Maintmaster® MI Technical White Paper

Maintmaster MI (Manufacturing Intelligence) is an add-on to Maintmaster CMMS that uses machine learning to turn the free text in your work orders, fault reports and documents into analyses that maintenance teams can act on.

This white paper is written for your IT department and system administrators. It describes how MI receives data, how the AI models work, where data is processed and stored, and how the service is secured and operated.

Specifications may change over time. The latest version of this document is available at maintmaster.com/whitepapers.

What Maintmaster MI Does

Most of the knowledge in a maintenance organisation is written as free text: what went wrong, what was done, and whether it helped. MI reads that text and structures it automatically. Typical results are:

- **Automatic Pareto analyses** of the most frequent problems, grouped even when people describe the same problem in different words.
- **Troubleshooting**: describe a symptom and MI finds similar past cases and the solutions that were actually applied.
- **Root-cause indication** and **reliability improvement suggestions** based on recurring patterns.
- **Preventive maintenance tips** and an estimate of **downtime savings potential**.
- **Regularity and correlation analysis**: statistical detection of recurring events and of event pairs that occur together.
- **A chat interface** where users ask questions about their data, with a gallery of ready-made analysis prompts that users can adjust and save.

MI works across languages. A fault described in Swedish and the same fault described in German are recognised as the same problem without first being machine-translated.

MI also analyses the PDF files and other documents uploaded to Maintmaster CMMS, not only work orders and their descriptions.

How MI Receives Your Data

When you activate MI, it automatically has access to your Maintmaster CMMS data. There is nothing to install, configure or integrate on your side, and MI never adds load to your CMMS.

Other data sources are also supported:

- **File import** of historical records, for example Excel exports from another system or shift book.

- **API** for third-party systems.

MI Is a Collection of Modules

MI runs as a set of containerised services on Kubernetes in Microsoft Azure, separate from your CMMS. MI has its own storage (a RAG database and the job history), optimised for domain-specific analysis. Together, these modules form the MI backend.

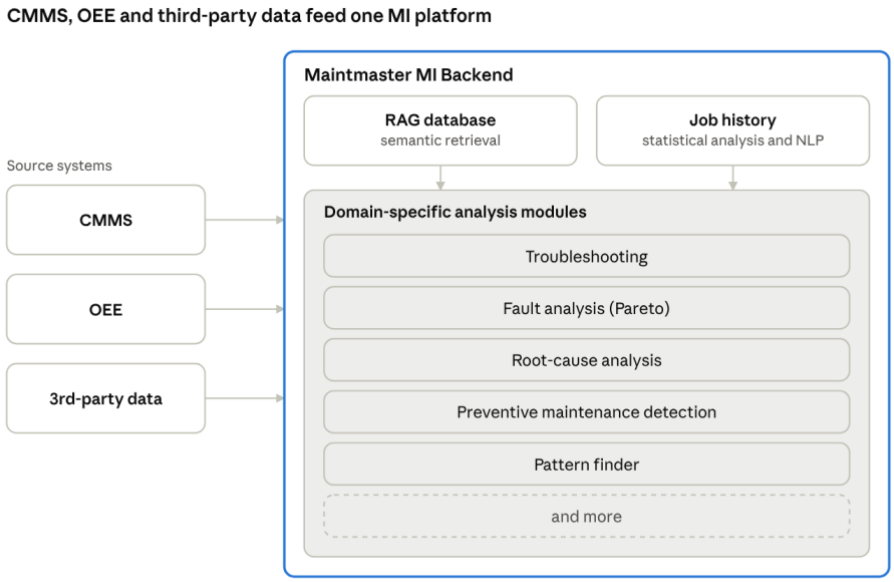


Fig 1. Maintmaster MI architecture

The MI backend can be accessed via our classic web UI, via a chat interface and via MCP (Model Context Protocol).

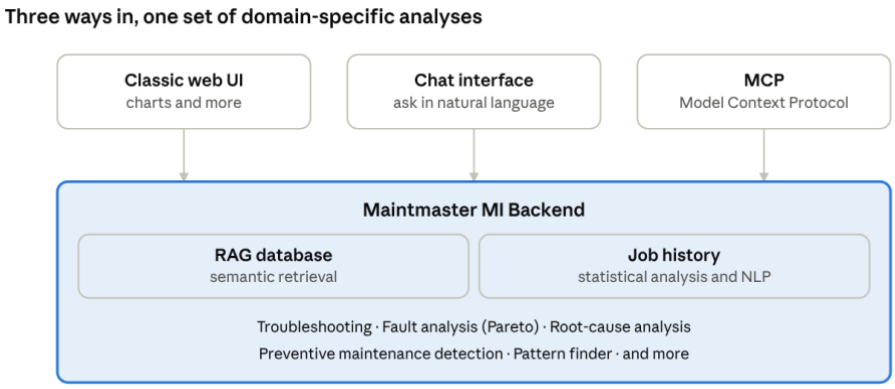


Fig 2. Access to Maintmaster MI

The chat in MI uses the same MCP endpoints internally, so external chat services can access MI through MCP in the same way.

How the AI Works

Custom models

MI's domain-specific analysis modules draw on task-specific machine learning models and algorithms. They are developed by Maintmaster and are what makes MI unique. The most important models are:

Model	What it does	Can be fine-tuned to customer data
Comment analyser	Extracts the key facts from maintenance histories (problems, causes, solutions and more).	Yes
Similarity	Scores how similar two descriptions are, so that "valve hissing" and "vent noise" are recognised as related.	Yes
Classification	Classifies events into maintenance-relevant categories, such as cleaning, wear and tear, refilling of consumables, and calibration or alignment.	Partly
Clustering	Groups similar or related topics together.	No
Regularity	Detects regular, recurring signals with classical statistics.	No

Multilingual by nature

MI does not machine-translate text before analysis. It uses models trained on multilingual vocabulary with aligned vectors, so that "car", "bil" and "Auto" map to nearly the same point. Azure translation is used only when a user asks for a maintenance job to be translated.

The chat

The chat lets users ask questions about their data in natural language. It uses large language models hosted in Microsoft Azure AI Foundry, with data processed only in the EU.

AI and Your Data

Your data is used to serve you, and training on your data stays within your own tenant.

- **Training confined to your tenant.** On higher MI tiers, analyses can be tuned to your company's own language: abbreviations, internal keywords and jargon. Your training data is never shared with other customers and stays in your tenant's storage.
- **No training of language models on your data.** The large language models are used as delivered. Maintmaster does not train or fine-tune them on your data.
- **No memory retention in our custom models.** Our custom models are pattern recognition models. They find patterns in data but cannot memorise customer data.
- **AI that stays in Maintmaster's EU environment.** MI's custom analysis models run on infrastructure operated by Maintmaster. The chat and document analysis also use large language models from Microsoft Azure AI Foundry, deployed in Maintmaster's

own Azure environment and processing data only in the EU. Your data is not retained, is not shared with the model providers and is never sent to public AI services.

- **Model training infrastructure.** Training of our custom models runs on short-lived GPU instances (strictly in EU) that are created for the job and removed afterwards.

AI-generated analyses are decision support. Results should be reviewed by qualified personnel before action is taken.

Hosting and Security of Your Data

MI is delivered as a fully managed service on Microsoft Azure, in resource groups dedicated to MI. All components run in Azure regions in the EU: West Europe (Netherlands), North Europe (Ireland) and Germany.

Isolation

- Production and test run in separate Kubernetes clusters, with separate configuration and credentials.
- Production data is never copied to development systems, and there is no direct access to production databases.
- Each customer is a separate tenant. MI services are multi-tenant but data is saved in tenant-separated storage.

Network and encryption

- Public access goes through Azure Application Gateway and is limited to specific ports, all over HTTPS (TLS).
- Communication between services runs on private virtual networks and/or is encrypted in transit.
- Data is encrypted at rest.

Operations and development

- Multi-factor authentication is required for access to cloud management portals.
- Dependencies are scanned for known vulnerabilities with Snyk.
- Organisational controls (ISMS, incident response, supplier management, awareness training) are the same as for all Maintmaster products. Maintmaster is partially ISO 27001 certified, with full extension of the certification planned for Q1 2027.

Availability, Backups and Monitoring

- **Scaling.** All services developed by Maintmaster scale horizontally.
- **Backups.** Automated backups are taken, including a backup before each deployment.
- **Monitoring.** Services are monitored with OpenTelemetry tracing and external uptime checks.

- **Support.** Production incidents are handled by Maintmaster together with its hosting partner, which provides 24/7/365 on-call operations.
- **Availability.** Maintmaster commits to 99.6% availability.

Getting Started

1. MI is activated inside Maintmaster CMMS with one click.
2. Historical data is loaded and analysed. This initial process takes 1–3 days.
3. On higher MI tiers, some models can be fine-tuned on your data.
4. Key users get 1–2 hours of training, followed by a workshop on how to use MI in your continuous-improvement process.

No software is installed on your premises.

User Accounts and SSO

The only personal data MI stores about users is the login, that is name and email address.

User permissions and roles are managed through Maintmaster CMMS permissions and MI's own role management.

MI uses the standard Maintmaster CMMS login service. Everything that applies to sign-in for Maintmaster CMMS 8 and CMMS 10 also applies to MI, including single sign-on and multi-factor authentication through Microsoft Entra ID. See the Single Sign-On (SSO) white paper at maintmaster.com/whitepapers.

Platforms and Technologies

MI is a web application and runs in any modern browser. A tablet web app is available for machine operators. Nothing is installed on users' computers.

On the server side, MI runs as containerised services on Kubernetes in Microsoft Azure. Source code is kept on GitHub, and builds and deployments run in GitHub Actions.

References

Additional resources on Maintmaster MI and related topics:

- Maintmaster White Papers
- maintmaster.com

For more information about Microsoft Azure:

- azure.microsoft.com