

Gas Brigades

The Gas Brigades are steel framed towers clad with granite and stainless steel. Inside each of the towers there is a large gas accumulator, a smaller air accumulator, a pressurised cabinet containing PLC (Programmable Logic Controller) and Burner Control Unit. There is a fire shooter nozzle at the top of each tower. The system burns natural gas at regulated mains pressure. Although the system is fully automated and monitored by a PLC network, it is not able to fire until it is given permission by the system operator. There are three fire effects; small fireballs, large fireballs and constant flame. All electrical components and connections in the Brigade towers are housed in gas proof or pressurised enclosures.

The main PLC requests permission to run pre-programmed sequences. The Gas Brigade operator must give the PLC permission to run any show. If the operator doesn't acknowledge the PLC's request, a show will not run. The operator visually monitors the system while it is running via eight CCTV cameras and the Brigade Status Screen in the control room. If there are any concerns that the operator has about the running of a show – gusty wind conditions, poor flame quality - the show can be modified or stopped and the system shut down immediately.

Animation is controlled by a main PLC which is networked with twelve other PLC's – one in each tower and one in each plant room. All critical components of the system are monitored by the PLC's. In addition there is an E-Stop bus which will shut down the system immediately if any Brigade Tower door is opened, or an E-Stop button is pushed. The E-Stop bus is also monitored by the PLC's.

When the operator gives the main PLC permission to run a show, the system first checks that the network is communicating and that all monitored components are safe to run. The system then operates the main gas supply valves to the towers, the pilot flame on each tower lights and a fire sequence will then run. After the sequence ends, the system turns off the main supply valves and shuts down the towers.

A show sequence involves the PLC quickly opening and closing small solenoid valves to allow compressed air to operate actuators controlling the larger gas valves to create the flame effects.

There are three wind sensors at each tower which measure wind speed and direction and feed that information back to the PLC. If the wind speed is too high the PLC won't allow that tower to fire.

At the top of each tower a UV detector monitors the pilot flame and feeds that information back to a Burner Control unit at the base of each tower. The PLC monitors all eight Burner Control units. If a pilot flame blows out or doesn't light, the PLC will not allow the gas valves to open on that tower.

There are eight gas detectors (LEL– low explosion level –) one inside each tower. If a gas leak is detected this would set off audible and visual alarms as well as report to the PLC. The emergency stop system would be activated and the entire Gas Brigade system would shut down until the fault was cleared.

Regular compliance testing of all critical components of the Gas Brigade System by third parties ensures that potential faults are identified and made good before a failure happens.

Safety inspections are carried out daily to ensure the system is ready to run each evening. After each tower is physically and visually checked, a test pilot show confirms the system is ready.