ABUS
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ABUS ONE LOTO
WHITE PAPER

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Inhalt

1. Executive Summary

ABUS One LoTo represents the **next generation of Lockout/Tagout (LoTo)**: digital, secure, and efficient.

Digital locks, app/dashboard workflows, and tamper-proof logging accelerate approvals, reduce errors, and strengthen auditability.

The ongoing digitalization of maintenance and asset management through solutions such as CMMS, EAM, Condition Monitoring, and Predictive Maintenance acts as a **booster**. Studies typically report impacts such as:

- Productivity: +25 %
- Breakdowns: −70 %
- Maintenance costs: −25 % (Deloitte)
- Uptime increase: +10–20 % with scaled PdM (Deloitte) [Q1]

These software solutions follow a clear business logic: sensor data (Condition Monitoring) → AI interpretation (Predictive Maintenance) → CMMS plans activities → EAM orchestrates strategic asset management.

ABUS One LoTo aligns with this development and systematically supports Permit-to-Work (PtW) and CMMS approaches.

2. Opportunity: Amplifying Impact with One LoTo – Building on proven mechanical LoTo systems

Mechanical LoTo remains the robust standard for physical energy isolation—established, compliant, and indispensable in many environments.

ABUS One LoTo builds on this foundation and adds digital support: guided workflows, transparent approvals, real-time status, and tamper-proof documentation. It’s not “either–or” but “both–and”: analog strength plus digital efficiency.

With CMMS/EAM and Permit-to-Work solutions already widely deployed, digital LoTo processes can seamlessly integrate into existing infrastructures—leveraging central role management, approval workflows, and audit trails via APIs.

Benefits include:

- Step-by-step process guidance and clear responsibilities
- Real-time transparency and improved coordination
- Automated, exportable audit logs
- Integration into PtW, CoW, and CMMS/EAM/ERP systems

3. Solution Approach: ABUS One LoTo

ABUS One LoTo combines smart, Bluetooth-enabled machine locks with cloud-based services (App, Dashboard, Login/Logout Terminal).

Bluetooth-enabled machine locks enable keyless operation. An app for LoTo supervisors, various applications for worker login and logout, and a web dashboard for administration form the digital core of the system.

Procedures, roles, and approvals are digitally mapped; each step is timestamped, documented in a tamper-proof manner, and can be exported.

Digital login/logout processes document the start or end of a procedural step. Personal mechanical locks are replaced by the digitally secured login/logout process; the necessary machine locks for the physical safeguarding of hazardous energy sources remain an essential part of the ABUS One LoTo system.

4. Market and Target Group Analysis (Brief Overview)

In particular, companies in the chemical, automotive, and mechanical engineering sectors have high requirements regarding safety, efficiency, and auditing.

The existing IT penetration (CMMS/EAM, CoW) facilitates the introduction of digital LoTo processes.

Through associations such as VDMA and VCI, multiplier effects can be leveraged.

5. Technology & System Architecture

Core modules of **ABUS One LoTo**:

- **Admin Dashboard** (roles, procedure creation and editing, approvals, reporting)
- **Foreman App** (assignments, step approvals, opening & closing of machine locks)
- **Login/Logout Terminal** (worker check-in)
- **Smart Lock** (physical locking with Bluetooth – direct proximity to the “lockout point”)
- **API integration** (e.g., EAM/ERP/EHS).

6. Digital LoTo Processes: Economic & Operational Impact

Digital LoTo processes shorten approval and handover times, reduce media disruptions, and automate documentation.

In the maintenance context, predictive maintenance programs deliver significant results:

- **+25 % productivity**,
- **−70 % breakdowns**,
- **−25 % costs** (Deloitte),
- **+10–20 % uptime** (McKinsey) [Q1] [Q2].

On a macro-economic level, the costs of unplanned downtime are estimated to be very high — about 11 % of revenue, equivalent to ~USD 1.4 trillion annually for Fortune Global 500 industrial companies.

Estimated savings for Fortune Global 500 industrial companies through full implementation of Condition Monitoring and Predictive Maintenance:

- **2.1 million hours** of downtime saved annually
- **USD 388 billion** from a 5 % increase in productivity
- **USD 233 billion** from a 40 % reduction in maintenance costs (Senseye/Siemens) [Q4].

Digital Permit to Work/CoW platforms already integrate LoTo as a safety measure (e.g., SAP WCM), enabling controllable and auditable approvals [Q5].

Digital LoTo systems extend existing maintenance software with an operational safety dimension. They transform a pure *Condition Monitoring and Predictive Maintenance tool* into an integrated safety and efficiency system that:

- shortens processes,
- measurably reduces risks,
- automates compliance documentation.

In short: Predictive Maintenance saves costs — Digital LoTo systems protect lives and shorten approval times. Combined, they create measurable value: safe, documented, and efficient.

7. Use Case / Praxisbeispiel

From the skeptical safety officer to the digitally savvy Assistant Plant Manager and the experienced master electrician – ABUS One LoTo is tailored to different roles and requirements. Digital support can be integrated either at a basic level or comprehensively, depending on the needs.

The Unitywater use case illustrates the potential of digital solutions for Permit-to-Work / Control-of-Work processes. Fundamentally, these process landscapes are an essential part of digitalized LoTo procedures.

7.1 Use Case Unitywater: Digitales Permit-to-Work (mit Go2Asset) [Q6]

Initial Situation

- Unitywater – a utility company in Queensland, Australia, responsible for water and wastewater infrastructure.
- Challenge: Up to now, the Permit-to-Work (PtW) process for work on hazardous or safety-critical equipment was handled either on paper or through fragmented systems.
- Problems:
    - Long lead times (permits could remain open for up to 30 days).

- Inefficient communication between applicants, approvers, and supervisors.
- High manual effort and susceptibility to errors (e.g., duplicate data, incomplete forms).
- Low transparency — responsibilities and status were not always traceable.

Implementation of the Digitalization

- Introduction of a centralized digital platform (Go2Asset) for Permit-to-Work.
- Integration with operational systems and mobile devices → application, approval, and tracking are fully digital and partially mobile.
- Automated workflows:
  - Validation of required safety documents.
  - Automated reminders and escalations.
  - Real-time status visibility for all stakeholders.
- Standardized templates for different types of work (Hot Work, Confined Space, Electrical, etc.).

Results / Effects

1. **Handling High Volumes Efficiently**
   - More than 4,500 digital permits successfully processed.
   - Success rate of 96.8 %: Hardly any incomplete or canceled requests, as the system detects and prevents errors early in the process.

2. **Substantially shortened lead time**
   - Previously: The average permit open time was around 30 calendar days (until processing was completed).
   - Today: Through the digital workflow, permits are approved and processed within working hours.
   - Effect: Significantly higher flexibility and faster operational readiness of on-site personnel.

3. **Financial Effects**
   - Estimated savings: ≈ 500,000 AUD per year.
   - Main drivers of savings:
     - Elimination of manual steps and paper handling.
     - Reduction of project and work delays (faster permits → earlier work start).
     - Fewer downtimes due to leaner processes.
     - Lower error rate (e.g., duplicate or incomplete applications).

4. **Safety and Compliance Benefits**

- Standardized, validated approval processes → increased legal certainty.
- Every step is digitally documented → enhanced audit readiness.
- Real-time overview of active work → improved operational risk management.

5. Employee and Stakeholder Satisfaction

- Less paperwork for both applicants and approvers.
- Clear roles and responsibilities stored in the system.
- Easier tracking via mobile devices → improved usability and practicality.

7.2 Relevance for LoTo

In typical Control of Work (CoW) / Work Clearance Management (WCM) processes, LoTo isolations are an integral part of the permit approval chain. Digital Permit-to-Work (PtW) platforms map these steps and accelerate approvals and audits. [Q9] [Q10] [Q11]

8. Regulatory Framework & Compliance

ABUS One LoTo is designed to support the implementation and documentation of the requirements defined in OSHA 29 CFR 1910.147 (Control of Hazardous Energy) and ISO 45001 [Q8], as well as relevant national regulations (e.g., TRBS/DGUV).

In SAP Work Clearance Management (WCM), measures such as Lockout/Tagout are explicitly defined as safety measures and can be fully integrated into work permits. [Q7] [Q5]

Annex I: Comparison of Analog vs. Digital LoTo Process

Criterion	Analogue Lockout/Tagout (LoTo) process	Digital LoTo process (ABUS One LoTo)
Procedure Management	Paper-based, static, error-prone	Digital, centralised, flexibly configurable, version-controlled; templates/workflows
Key management / access management	Physical, loss-prone, higher administrative effort	Digital log-in/log-out processes; roles & permissions; padlocks managed via the app; function groups and named workers are assigned in the app; transparent procedure management
Status overview	Visible only on-site, no real-time data	Live status via app/dashboard
Documentation	Automatic, tamper-evident (audit-ready), exportable	Automatic, tamper-evident (audit-ready), exportable
Safety approvals	By coordination (often verbal), risk of incomplete documentation	Digitally controlled, documented, role-based; step-by-step approvals with time stamps
Audit capability	Time-consuming, incomplete	"At the click of a button" reports/exports; complete audit trail

Annex II: ROI Drivers for Digital LoTo (Indicators & Examples)

Cost / impact area	Benefit / indicator (generic)	Example / source	Potential effects – ABUS One LoTo
Release and hand-over times	Shorter releases through digital workflows, live status and clear accountabilities; fewer waiting times at shift changes	Unitywater: "permit open time" reduced from ~30 days to working hours; >4,500 permits; success rate 96.8% [Q6]	Double-digit reductions possible (see e.g. Unitywater: PtW process reduced from days to hours)
Administrative effort	Automated logs and digital signatures reduce media breaks and manual rework	Unitywater: ≈ AUD 500,000/year savings; 1 FTE redeployed [Q6]	Noticeable reduction by eliminating paper/manual logs (see e.g. Unitywater: ~AUD 500k/year)
Key / access management	Reduction of manual key distribution through digital log-in/log-out processes; use of personal padlocks remains a matter of risk assessment / procedure	-	Complete elimination of personal padlocks
Audit preparation & compliance	xportable logs (timestamps, history) → significantly shortened preparation and stronger chains of evidencetten	SAP WCM: LoTo embedded as a safety measure in the work permit [Q5]	Significantly shortened via export / audit trail
Asset availability (indirect effect)	PdM/CMMS/EAM reduce outages and improve uptime; LoTo digitalisation accelerates safe approvals within the process flow	Deloitte: Productivity +25%, Breakdowns −70%, Costs −25% [Q1]; McKinsey: Uptime +10–20% [Q2]	-

Annex III: Advantages of Digital LoTo in the Context of Maintenance and Asset Management Software

The integration of a digital Lockout/Tagout (LoTo) system with CMMS, EAM or PtW solutions elevates maintenance operations to a new level of safety and efficiency. While traditional systems digitalize the planning and execution of maintenance activities, a digital LoTo system ensures the **digital safeguarding of physical workplace safety** — fully integrated into the same data flow.

1. Seamless process integration instead of media disruption

- Digital LoTo approvals are generated directly from the maintenance order (e.g., SAP PM, Maximo, Infor EAM).
- No more manual coordination or paper lockout lists – approvals are automated based on the work orders.
- Safety status ("locked," "released") is synchronized bidirectionally with the maintenance system.

2. Digital proof of compliance & auditability

- Complete, time-stamped documentation of all LoTo activities (who, when, which asset was locked/released).
- Meets the requirements of ISO 45001, OSHA 1910.147, and internal audit standards.
- Auditability at the push of a button – no scanning, no manual typing, no media disruption.

3. Increased occupational safety through system logic

- Maintenance work can only begin once all affected energy sources are digitally locked and confirmed.
- Prevention of human error (missed lockpoints, duplicate releases).
- System-based interlocks: the backend can prevent a device from being released as long as a tagout is active.

4. Real-time transparency and control

- Dashboard-based overview of all ongoing LoTo activities within the plant or facility.
- Integration with condition monitoring data: if a failure is detected, the LoTo system can automatically trigger preconfigured lockout processes.
- This enables operationalization of predictive maintenance — from data signal to safe release.

5. Efficiency gains in the maintenance workflow

- Elimination of manual release and coordination times (often 10–30 minutes per intervention).
- Accelerated restart through digital feedback.
- Overall, typically 10–20% shorter downtime per intervention.

6. Improved planning and KPI transparency

- Combination of maintenance KPIs (e.g., MTTR, MTBF) with safety KPIs (e.g., LoTo compliance rate).
- Data foundation for continuous improvement processes in maintenance and EHS management.

Annex IV: Notes and Limitations of the Listed Effects

- The figures for predictive maintenance and downtime depend on the specific industry and plant; they illustrate potential benefits but do not replace site-specific ROI calculations.
- The scope of digital and analog locks is determined by the hazard assessment, applicable standards, and operational procedures.
- Compliance with OSHA, ISO, TRBS, and DGUV requirements must be achieved through operational implementation and processes; the system supports documentation and control.

Annex V: Glossary

API (Application Programming Interface) – Interface through which One LoTo exchanges data/processes with third-party systems (e.g., ERP/EAM/EHS).
AUD – Australian Dollar; currency used in the Unitywater example.
Audit Trail – Complete, tamper-proof log of all actions (who/what/when) ensuring traceability and audit security.
BLE (Bluetooth Low Energy) – Wireless standard for low-energy, secure communication with smart locks/devices.
CMMS (Computerized Maintenance Management System) – Software for planning and controlling maintenance (work orders, assets, spare parts, history).
CoW (Control of Work) – Framework for safe work authorization (e.g., Permit-to-Work including isolations such as LoTo).
DGUV – German Statutory Accident Insurance; publishes rules and information on occupational health and safety.
EAM (Enterprise Asset Management) – Company-wide asset management including maintenance, risk, and lifecycle processes.
EHS / HSE (Environment, Health & Safety / Health, Safety & Environment) – Organizational areas/management systems for environmental, occupational, and plant safety.
ERP (Enterprise Resource Planning) – Integrated enterprise software (e.g., SAP) for finance, procurement, production — often the basis for EAM/EHS integration.
Gefährdungsbeurteilung (GBU) – Risk assessment that defines whether and how personal locks are used in addition to the digital process.
Go2Asset – Name of a digital Permit-to-Work/Control-of-Work platform used by Unitywater to digitize its authorization process.
ISO 45001 – International standard for occupational health and safety management systems.
LoTo / LOTO (Lockout/Tagout) – Procedure for the safe isolation (Lockout) and labeling (Tagout) of energy sources prior to maintenance work.
NFC (Near Field Communication) – Short-range wireless technology for contactless authentication/operation.
OSHA 29 CFR 1910.147 – U.S. regulation “Control of Hazardous Energy,” governing LoTo requirements.
PdM (Predictive Maintenance) – Condition- and data-based predictive maintenance to reduce unplanned downtime.
Permit / PtW (Permit-to-Work) – Work permit with defined safety measures; LoTo steps are typically integrated and subject to approval.
ROI (Return on Investment) – Ratio of benefits/savings to investment (e.g., time, downtime, admin reduction).
SAP WCM (Work Clearance Management) – SAP functionality for permits/safety measures; digitally integrates LoTo in permit processes.
Uptime / Downtime – Available operating time of a system vs. outage time; key KPI for efficiency and cost-effectiveness.

Annex VI: References

- **[Q1] Deloitte Analytics Institute (2024): Predictive Maintenance – Position Paper (**Siehe Seite 5 (increases productivity) & Seite 10 (Uptime))**.**
  https://www.beekeeper.io/wp-content/uploads/2024/10/Deloitte_Predictive-Maintenance_PositionPaper.pdf
- **[Q2] McKinsey (2021): Prediction at scale – How industry can get more value out of maintenance.**
  Prediction at scale: How industry can get more value out of maintenance
- **[Q3] Plant Engineering (2023): Maintenance survey indicates shift to cloud – incl. 59% CMMS, 39% EAM, Ø 108,000 USD Downtime.**
  Maintenance survey indicates shift to cloud, more sophisticated apps well underway - Plant Engineering
- **[Q4] Siemens/Senseye (2022): The True Cost of Downtime – Fortune Global 500 verlieren ~11% Umsatz (~1,4 Tn USD).** (Siehe Seite 3 & Seite 12)
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- **[Q5] SAP Help Portal: Work Clearance Management – Sicherheitsmaßnahmen inkl. Lockout/Tagout in Work Permits.**
  SAP Help Portal | SAP Online Help
- **[Q6] Unitywater (2019): Case Study – Digitising Unitywater's Permit-to-Work System (Go2Asset).** Case study download
  https://www.unitywater.com/-/media/unitywater/news/unitywater-case-study-on-go2asset-pdf.pdf?la=en
- **[Q7] OSHA 29 CFR 1910.147: The control of hazardous energy (Lockout/Tagout).**
  1910.147 - The control of hazardous energy (lockout/tagout). | Occupational Safety and Health Administration
- **[Q8] ISO 45001:2018 – Occupational health and safety management systems (Overview).**
  ISO 45001:2018
- **[Q9] SAP Help Portal – Work Clearance Management (ERP, PM-WCM):**
  „These safety measures can include, for example, ***lockout/tagout*** *…"* – beschreibt LoTo als Sicherheitsmaßnahme innerhalb des WCM/PtW-Prozesses.
  lockout/tagout (PM-WCM) (SAP Library - Glossary)
- **[Q10] SAP Help Portal – Classic Work Clearance Management (S/4HANA On-Premise):** Erläutert die Rolle von **Lockout/Tagout** im WCM-Kontext (Isolieren/Trennen technischer Objekte). work clearance application (PM-WCM) (SAP Library - Glossary)
- **[Q11] SAP Service & Asset Manager – Work Clearance Management (mobile Features):**
  „Record ***lockout and tagout*** *activity (working with tags digitally) … check status of LOTO-related safety certificates, work permits …"* – Beleg für **digitale LoTo-Erfassung** im mobilen WCM.
  SAP Help Portal | SAP Online Help

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