

The background of the slide is a photograph of an industrial facility. Two workers are in the foreground, looking at a tablet. One worker is wearing a white shirt and a yellow hard hat, while the other is wearing a light blue shirt and a white hard hat. The facility is filled with large pipes, valves, and machinery, with a complex network of red and yellow pipes running across the scene.

TRUEYE™

# Industrial Safety Monitoring and Improvement using Video Analytics



# The Situation

Operations & security posed two pivotal issues at this Specialty industry focused on niche markets, specialized products and services. They were often catering to specific customer needs or preferences, and their products or services was requiring a certain level of expertise and craftsmanship. The client was encountering challenges in ensuring safety compliance within their facilities due to the limitations of manual monitoring using manned CCTV cameras. These challenges included resource intensiveness and ineffectiveness in detecting safety breaches. To address these issues, a Video Analytics solution was introduced, which resulted in better safety monitoring processes and cost savings.

Leveraging video analytics in industrial operations can significantly enhance workplace safety by providing real-time monitoring and alerts in areas with moving vehicles, moving people, machinery, shop floors and places of potential hazards.

## The Challenge

**Resource Intensiveness:** Manual monitoring using manned CCTV cameras requires significant human resources, which can be costly and inefficient.

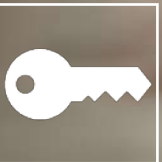
**Ineffectiveness in Detecting Safety Breaches:** Traditional CCTV systems may miss or fail to detect safety breaches in real-time, leading to potential accidents or incidents.



# The Solution Approach



A well-structured approach towards implementing video analytics solutions in manufacturing environments, emphasizes the importance of understanding infrastructure, defining scenarios, and leveraging technology to enhance security, safety, and operational efficiency.



*Here's an overview of the key points around our solution approach:*

## Understanding Infrastructure and Deployment Needs:

- 1. Assessment of Existing Systems:** The team analysed the systems already employed in manufacturing sites to gain insights into the coverage area and potential gaps in monitoring.
- 2. Installation of Cameras:** Cameras were strategically installed at specific locations based on coverage area requirements and the type of camera (e.g., PTZ, night vision) needed for optimal monitoring.
- 3. Infrastructure Setup:** A DVR-based CCTV system was utilized, along with a server system to support video analytics models and deploy web applications for centralized processing.

## Feeding the Video Analytics System:

- 1. Server Specification:** The server specifications were tailored to the requirements of running different video analytics models and handling data from multiple cameras.
- 2. Data Sources:** The data for video analytics was sourced from various video streaming sources, indicating a comprehensive approach to monitoring different areas of the manufacturing sites.

# The Solution Approach

## Running the System:

**1. Central Deployment:** The video analysis software was deployed centrally for efficient processing, enabling real-time monitoring and analysis of events across multiple locations.

**2. Web Application:** A web application was developed to provide centralized streaming of all cameras installed at various locations, including the head office, facilitating easy access to live feeds for security and monitoring purposes.

## Defining Scenarios and Model Usage:

**1. Scenario Definition:** Scenarios were defined to focus on specific areas such as theft control, security measures, and staff efficiency improvements, aligning the video analytics system with business objectives.

**2. Model Selection:** Pre-trained models were utilized to map scenario requirements, ensuring efficient detection of events and optimization of resources.

## Human Involvement and User Support:

**1. Event Detection Support:** The video analytics system provided support to users by detecting events that might have been overlooked or required significant time for manual detection, enhancing overall monitoring efficiency.

**2. Interactive Dashboard:** An interactive dashboard provide users with daily activities of the models, enabling easy monitoring and management of the system's performance.

# The Implementation

**Real-time Monitoring in Hazardous Areas:** Video analytics software continuously monitored areas with moving vehicles, machinery, and people, such as shop floors or loading docks. This allowed for prompt detection of potential safety breaches.

**Automated Alert Generation:** The video analytics system was configured to automatically generate alerts when it detected safety violations, such as unauthorized personnel in restricted areas or workers not wearing appropriate safety gear.

**Virtual Perimeter Monitoring:** Virtual perimeter lines were created around hazardous machinery or areas. When a worker crosses these virtual lines, the system triggered an alert, prompting immediate intervention.

**Behavioral Analysis (a part of it):** Behavioral Analysis is a wide area. Our Video Analytics algorithms analyzed employee behavior patterns limited to loitering, idleness, crowding; and detected anomalies that indicated safety risks, such as erratic movement or prolonged inactivity near machinery.

**Integration with Access Control Systems:** Video analytics were integrated with access control systems to ensure that only authorized personnel have access to certain areas, further enhancing security and safety.



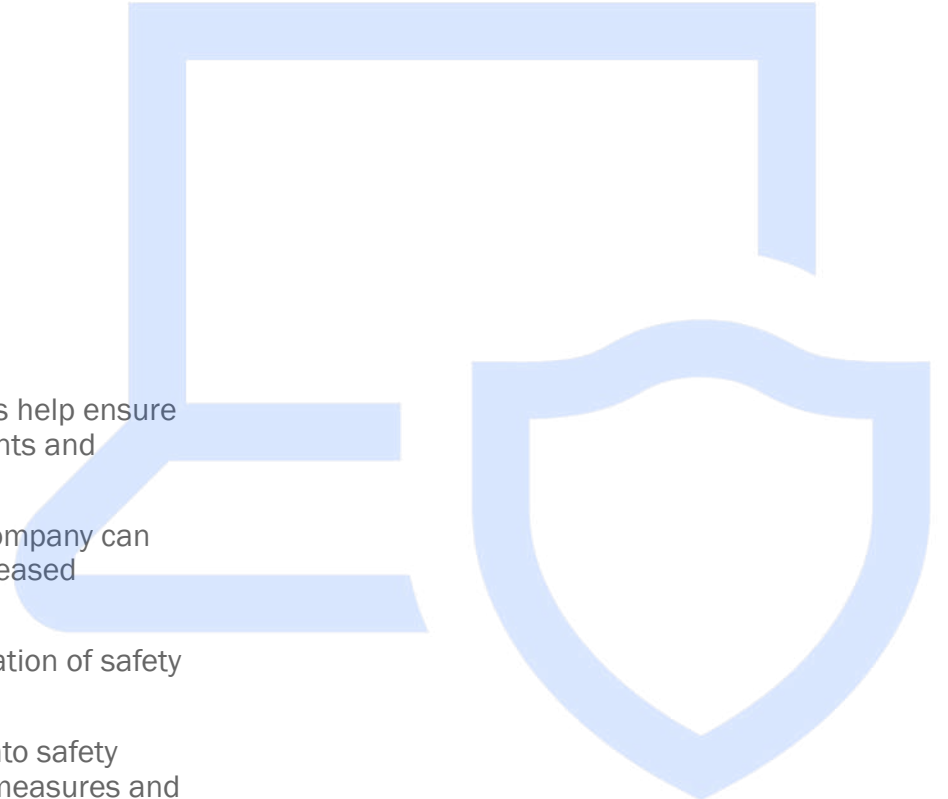
# The Cumulative Results

**Improved Safety Compliance:** Real-time monitoring and automated alerts help ensure that safety protocols are followed consistently, reducing the risk of accidents and injuries.

**Efficiency and Cost Savings:** By automating monitoring processes, the company can reduce the need for manual surveillance, leading to cost savings and increased operational efficiency.

**Risk Mitigation:** Video analytics enable real-time identification and mitigation of safety risks, minimizing the likelihood of accidents and incidents occurring.

**Data-driven Insights:** The system generates valuable data and insights into safety trends and patterns, allowing the company to implement targeted safety measures and continuous improvement initiatives.

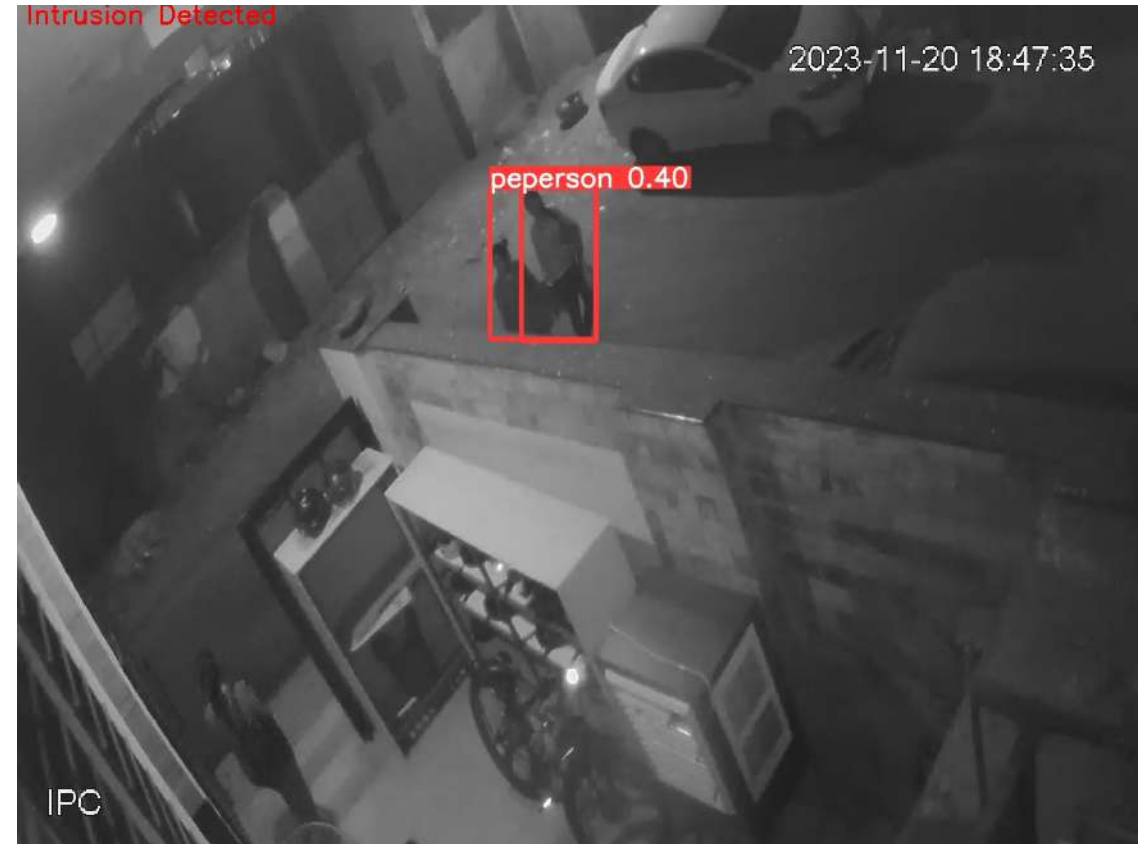


# Models in our system that help in such use case scenarios

## Intrusion Detection

In our surveillance applications, an intrusion might involve a person or object entering a specified restricted area during a specified time of the day. Our system takes the camera feed frame by frame in real time and analyze each frame, identifying instances of intrusion in the monitored environment. This detection can trigger alerts or actions to notify security personnel or take preventative measures.

In the industry, if the closing time was 7pm; and if In case a person is detected on specified camera, an alarm is triggered. Mail is sent along with snapshot of the feed and other details like camera name, time etc.



## Models in our system that help in such a use case scenario...

### Crowd Detection

Crowd detection involves counting individuals within a scene by taking the feed. The user sets a minimum count threshold for crowd size, and if the number of people detected surpasses this threshold, the system generates alerts or notifications to prompt further investigation or action by security personnel.

The company didn't want people to gather at one place during working hours. Gathering can be due to fight or staff just chatting around in groups. So, we set a maximum of 4, if people gathered more than that in frame, an alarm was triggered.



### Safety Gear Detection

We designed algorithm to detect safety gear worn by individuals within the monitored environment. Operating in real time, the system analyses frame of the specific camera feed to identify specific safety equipment such as helmets, vests, and more. Thus, ensuring that the staff is wearing safety gears around tasks where there is threat to safety, in events of accidents.



## Models in our system that help in such a use case scenario...

### Fire and Smoke Detection

Our model operates by continuously capturing and processing real-time camera feeds, analysing each frame for the presence of fire or smoke within a designated area. Upon identification of such instances, the system promptly triggers alerts or predefined actions to notify security personnel.

In this industrial case, the company uses combustible substances. So if fire or smoke was detected, an alarm was triggered to stop it or control it at initial stage.



### Camera Tampering and Tripwire Detection

In our surveillance model, it analyses changes in frame characteristics, such as sudden shifts in brightness, sharpness, or perspective, which may indicate tampering activities. Upon detecting such activity, the system generates alerts or notifications to prompt further investigation or action by security personnel. In case anyone tries to hide the camera view by blocking or disturb the camera by tilting it etc.; Also if someone cuts the wire of a camera, or there is some network issue such that we can't get the feed, alert is sent.

## Models in our system that help in such a use case scenario...

### Loitering Detection

We implemented algorithms to detect and track individuals exhibiting loitering behaviour, within specific areas of interest. System initiates tracking when someone remains within a designated area for an extended period more than the defined time, an alarm is triggered. If the duration exceeds a predefined threshold, an alert is triggered to notify relevant personnel or authorities.

### Object Tagging and Tracking

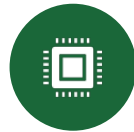
Our system includes object tagging and tracking functionalities. The system detects and labels objects of interest within the camera feed, enabling precise identification and tracking. Utilizing techniques like bounding boxes and unique identifiers, objects are tagged for continuous monitoring as they move across frames. This real-time tracking facilitates accurate assessment of spatial coordinates, velocity, and other relevant attributes, empowering the system to detect anomalies and prompt timely alerts or interventions.

# Indeed, video analytics solutions have the potential to benefit the manufacturing industry in numerous ways. Here are some key points highlighting the significance of video analytics in industrial scenarios:



## Safety Monitoring:

Video Analytics can be used to detect unsafe behaviours or situations in real-time, such as workers not wearing proper safety gear, unauthorized personnel entering restricted areas, or potential hazards on the production floor.



## Machine Failure Prediction:

By analysing video feeds from machinery, anomalies in operation can be detected early, allowing for predictive maintenance to prevent costly downtime due to unexpected breakdowns.



## Quality Control:

Video Analytics can inspect products on the assembly line for defects, ensuring that only high-quality products make it through the manufacturing process.



## Inventory Management:

By analysing video feeds of warehouse shelves, inventory levels can be monitored in real-time, helping to optimize stock levels and prevent stockouts or overstock situations.



## Supply Chain Optimization:

Video Analytics can track the movement of goods within the manufacturing facility and throughout the supply chain, identifying inefficiencies and bottlenecks for optimization.



## Energy Efficiency:

Analysing video feeds from the production floor can help identify areas where energy consumption can be reduced, leading to cost savings and environmental benefits.



## Workforce Management:

Video Analytics can monitor worker productivity and identify areas where workflow can be optimized, leading to increased efficiency and throughput.



## Security Surveillance:

In addition to traditional CCTV monitoring, video analytics can detect suspicious behaviour or intruders in real-time, triggering alerts for immediate response.

Overall, video analytics deployment at the industrial sites and scenarios offers several advantages, including improved safety measures, enhanced security, enhanced quality control, and optimized logistics management. By leveraging video analytics solutions, they can ensure compliance with safety regulations, reduce operational risks, enhance productivity, and feed their maintenance and levelling up of competitive edge in the market. As technology continues to advance, video analytics will remain a vital tool for optimizing manufacturing processes and driving business success.

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**Let's wrap it up...**

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## About

# VertexPlus Technologies Limited

A Global Technology Company delivering differentiated, innovative, cost-effective, insight-driven, operationally excellent services across different industry verticals, to help achieve high performance, transformation, scalability and business agility.

**700+**  
Clients served

**1000+**  
Services & Projects delivered successfully

**1250+**  
Years of Total Experience

**350+**  
Team of Experts



**BFSI**



**IT/Telecom**



**Travel**



**Hospitality**



**Media**



**Manufacturing**



**Automotive**



**Education**



**Health Care**



**Retail**



**Real Estate**



**Logistics**

### Service Categories

**Technology**

**Consulting**

**Infrastructure**

**Outsourcing**

**Digital Media**

### Solution Categories

**Enterprise**

**Business**

**E-Governance**

We provide innovative technology solution and service models for business impact, through state-of-the-art infrastructure, well-crafted strategy, rigorous execution, and engagement approach.

We combine process proficiency, technical expertise, domain knowledge, innovation, intelligence and more than a decade's experience while navigating through projects of varying scales to deliver quality solutions and services.

With a large pool of highly talented professionals, we always value continuous research and innovation to fulfill dynamic requirements of clients worldwide, including Fortune 500 companies.

VertexPlus always strives to adapt futuristic approaches and technologies to help transform organizations into agile enterprises.

# VertexPlus Service and Solution Spectrum



## Automation & Intelligence

- ❖ Data Science
- ❖ Intelligent Automation
- ❖ Artificial Intelligence
- ❖ Video Analytics
- ❖ Extended Reality

## Digital Experience

- ❖ Experience Design Consulting
- ❖ Digital Transformation
- ❖ Digital Media Assets
- ❖ Digital Marketing

## Enterprise Security

- ❖ Managed Security Services
- ❖ Risk Management Consulting
- ❖ Security Audits

## Engineering

- ❖ Enterprise Mobility
- ❖ Application Engineering
- ❖ Product Engineering
- ❖ Integration Services
- ❖ Quality Engineering

## Infrastructure

- ❖ Managed Services
- ❖ Infrastructure Consulting
- ❖ Infrastructure Transformation
- ❖ Infrastructure Management & Monitoring
- ❖ System Integration

## Outsourcing

- ❖ Business Process Outsourcing
- ❖ Workforce Services
- ❖ Managed Sourcing
- ❖ Software & IT Support



Video Analytics

HR & Payroll System

Point of Sales System

E-Commerce Solutions

Asset Lifecycle Management System

Service Delivery Management System

Digital Office Management System

Project Management System

Consumables & Expense Management System

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