



BILFINGER

Autonome Inspektionen bei sicherheitskritischen und schwer zugänglichen Anlagen

Praxisbeispiele aus der Öl- und Gasindustrie

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Agenda

- 01** Introduction
- 02** Customer Challenges
- 03** The Technology
- 04** Typical Use Cases
- 05** Bilfinger Approach
- 06** Summary and Outlook

The Leading Industrial Service Provider



>90% of Our Customers Purchase Our Services More Than Once

Consulting & Engineering	Prefabrication & Installation	Access & Insulation	Asset Performance
Digitalization			

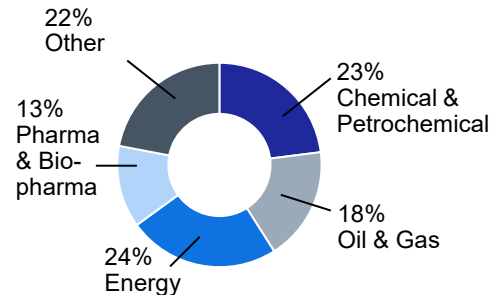
>€5.4bn
Revenue

~31,000
Employees

~30 Countries

>140 Years of Expertise

Market Split

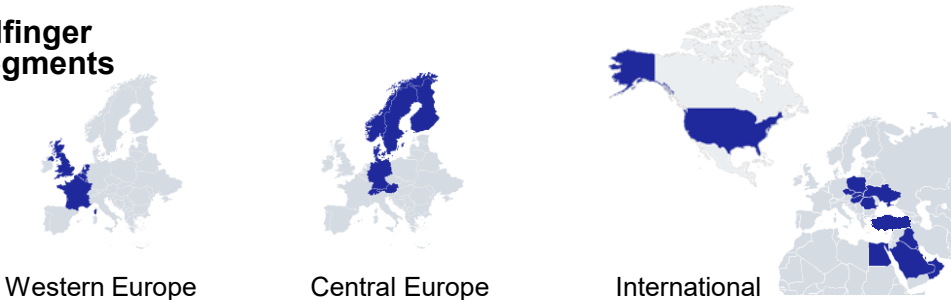


~80%
Similar business across all industries

5 Global Product Centers:

- Maintenance
- Engineering
- Insulation, Scaffolding and Corrosion Protection
- Static Equipment
- Rotating Equipment

Bilfinger Segments



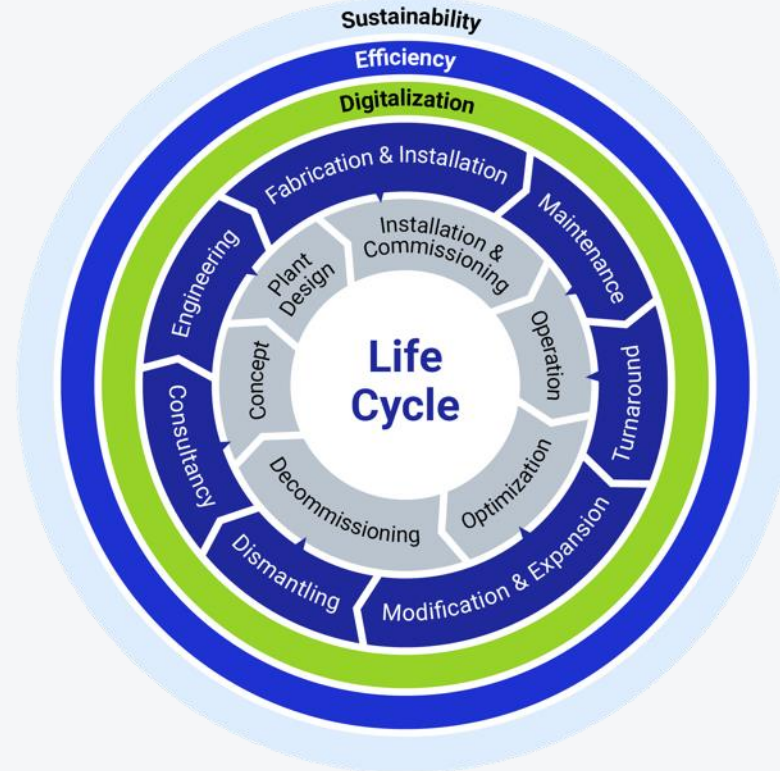
No. 1 for Our Customers in Efficiency and Sustainability

Bilfinger is an international industrial services provider. As the solution partner of choice, we aim to enhance the efficiency and sustainability of our customers in the process industry. Our comprehensive portfolio covers the entire value chain from consulting, engineering, manufacturing, assembly, maintenance and plant expansion to turnarounds and digital applications. With around 31,000 employees, Bilfinger upholds the highest standards of safety and quality.



SCIENCE
BASED
TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION



Customer Challenges



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New approach for Industrial Maintenance needed

Challenges of Today



Maintenance budgets strained by manual inspections and reactive repairs



Skilled labor shortage and safety risks



Inconsistent data management and lack for asset performance

Customer voice

Shift from cost-per-hour to performance-based models that share efficiency gains.

Bilfinger Customer, Plant Manager

We use drones and robots already but need stronger internal and external teams plus data experts.

Bilfinger Customer, Country Manager

Safety risks like fire or leakage drive us to risk-based, data-driven maintenance for critical decisions.

Bilfinger Customer, COO

1,400 data points per valve mean nothing without context — value comes from interpretation.

Bilfinger Customer, CEO

The Technology



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Bilfinger approach towards Robotics

Integrated into Bilfinger services delivery



Task-based Robotics

Robots temporarily deployed on-site for specific tasks (e.g. inspection, maintenance, emergency response), typically operated manually with only limited automation.



Surveillance Robotics

Robots permanently stationed on-site that perform recurring tasks (e.g., surveillance, operational actions), typically operating (semi-) autonomously with increasing levels of autonomy over time.



Integration

Framework ensuring that deployed equipment and services are safely and effectively integrated into existing systems, while identifying and resolving integration risks and challenges across the ecosystem.

Bilfinger approach towards Robotics

Integrated into Bilfinger services delivery



Task-based Robotics

Inspection

- Visual and thermal inspection via drone or crawler
- Drone based non-destructive testing
- 3D scans

Welding

Pre-treatment & Blasting

Scaffolding & Insulation logistics

Decommissioning & Retrieval

Stopaq wrapping

Surveillance Robotics

Inspection

- Visual and thermal inspection
- Visual recognition and analysis
- Audio analysis
- Gas detection & mapping

Integration

Proprietary Systems

Korial

- Hardware-agnostic integration
- AI Analytics Brain
- Data Integration

Selection of the right technology is key

Selection of Surveillance Robotics

ExRobotics

- ATEX Robot, with option to equip with PTZ camera for inspections
- LiDAR sensor for autonomous navigation, obstacle detection and avoidance
- Acquisition of 3D digital twin through LiDAR geometry data
- Robust device, no stair climbing



Taurob

- ATEX Robot, with robust stair-climbing capabilities
- Advanced sensors and camera setup incl. zoom, video capabilities for inspections, gas sensing, and more
- LiDAR sensor for 360° scan to navigate precisely, avoid obstacles



Boston Dynamics

- Non-ATEX Robot, multi-purpose, ideal for autonomous inspections in- & outdoor, robust stair-climbing
- PTZ camera and various sensor scan be equipped, LiDAR payload
- Specialized payloads such as 3Dmicrophones for special use cases



DJI

- Drone-in-a-Box, fully automatic drone system in protective housing
- Automatic launch, flight, and landing process, charging in box
- Drone can conduct pre-defined missions for inspection tasks
- Real-time data capture using onboard sensors and cameras



Hardware choice depending on inspection use cases

Major capabilities per device

	Remote Teleoperation	Supervision in Korial UI	Click & Inspect	Korial AI Skills	Inspection data in UI & API	Gas Sensing	Thermal Cam	Stair climbing	Points of Interest Inspections	ATEX
ExR	✓	✓	✓	✓	✓	✓	✓	X	✓	✓
Taurob	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BD Spot	✓	✓	Autowalk	✓	✓	✓	✓	✓ Autowalk	✓	X
DJI Drone	✓	✓	✓	✓	✓	X	✓	N/A	✓	X

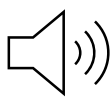
Supported Sensor Types¹



**Zoom
Camera**



**PTZ
Camera**



**Acoustic
Camera**



**Thermal
Camera**



**Optical Gas
Imaging
Camera**



**Point Gas
Sensor**



**Multi-Gas Point
Gas Sensor**



**NDT Sensor
Inductosense**

Typical Use Cases



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Bilfinger Autonomous Inspection



Visual recognition & AI Analysis reduce operator rounds

Customer challenge

- Manual paper-based recordings of manometers
- Sometimes climbing of stairs and ladders required. Additional access solution required
- High risk, requires ATEX & Safety training

Bilfinger Solution

- Autonomous device takes picture of asset
- Ai-based skills post-process data and provide insight
- Instant highlighting of outliers

Customer Added Value

- Reduced in operator rounds and inspection time
- Increased safety
- High-resolution data for faster decision-making

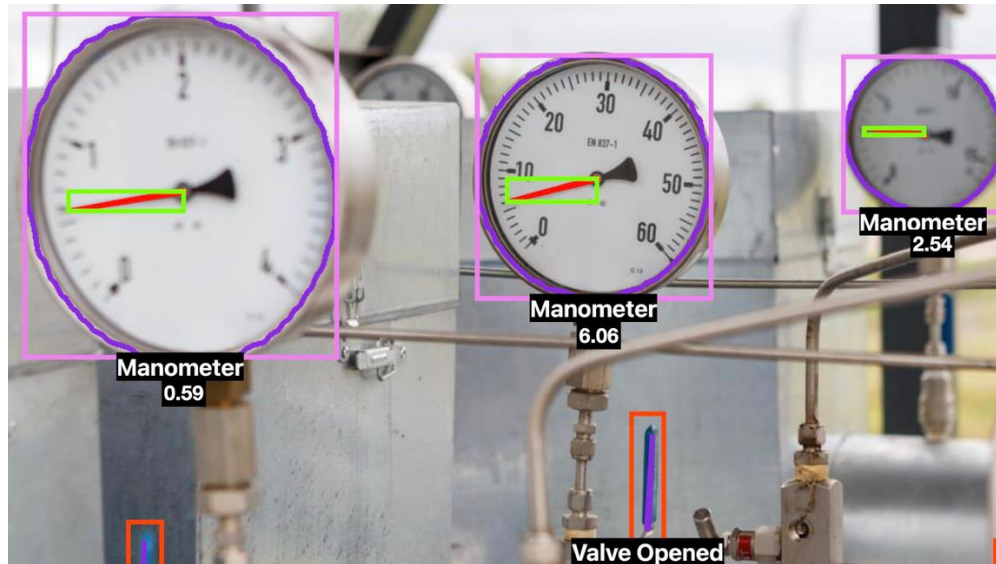
Solution summary

Bilfinger Product:
Maintenance

Reference customers:
Confidential

KPI:
Night shift reduction up to 100%

Market:
Oil & Gas, Petrochemicals



Bilfinger Autonomous Inspection



Thermographic Analysis increase uptime of critical assets

Customer challenge

- Reactive maintenance strategy
- High costs for online monitoring
- Manual thermographic analysis in high-risk environment
- Limited comparability to previous values

Bilfinger Solution

- Autonomous device carries thermal camera
- Ai-based skills post-process heatmaps and provide insight
- Instant highlighting of outliers and hotspots

Customer Added Value

- Preventive Maintenance for key assets leading to reduction in downtime
- Upskilling operators for higher value maintenance
- High-resolution data for faster decision-making

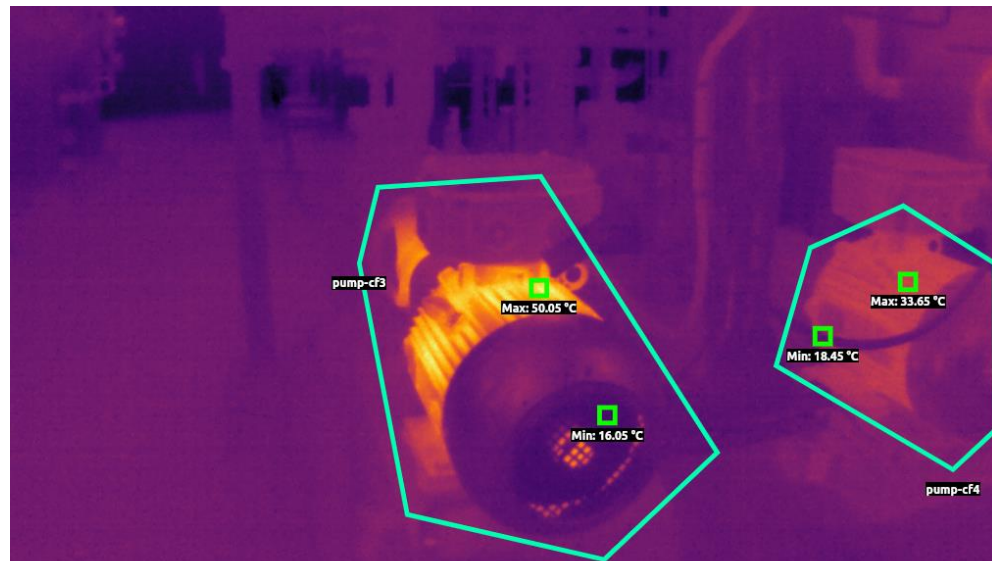
Solution summary

Bilfinger Product:
Maintenance

Reference customers:
Confidential

KPI:
Early detection of failures

Market:
Oil & Gas, Petrochemicals



Bilfinger Autonomous Storage Tank Inspection

All-in-one solution tank farm inspections



Customer challenge

- Oil and Storage tank farms need to be manually inspected. Manual documentation
- Status and fill level are checked manually for each tank
- High risk (ladders and scaffolding) and error rate (large visual distances)

Bilfinger Solution

- Autonomous drone (dock solution)
- Water on tank detection, valve detection, thermographic analysis and visual inspection
- 2-3 missions per week. Each 80-180 POIs
- Flat fee for all inspection activities

Customer Added Value

- Achieve major cost reduction and focus on core business
- Reduced inspection time from 8 hours to 20 minutes
- Significant safety increase

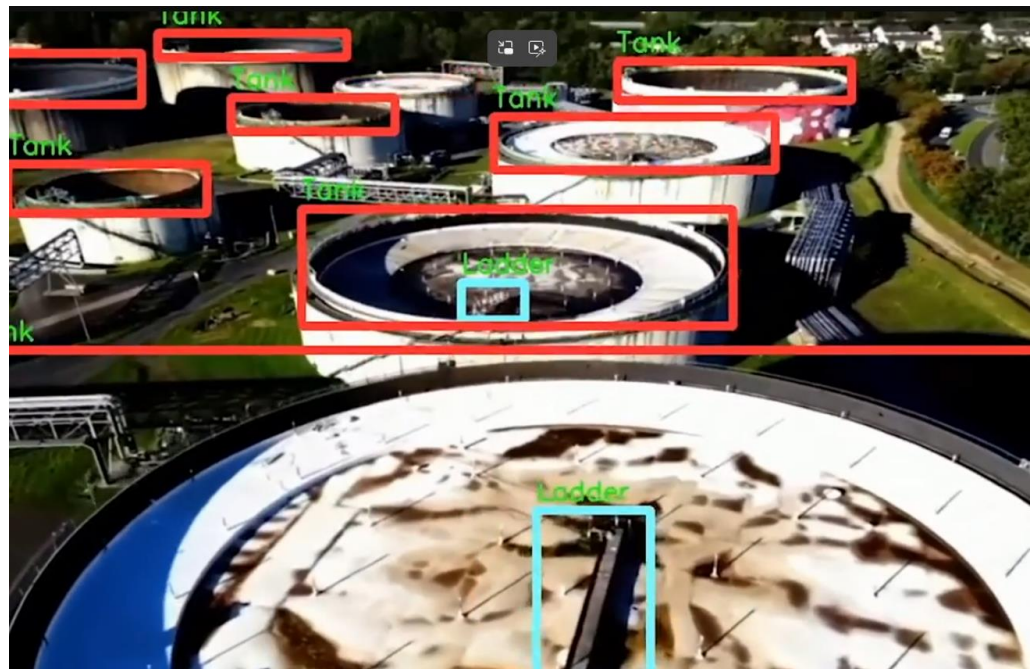
Solution summary

Bilfinger Product:
Inspection Solutions

Reference customers:
Shell via Partner Korial

KPI:
Reduction of inspection costs 20%

Market:
Process Industry



Bilfinger Autonomous Inspection

Gas Detection delivering continuous gas mapping



Customer challenge

- Continuous gas monitoring not installed throughout entire asset
- Manual gas sniffer or expensive optical gas imaging camera required

Bilfinger Solution

- Autonomous device carries gas measurement and optional optical gas imaging camera
- Instant highlighting of outliers and anomalies

Customer Added Value

- Ability to pin-point gas leaks
- Continuous insights and early gas leak detection

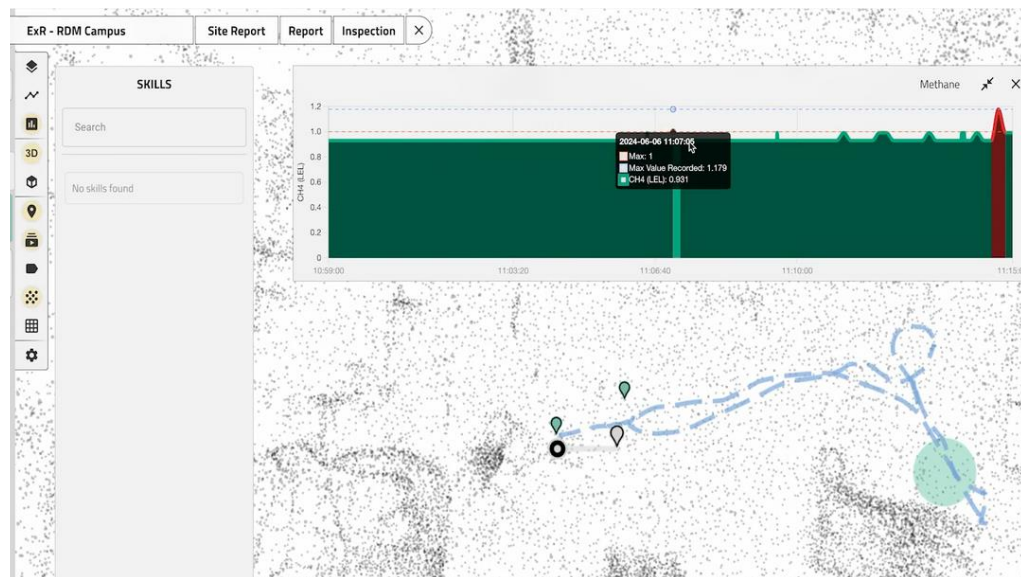
Solution summary

Bilfinger Product:
Maintenance

Reference customers:
Confidential

KPI:
Increase in site safety

Market:
Oil & Gas, Petrochemicals



Bilfinger Approach



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Bilfinger Autonomous Inspection

All-in-one solution for inspections



Customer challenge

- Change in “way of working” needed without compromises in safety and asset performance
- Customers reviewed technologies but struggle to build up inhouse capabilities

Bilfinger Solution

- Integrated package of hardware, software and service by Bilfinger
- Gas detection & mapping, thermographic analysis and visual inspection
- Autonomous ATEX certified robots from multiple vendors
- Enterprise AI Platform from Korial for fleet management, analytics and data integration

Customer Added Value

- No need to build up technical expertise and remote operations center
- Global solution and site-specific integration

Solution summary

Bilfinger Product:
Maintenance Solutions

Reference customers:
Shell via Partner Korial

KPI:
Focus on core processes

Market:
Oil & Gas, Petrochemicals



Summary and Outlook



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Summary and Outlook

- The demographic change and cost pressure drives automation of repetitive activities
- All Oil & Gas Super Majors are completing their test and validation period of the technology
- Scaling phase for autonomous robotics in Oil & Gas has started
- Chinese robotic manufactures have entered the European market and will change the current price structure
- Humanoids will be able to interact with the assets
- Humanoid pilots and tests have started and will show its first results within the next three years

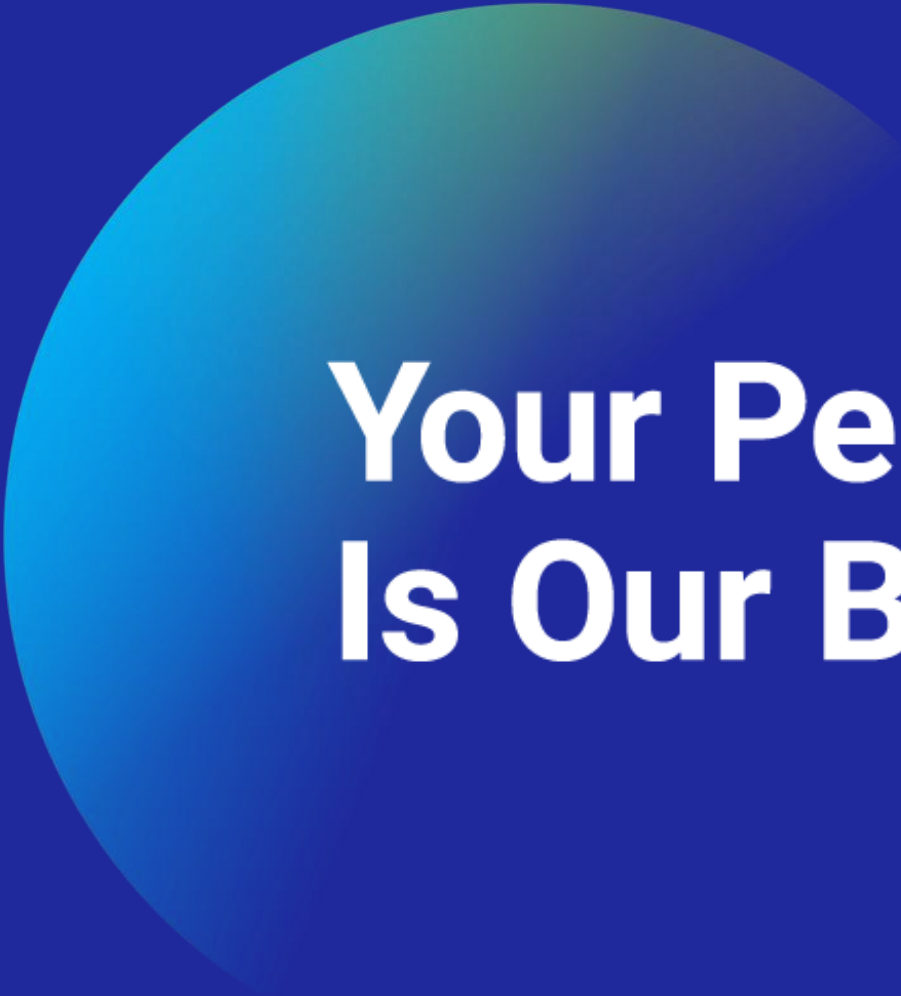
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**Your Performance
Is Our Business**