



APPLICATION STORY



ORLEN refinery deploys FLIR Systems SR-100 thermal imaging cameras

Protecting the perimeter at one of Central Europe's largest petrochemical facilities.

Polski Koncern Naftowy ORLEN, better known as PKN ORLEN is a Polish company. It is one of Central Europe's largest refiners of crude oil. ORLEN specializes in processing crude oil into world-class unleaded petrol, diesel, heating oil, and aviation fuel as well as plastics and other petroleum related products.

Employing more than 20,000 people, PKN ORLEN operates 7 refineries, of which 3 are located in Poland: Plock, Trzebinia and Jedlicze. Another 3 are located in the Czech Republic and one in Lithuania.

ORLEN processes mainly URAL blend crude oil, shipped from Russia via the Friendship pipeline.

Retail network

PKN ORLEN also operates an extensive retail network. It comprises approximately 2,700 outlets offering services in Poland, Germany, the Czech Republic and Lithuania. ORLEN fuels are fully compliant with the strictest European environmental and quality standards. The high quality nature of ORLEN products meets the standardized engine tests of the world's leading car manufacturers.

Security at ORLEN's main complex in Plock, Poland

The main refining and petrochemical complex is located in Plock, about 2 hours driving from Warsaw, Poland. The complex in Plock is ranked amongst the most advanced and modern facilities of its kind in Europe.

Just like at every petrochemical plant, security is taken extremely serious at the refinery in Plock. Preventing unauthorized access is a big concern which is not taken lightly. Not only at the gate, the entire perimeter of the plant is tightly secured.

Reasons for these stringent security measures are obvious. Not only can intruders jeopardize production which goes on 24/7, a plant where so many chemical

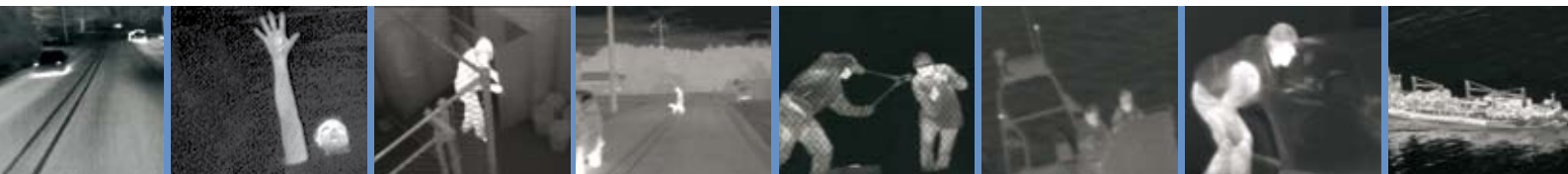


FLIR Systems SR-100 installed at Orlen.

processes are taking place presents some other concerns as well. Finally, theft is also a major concern. There are a lot of valuable things on-site, copper and other metals, to name just a few, are valuable material that a lot of people would like to steal and sell.

Securing a surface of more than 800 hectares

"It is not an easy task to secure the petrochemical plant here in Plock and to prevent unauthorized access," explains Mr. Jacek Kotulski, Security Specialist and Coordinator at PKN ORLEN, Plock. "It comprises nearly 70 production units which operate in an area of over 800 hectares."



"Just like at any perimeter where security is tight, we have a lot of different security measures and installations in place to make sure that no one enters the facility without us knowing about it. CCTV cameras, video analytics, fences, ... it is all installed, and working together, at various places around the perimeter to keep intruders out."

Thermal imaging: an extra addition to the security network

"The refinery does not only need to be protected during the day against unwanted visitors. My task is to see to it that it is safe during the dark hours of the night as well.", continues Mr. Kotulski.



Mr. C. Swies of AGTES and Mr. J. Kotulski from ORLEN in front of the main building in Plock

"I knew about thermal imaging technology and got in contact with Mr. Swies of Agtes, a FLIR Systems distributor in Poland, who demonstrated me the systems. We practically immediately decided to purchase and install a number of thermal imaging cameras. We opted for FLIR Systems SR-100 thermal imaging cameras. One of the reasons for choosing this type is the excellent range performance. The SR-100 can detect a man-sized target at a distance of no less than 1.6 kilometers away. In total darkness, in practically all weather conditions"

"The FLIR Systems SR-100 thermal imaging cameras are installed along the perimeter and at certain highly restricted areas. The thermal imaging cameras are fixed mounted. They always overlook the same area. In the direct vicinity of the thermal cameras, there is also a CCTV dome installed. If an alarm goes off, and weather conditions permit, we can have a closer look at the situation with the CCTV cameras. Otherwise we send out a walking patrol to check out the situation."

Seeing in daylight, through fog, vapor and smoke

"The FLIR Systems SR-100 thermal imaging cameras do not only help us to detect potential intruders



Object Video utilizes algorithms, such as trip wires and areas of interest, to detect objects, and immediately generates useful output such as real-time alerts or triggers for other applications. It works perfectly together with the SR-100 thermal imaging cameras.

during the dark. Here in Plock, we have quite some foggy days. Although the range performance of the thermal imaging cameras is also affected by the fog, they still allow us to see and detect quite a bit more than with a CCTV camera."

"At the refinery we also have quite some processes in place that are creating a lot of vapor and smoke. The FLIR Systems SR-100 cameras are excellent tools to see through the vapor and smoke. Something which can also not be done with a CCTV camera."

Thermal imaging and video analytics

"One reason for choosing for fixed mounted thermal imaging cameras is that they are working together with video analytics. By installing fixed mounted instead of pan/tilt cameras, we are reducing the number of unwanted alarms."

"The FLIR Systems thermal imaging cameras are working perfectly together with our existing video analytics. One of the advantages of thermal imaging cameras is that they are always producing a high-contrast image. Not only during the night. Also in difficult light conditions where CCTV cameras are giving hardly any contrast. This makes thermal imaging perfect to work together with video analytics."

Object Video

"The video analytics we are using at ORLEN and that are working perfectly together with the SR-100 cameras, is Object Video.", continues Mr. Kotulski.

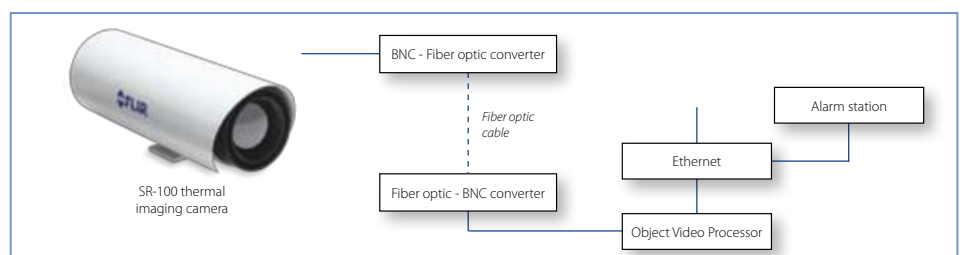


"Through a BNC-fiber optic converter, the images produced by the SR-100 are being transferred over fiber optics. At the end of the fiber optics, a fiber optic-BNC converter is installed and the images enter an Object Video Processor. From this processor the images are transferred to the Ethernet so we can look at them whenever and wherever we want. Most of the time we do not even look at the thermal images. Over Digital Signal Processors (DSP) we run Object Video VEW 5.0. Object Video Forensics is installed as an ad-on to this software. Object Video utilizes algorithms to detect objects, and immediately generates useful output such as real-time alerts or triggers for other applications. One of the algorithms we are using is "trip wires". If someone or something crosses a certain line, which I can define myself in Object Video, an alarm goes off. Another algorithm is Areas of Interest (AOI). With this algorithm I can define a zone in which no access is allowed. Again, if someone enters the AOI, an alarm will go off. Filters are in place to minimize the number of unwanted alarms."

"One of the actions when an alarm is generated by Object Video, is that the thermal images are being shown immediately on a screen in the control room. If this happens, the operator decides about the next step that needs to be taken."

Thermal imaging, a valuable tool

"The SR-100 cameras have proven to be valuable tools for our security. They help us to protect the perimeter not only during the night, but during daytime, in all weather conditions, as well.", concludes Mr. Kotulski.



ORLEN operates an extensive retail network comprising approximately 2,700 outlets.

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

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