

CASE STUDY

GAS STATION MONITORING: FROM COFFEE MACHINES TO FUEL STORAGE TANKS

INDUSTRY



OIL AND GAS

COUNTRY



Russia



CUSTOMER

Gazprom Neft

Russian vertically integrated oil company, ranking among TOP-3 Russian oil companies in terms of oil output and refining volumes. It is the most efficient company of the Russian oil industry. Company's main activities are oil and gas field exploration and development, oil refining and oil products sales.

Gazprom Neft company has over 70 000 employees all over the world. Its structure includes over 70 oil production, refining and distributing enterprises in Russia, CIS and other foreign countries.



PARTNER

ITSK

System integrator and software developer, PAO Gazprom Neft subsidiary company. ITSK supplies IT services to fuel and energy complex and production enterprises. The company specializes in service and project implementation in the area of IT and enterprise management systems, industry software development and IT infrastructure support.



МЕЛСТОН

PARTNER

Melston-Service

The first Russian company to have offered a full range of maintenance services for fuel stations and oil tank farms. This includes buildings, structures and sites maintenance and repair, ensuring good working conditions of external decoration elements, commissioning and start-up, as well as process equipment technical servicing and fuel and gas-filling stations utility network maintenance.



MAIN TASKS AND PROEJCT CHALLENGES

Gazprom Neft company required to arrange complex operation control over their gas stations in Russia, CIS and other foreign countries, that is around 2000. This implied monitoring of commercial and network equipment, tank terminals, fuel dispensers and price boards, device data collection, visualization, profound analytics, possibility of distant service unification, remote diagnostics and repair.

Before the solution implementation, the customer had to face a number of problems at sites:

- ① Troubles could be diagnosed only during periodic maintenance that is not more often than once a month;
- ② Fuel dispenser problems (for example, lower filling speed due to a filter blockage or any other malfunction) would normally cause its shut down for repairs for about 5 hours. It's easy to figure out that even 5 hour daily shut downs result in significant financial losses;
- ③ It was impossible to monitor trading and cash equipment or to control quality of both main product (fuel) and associated goods (coffee, for instance).

This illustrated the need of a completely new approach to the process organization and management. That is how Infrastructure Monitoring Center (IMC) project appeared, IoT-platform AggreGate being its software basis.

Why AggreGate?

The choice in favor of IoT-platform AggreGate by Tibbo Systems was made mainly because of its flexibility and wide possibilities for integration and further functional development. Besides, AggreGate ownership cost is optimal as compared to analogues in the market.

Morning Doesn't Begin with Coffee, Digitalization Does

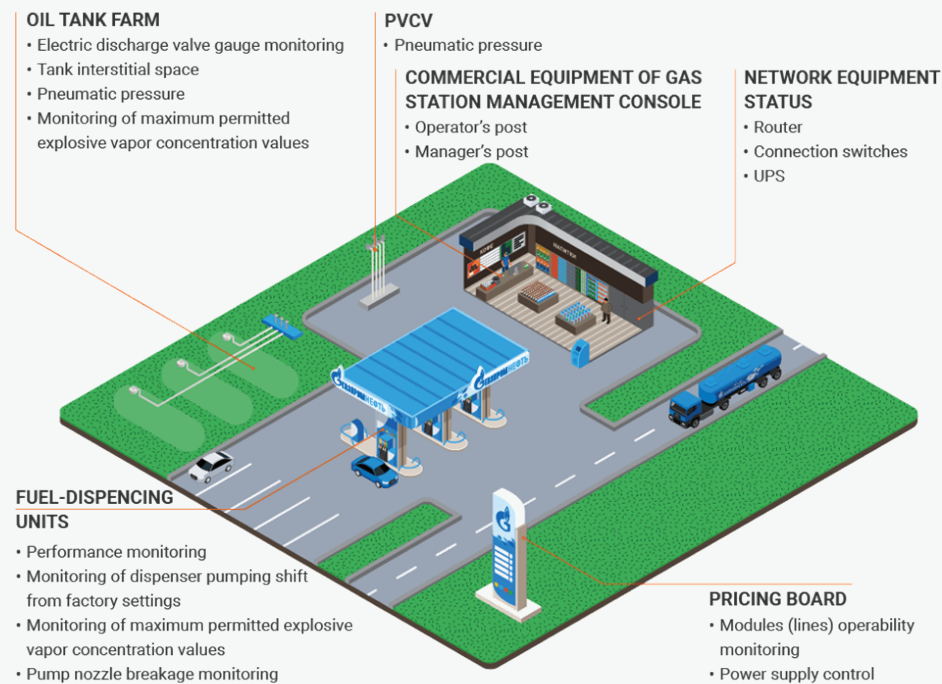
IMC project was launched in 2017, and Gazprom Neft has become the first vertically integrated oil company to have implemented self-service cafes at gas stations. All the coffee machines were connected to a unified intelligent system managing coffee sales. What benefits were achieved?

- ✓ Equipment complex operation control and possibility of remote repair.
- ✓ Remote setting of a unified recipe and high quality of coffee making throughout the gas station chain.
- ✓ Consequently, record-high coffee sales at gas stations.

After positive evaluation of the implemented solution, the company decided to connect all the gas station equipment and systems to IMC. That's how, ironically, Gazprom Neft started its way to gas station global digitalization with coffee.

SOLUTION, DEPLOYMENT, RESULTS

More than 1500 gas stations all over Russia have been connected to IMC. Data is collected from automatic control systems, cash equipment, fuel storage tank level gauges, coffee machines and vending equipment, Kontar software and hardware complex. The average number of collected signals varies from 500 to 1000 depending on the gas station size. IMC functionality was built with the help of AggreGate distributed architecture technology. Total workload is distributed between three server roles: collection point server, processing server and data representation server. Moreover, additional servers are allocated to enhance the system failover capability.



After the monitoring center was launched, station equipment stays in working condition 99% of time and technological downtime decreased by 30%. Reaching such figures became possible through deploying machine learning and predictive analytics modules that timely notify the user on the equipment malfunction. The system controls the state of each gas station equipment online. In case any deviation from specified parameters exceeds the acceptable level, the system will send an alert and compile a repair request for the service company. It means that IMC can detect equipment performance lowering in a matter of seconds.

As for fuel dispensers malfunction detection, IMC automatically registers filling speed reduction and instantly notifies the service company. Decision-making on the gas station visit takes less than 30 minutes, same again for troubleshooting. The difference is unmistakable – instant detection and one-hour repair instead of 60 days issue recognition (equipment inspection interval) and five-hour fuel dispenser shutdown.

New intelligent system streamlines the workflow and improves efficiency of each gas station of the chain.

- Gas station managers now have a tool to monitor oil products flow, underfillings, errors and exclude human factor from the processes.
- Office workers and company top management at all times get proper control over gas stations, personnel and maintenance service efficiency to make strategic decisions.
- Maintenance services get instant notifications on equipment parameters deviations for a rapid response to the incident, timely diagnostics and repair.

MORE ABOUT THE IMPLEMENTED SOLUTION

Equipment / Data Sources / Environment

Specialized gas stations controller DOMS (Gilbarco Veeder-Root), Tehnokod controllers, software and hardware complex KONTAR, MRO system, Rusholst on-line monitoring service.

AggreGate Deployment Targets

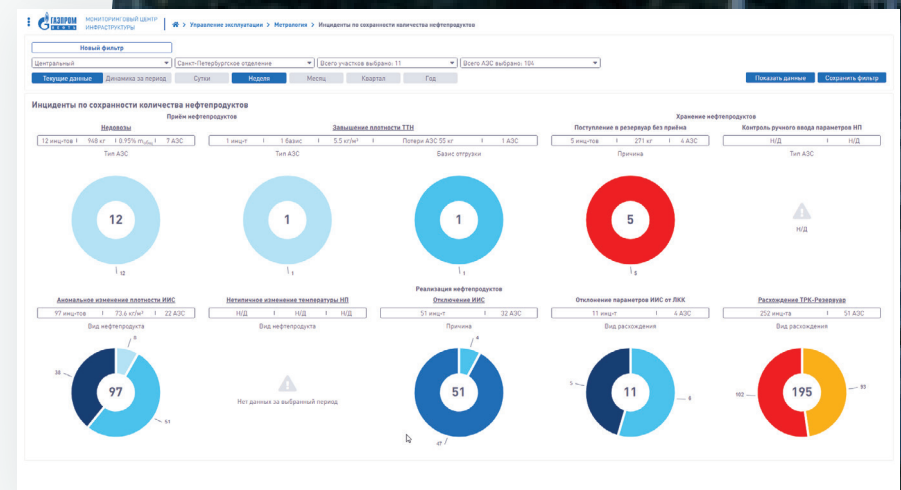
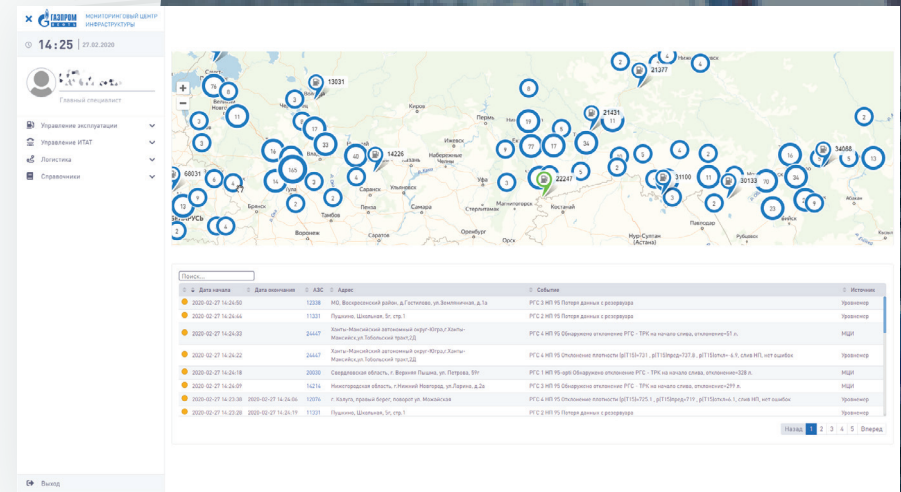
Data collection from process equipment and existing IT systems, oil products unloading automation, automated oil products unloading certificate issuing, oil products short delivery automated detection, oil products mixture recognition, oil products quality monitoring in storage tanks (based on density and water tets), oil products monitoring tool development for metrological service, forecasting oil products supplies to avoid fuel deficiency at the station.

Pilot testing in several regions have illustrated tens of millions of profit. That is why most gas stations were connected to the Internet of things.

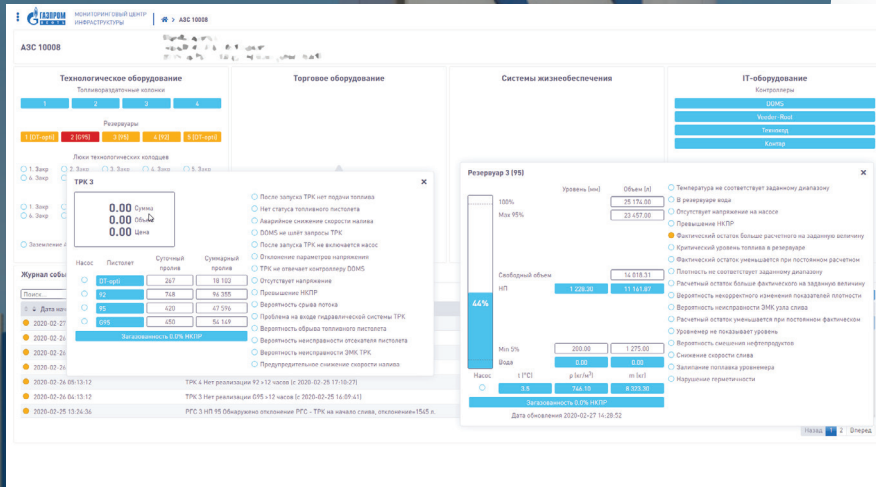
Monitoring center software core processes up to one hundred thousand signals per second and make over fifty thousand computations. Oil products inventory information in continuously collected from each Gazprom Neft gas station connected to IMC. These data are transmitted online to «Neftecontrol — Gazprom Neft» system.

Machine learning and predictive analytics IMC modules read signals from the connected devices and notify in advance on the necessity of gas station equipment maintenance.

SCREENSHOTS



SCREENSHOTS



BENEFITS

✔ New level of service quality

The service team is enabled to monitor equipment operation parameters and carry out predictive maintenance. This allows to keep equipment working without downtime 24/7 all the year round.

✔ Gas station equipment operation is smooth and almost trouble-free

EQUIPMENT EFFICIENCY	EMERGENCY RISK	DOWNTIME REDUCTION	MAINTENANCE AND REPAIR TIME REDUCTION
99%	0%	30%	21%

✔ Modeling and analysis

Equipment operation parameters collection and analysis, as well as malfunction correlation with specific equipment. Periodic technical services are now managed at a different level of quality: the number of off-schedule repairs is minimized; equipment maintenance is done before actual failures.

✔ Financial benefits

- ↑ Maintenance cost reduction by 5%.
- ↑ Significant cut of equipment downtime losses.
- ↑ Profit growth due to filling stations smooth operation and high quality client service.

CUSTOMER'S FEEDBACK

"Connecting our gas stations to the Internet of things is an important step on the way to growth of business efficiency and transparency.

We managed to significantly cut equipment maintenance costs and provide highest-level control over oil products quality and quantity having excluded human factor from the process. It means, our clients can be sure to get high quality product exactly in the required quantity."



Alexander Krylov
Regional Sales Director, Gazprom Neft

PLANS FOR THE FUTURE

Today the project is implemented in Russia, but in the nearest future Gazpromneft- Center is planning to replicate it in Belarus and layer in other world countries.


By 2030 the company is planning to get into TOP-10 of world largest liquid hydrocarbon extraction companies, gain the lead in ROACE, maximize generated value of each barrel per extraction and processing ton and become the industry world benchmark in terms of efficiency, technology and safety.

Tibbo Systems is a part of an international company group leading in hardware and software solutions for the Internet of Things, IT infrastructure management, industrial and building automation, remote monitoring and service, physical access control, and data center management.

We develop, deploy and service solutions based on AggreGate IoT Platform. Established in 2001, Tibbo Systems takes care of developing AggreGate Platform itself, as well as all vertical market products based on it. There are many software professionals, IT infrastructure engineers, automation experts and IoT gurus in our core team.

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