

Preventive maintenance: Regularly scheduled maintenance tasks are carried out to prevent equipment failures and minimize downtime. Preventive maintenance activities include cleaning, inspection, lubricating, calibrating, monitoring and tracking equipment reliability as well as alignment and replacing worn-out parts. This proactive approach supports equipment reliability, preventing breakdowns, contaminations and extending the lifespan of semiconductor

With respect to (embedded) software, preventive maintenance is concerned with a) proper documentation management and b) solving design flaws as well as adaptations following changes in third party software, on the initiative of Tenderer. Both a) and b) are the subject of Software Updates.

Predictive maintenance: A proactive approach that utilizes data analysis and machine learning algorithms to predict equipment failures and schedule maintenance accordingly. Predictive maintenance helps to reduce downtime and improve overall equipment effectiveness by addressing potential issues before they escalate into major problems. Predictive maintenance results in an advice to TNO either to undertake specific maintenance activities or to make adjustments to the preventive maintenance schedule. TNO regards predictive maintenance as an activity for which the exchange of data in real time is not necessary (as is often included in condition based maintenance).

Corrective maintenance: Maintenance activities are performed to repair or to replace faulty equipment. This type of maintenance is typically carried out after a failure has occurred, with the aim of restoring the equipment to its optimal performance levels (unplanned maintenance).

With respect to (embedded) software, corrective maintenance is concerned with fixing errors and problems, likewise as it also applies to equipment.

Condition based maintenance: Maintenance activities are carried out based on the actual condition of the equipment. This approach leverages real-time data from sensors and monitoring systems to determine when maintenance and services is required, ensuring that efforts are both targeted and efficient.

Software Upgrades

Next to Software Updates as discussed above, there may be a case of Software Upgrades. A Software Upgrade is to be understood as a new version of the software as part of manufacturer's release management or the issuing of newly or enhanced specific functionalities.