

Honeywell Helps Phu My Fertilizer with Fire & Gas Mapping to Improve Plant Safety & Security

Case Study

Honeywell helped Phu My Fertilizer Plant to proof the detection coverage effectiveness of existing F&G system and suggest solutions to improve plant safety and reliability

Background

The Phu My Fertilizer Plant (PMFP) is the largest of its kind in Vietnam and uses 450–600 million m³ of gas/year. PMFP produces 1,350t/d ammonia and 2,200t/d urea for fertilizer production.

The plant has been in operation for more than 10 years with Honeywell safety systems in continuous operation since start up including failsafe controllers for the fire and gas system, the fire alarm system, and the HVAC induct gas detection system.



Phu My Fertilizer Plant in Vietnam

To further improve process safety of the plant and to reduce the risk of fire, an updated means of early gas leakage detection was needed. In addition, a possible plant expansion is on the horizon and management wanted to assess the capacity and remaining life cycle of the existing safety systems.

PMFP turned to Honeywell as an experienced expert in the Oil & Gas industry to conduct a Fire & Gas mapping analysis to measure and report on detection coverage and to make recommendations for possible future expansion of the safety systems.

Challenge

Due to the complexity of the existing system and the large amounts of site data to be gathered and shared, the project was somewhat slow in getting off the ground. Both parties worked diligently to overcome the obstacles and a 3-day meeting culminated in agreement on the scope of the report and recommendations to be delivered by Honeywell.

The design of gas leak and fire detection systems in oil & gas and petrochemical industries has been an ongoing challenge to plant designers and users. Even with the most experienced system designers developing superior system designs, proper tools are essential to enable plant engineers to qualitatively as well as quantitatively evaluate F&G detection coverage performance.

According to ISA-TR84.00.07 **Guidance on the Evaluation of Fire, Combustible Gas and Toxic Gas System Effectiveness** besides the required safety evaluation of the Flame & Gas hardware and software, “the mapping calculation for fire and gas detection coverage performance relating to their locations, positions, and settings must be evaluated as well.” To ensure system integrity and effective performance the detector type, range setting, quantity, angle/position allocation must be considered within the context of the overall system design.

Geographic Coverage Assessment

GCV gas cloud validation software allows users to define the target area to be protected. Detector Geographic Coverage is defined as “the fraction of the geometric area (at a given elevation of analysis) of a defined monitored process area that, if a release were to occur in a given geographic location, would be detected by the release detection equipment considering the defined voting arrangement “

The calculation is based on comparing geometric modelling and detector coverage available space. Detector coverage space is based on scientific assumption for cloud size, hazard scope, flame plume size, and other parameters. The advantage of Geographic assessment is its ease and speed and its applicability to congested, semi-open areas such as the PMFP site where focus on specific hazard sources is clearly defined.

Coverage Assessment Methodology

1) Establish 3-D Model

AutoCAD 3-dimensional model is developed per layout and vertical section drawings, and facility 3D-view drawings.

2) Target Zones

Target area covers detailed information including the zone to be protected and any potential risks in that area.

3) Generate Risk Layer

Defines the layer which covers/surrounds the hazard source according to its distance

4) Detector Configuration

Defines the quantity, location, type, and angle of detectors for the protecting target

5) Geometric Calculation

Determines the grids under cover of certain detectors and by calculating the out-of-total ratio of coverage.

Solution

Honeywell conducted an in-depth mapping and analysis of the existing F&G system. Honeywell's services included:

- Site survey and document acquisition
- Building of the 3-D plant model
- F&G mapping analysis for selected targets
- Recommended solutions to improve detection coverage
- Recommendation of entire F&G system upgrade

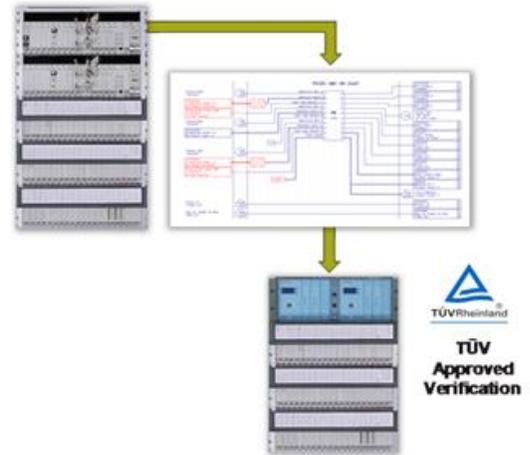
Mapping analysis can be executed using the Scenario coverage assessment or the Geographic coverage assessment approach. Geographic coverage assessment is relatively easy to perform and is recommended for use in congested areas or environments where risk is not significant.

Honeywell determined that the Geographic assessment method was the appropriate approach for the PMFP site and utilized the GCV (Gas Cloud Validation) software tool. Based on current requirements of fire safety, GCV is a Fire & Gas detection mapping coverage analysis software solution; it is an integral part of Honeywell's Safety Lifecycle suite designed to evaluate total F&G system safety integrity and detection performance.

Benefits

Upon completion of Honeywell's task the PMFP management and operations staff received a comprehensive report with detailed information about detection coverage of selected targets and recommendations for improvement in those cases where the current coverage is not performing up to expectations. Among others, some of the recommendations included changing detector location, installing new detectors, or converting to new detection techniques.

Honeywell also advised the plant about upgrade solutions for the whole F&G system in order to meet future expansion requirements. PMFP also benefited from Honeywell-provided updates concerning current industry and approval body standards, and new technologies now being used in F&G systems industry-wide.



Proposal to upgrade F&G system from FSC to SM

Summary

The GCV mapping software, specifically developed for Fire & Gas systems, is the most advanced 3-D model-mapping tool available for designers or consultants in the analysis and design of fire and gas detectors. GCV has broad application for green/brown field plants, oil & gas drilling wells, offshore platforms, LNG terminals, refineries, pipelines, and chemical plants. GCV is a powerful tool that designers can use to easily carry out quantitative design and assessment for F&G detectors detection coverage in virtually any plant operation.

To learn more about how Honeywell's Gas Mapping Analysis can benefit your plant safety visit our website [Fire & Gas Solutions](#) or contact your Honeywell account manager.

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