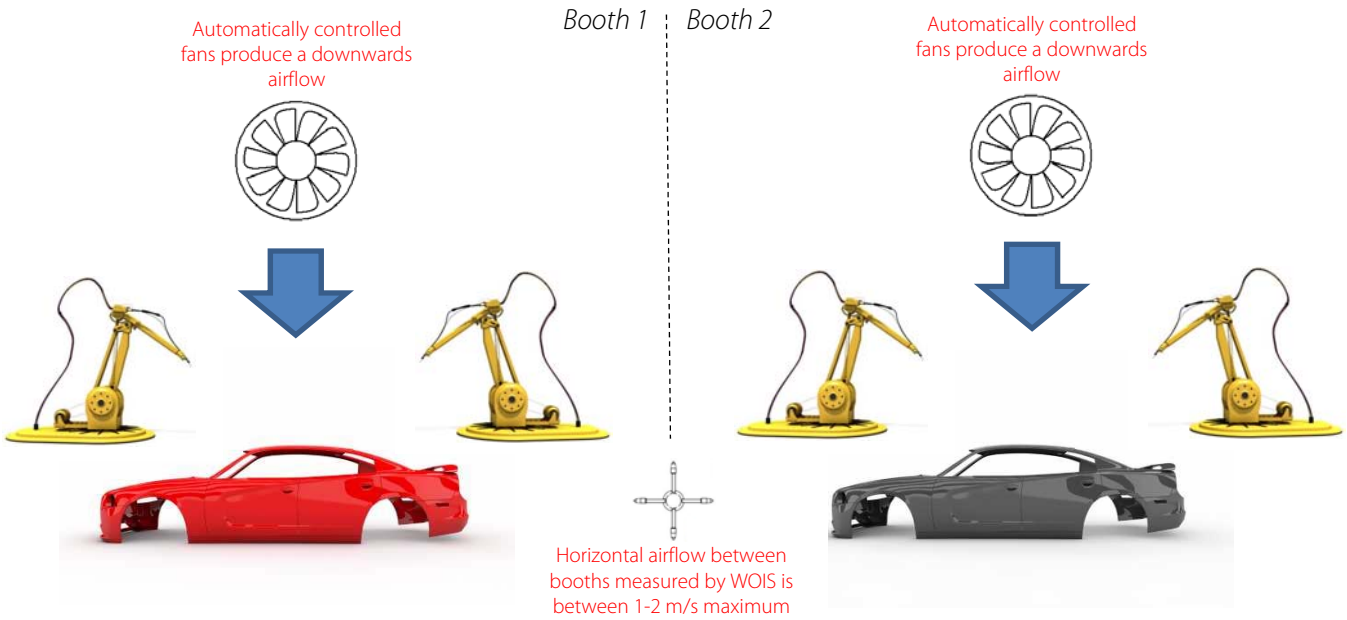
Why control the airflow:

- Allows the paint to fall as required
- Helps to reduce overspray areas
- Helps to provide a consistent thickness overall
- Helps to stop cross-contamination of different colours as production lines could switch between painting a vehicle grey to the next being painted red.

All of these help to provide the defect free paint finish that the end customer requires from a new vehicle.

Installations

Gill Instruments has provided several major car manufacturers worldwide with hazardous area airflow sensors and an example of one of the car paint spray line installations is shown below (this only shows a small part of the line, which could contain anything from 4-10 cars):



Systems can use water flowing below the spraying area to carry away any excess paint. This water will then be filtered and fed back into the system.

WindObserverIS is used to measure the horizontal airflow between the vehicles and this airflow is closely monitored to make sure it stays as low as possible i.e. between a 1-2m/s maximum, as this then allows the manufacturer to utilize the space on their production line to its maximum capacity by having the vehicles as close together as possible but avoid cross-contamination of different paint colours.

WindObserverIS when mounted horizontally can also provide an indication of the vertical airflow, which is then fed into the paint spray line control system to provide automatic feedback for the ceiling fan speed.

Maintenance

The maintenance regime is usually that the paint booth and robots are inspected regularly (every shift and / or day) and cleaned as part of the ongoing work which also requires users to visually inspect the WindObserverIS transducer heads for any paint overspray that may be accumulating on the transducer heads (but from experience can easily be wiped free with approved cleaning material).

Interfaces

WindObserverIS provides RS422 or RS232 output and so the data can automatically be fed back into the paint spray control system to adjust the airflow, can also provide a local indication of the airflow and can allow the data to be viewed elsewhere in the factory as the RS422 can provide a connection up to 1000m.

Why Gill?



All Gill ultrasonic wind sensors have the added benefit providing high accuracy, instantaneous airflow data even in very low airflow environments via a robust and virtually maintenance free package. WindObserverIS is chosen due to the hazardous area certification, however, also as other technologies are not easy to maintain in these installations. Also using the WindObserverIS helps keep the line running non-stop 24/7 and ensures maximum productivity with excellent monitoring capability through the status codes that are always outputted.