

SmartMoM - Integration

With the goal of visualizing all factory data and KPIs in a BI tool running on the German Edge Cloud platform, FIP requires IMPROVE 4.0 integration with SmartMoM (German Edge Cloud's application used for production master data management).

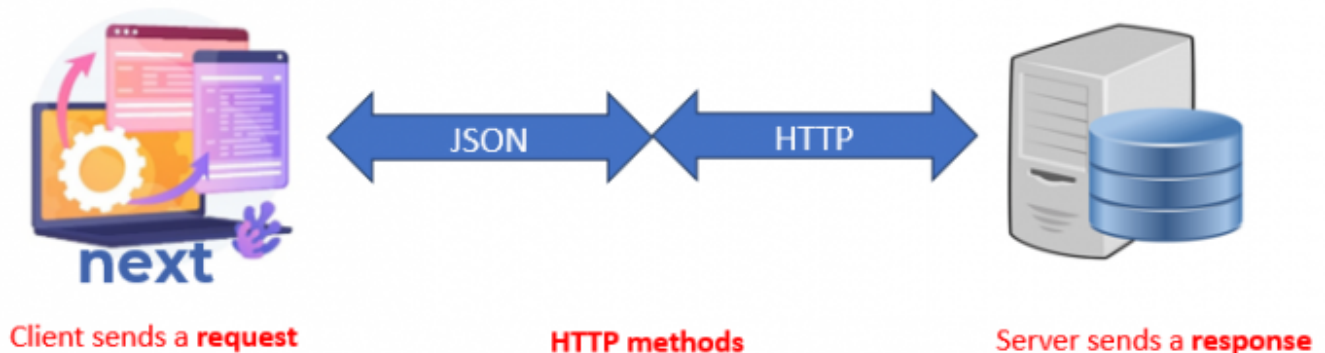
Communication will be via REST API through which IMPROVE 4.0, purely performing the function of REST client, will provide the requested data, related to the production lines currently being monitored in Peschiera, to the server. As such, it will be up to IMPROVE 4.0 to make an initial REST call to obtain an authentication token, which will be necessary for the subsequent execution of the corresponding API.

The APIs agreed upon are, specifically, two:

- one REST POST for retrieving data related to Work Orders Statuses;
- one REST POST for retrieving data related to Machine Statuses.

Details and documentation related to the parameters (both mandatory and non-mandatory) that will be transmitted via these APIs have already been discussed in a preliminary meeting between the parties, where German Edge Cloud made itself available for any future interactions that may facilitate the NeXT team with the integration process.

FLOWCHART



It has been agreed that data will be exchanged on an event-by-event basis to enable the server to receive, in near real time, information regarding orders and machine status.

A cloud-based server will be provided that can enable appropriate testing activities to be performed in parallel with developments: the estimated timing includes, in addition to and prior to the aforementioned software development and testing activities, the entire process of analyzing the documentation mentioned above, preparatory to the data mapping required for proper communication between the two systems, and the implementation of the mapping itself for all required parameters.

In the following paragraphs are specified the data available in Improve 4.0. For any additional required data it will be necessary to evaluate if they are stored or not in the IMPROVE 4.0 platform.

IMPROVE 4.0 side: Work Order Status

IMPROVE 4.0 can provide the following family of data:

- work order number or confirmation order number

- work center
- number of produced items
- number of scrap items
- standard takt time (provided by Sap)
- real takt time (calculated by the system if the related module will be activated)

For any produced item and for any scrapped item IMPROVE 4.0 can call the related REST POST API.

IMPROVE 4.0 side: Machine status

IMPROVE 4.0 can provide the following family of data when a machine stop starts:

- work center
- time of beginning of the stop machine
- stop reason

IMPROVE 4.0 can provide the following family of data when a machine stop ends:

- work center
- time of ending of the stop machine
- stop reason

Each event can be sent once is detected via REST POST API.

 **Fix Me!** If an operator changes the stop information a posteriori how IMPROVE 4.0 can update the GEC platform ?

MAPPING Informations

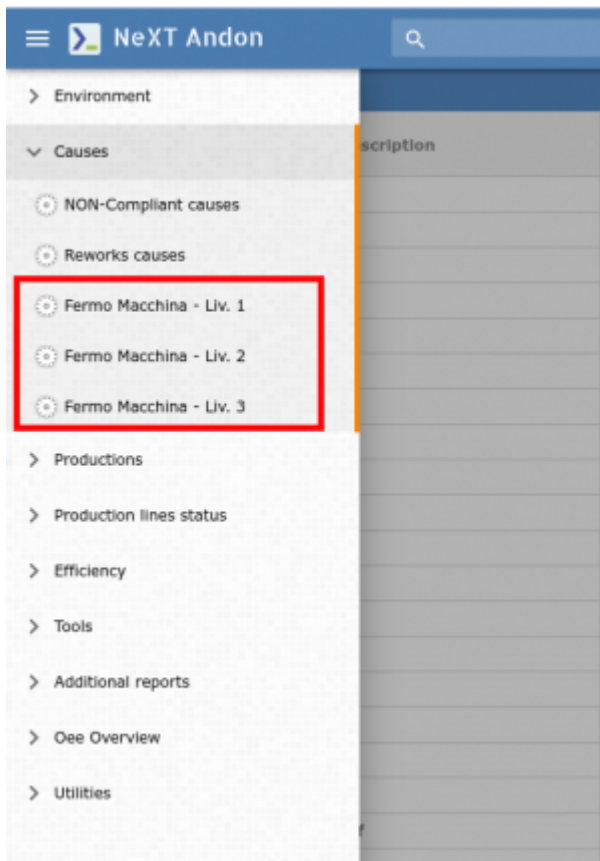
It is required to create a mapping between IMPROVE 4.0 dataset and GEC platform dataset, in particular for the following structures:

- stop causes
- work centers

In both the cases IMPROVE 4.0 provides a page where the user can by himself set this mapping.

Stop Causes

Using the related menu it is possible to access to the machine stop causes list:

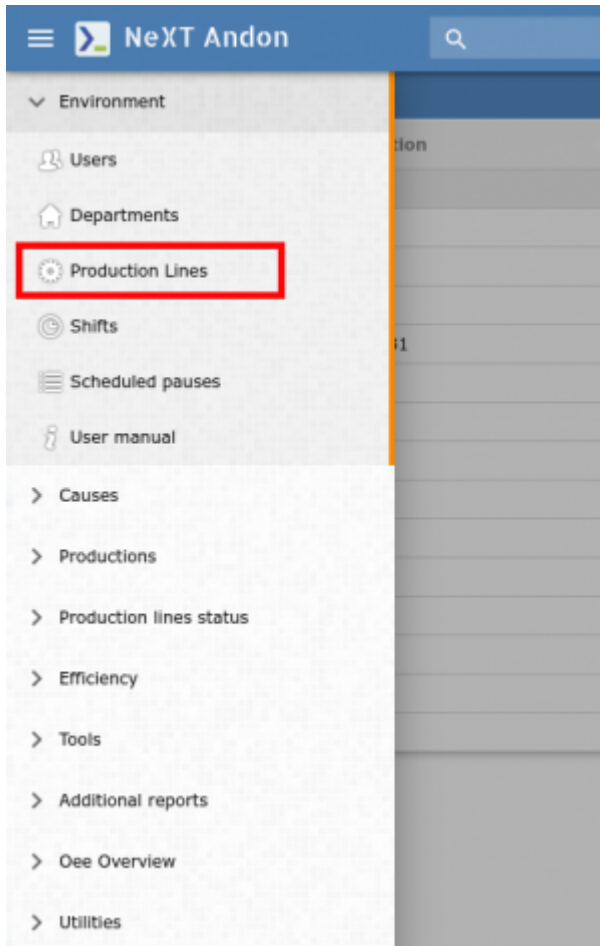


Opening the page of a specific machine stop cause, it is possible to configure the GEC platform related code in the indicated field:

A screenshot of the 'Machine downtime' configuration form in the NeXT Andon application. The form is divided into several sections: 'Master data', 'Tipologia', and 'Details'. In the 'Master data' section, there is a field for 'ERP code' which is highlighted with a red rectangular box. A red arrow points to this field. Other fields in this section include 'Code' (U02201E), 'Description' (Elektrisches Problem), and 'IDGR' (0 - System (cannot be deleted)). The 'Tipologia' section has radio buttons for 'Type' (Failure, Scheduled, Slowdown) and checkboxes for 'Organizational' and 'Machine breakdown'. The 'Details' section has dropdown menus for 'Level' (Level 3), 'Level 1' (FU02 - Ungeplant - Maschine, Grund bekannt), and 'Level 2' (U02201 - Schweißen), along with a 'Sort index' field (1) and an 'OEE stratification' dropdown (Maintenance).

Work centers

Using the related menù it is possible to access the work centers list:



Opening the page of a specific work center, it is possible to configure the GEC platform related code in the indicated field:

A screenshot of the 'Resource configuration' page in the NeXT Andon system. The page contains various configuration fields for a work center. The 'ERP code' field, located in the 'Master data' section, is highlighted with a red rectangular box and has a red arrow pointing to it. The value '151302' is entered in this field. Other visible fields include Department (abt151 - Hohlkörperlinie), Code (151302), Description (630to NZ, 151302), Workers (0), Workshift (h24), Linked resource (151301-630to VZ, 151301), Default Quantity / production cycle (1), Takt Time Management Policy (Divide CT / Q.ty), OEE limits (red/yellow at 80%, yellow/green at 85%), Cycle Time Factor (88%), OEE reports thresholds (Monthly 85%, Daily 85%), Tooling reports thresholds (Monthly 10%, Daily 15 minutes), Failure reports thresholds (Monthly 5%, Daily 30 minutes), and NON-compliant reports thresholds (Monthly 1.3%, Daily 1.3%). A gauge on the right shows '100 OEE LIMITS'.

For the case of work-center it is necessary to check if GEC platform will use the same code of the SAP system. If YES, no additional operation will be required since IMPROVE 4.0 is already configured for this scope. If NOT, it will be necessary to add another field in the same page for mapping the GEC platform work centers codes.

Activities

Activities will be divided as follows:

- Credential retrieval to obtain the token for access to the provided API, study and test of the provided APIs, implementation of the interface (middleware) for sending data to the server;
- Support to the users for mapping out causes of downtime currently set in the NeXT system for FIP according to the nomenclature of the German Edge Cloud system;
- Preparation of the software module for API #1, cloud testing and activation in production environment;
- Preparation of the software module for API #2, cloud testing and activation in production environment.