Super Visualization System for Machine Tools by the Intensive Collaboration

Objective

Design and validation of common expression of data obtained from machine tools in context of two cases, where decision makings require integration of the data of machine tools in a (even distributed) production line regardless of tools types and manufacturers

- Case 1: Planning and scheduling of maintenance of machine tools
- Case 2: Quality control with sufficient traceability of production data

Design and implementation

Identification of data items for visualization of two types of information:

- For case 1: When each machine tool should be maintained
  - 19 data items are identified through detailed analysis of six activities for collecting necessary information for estimating the residual life of each component of a machine tool
- For case 2: How manufacturing condition changes during a series of production
  - 16 data items that are used for identifying the point of variation in machine shop tool conditions, work setting, and NC programs are identified.

A prototype monitoring/visualization system is developed and demonstrated through an intensive collaboration among members of The Industrial Machinery Steering Committee

Supported by

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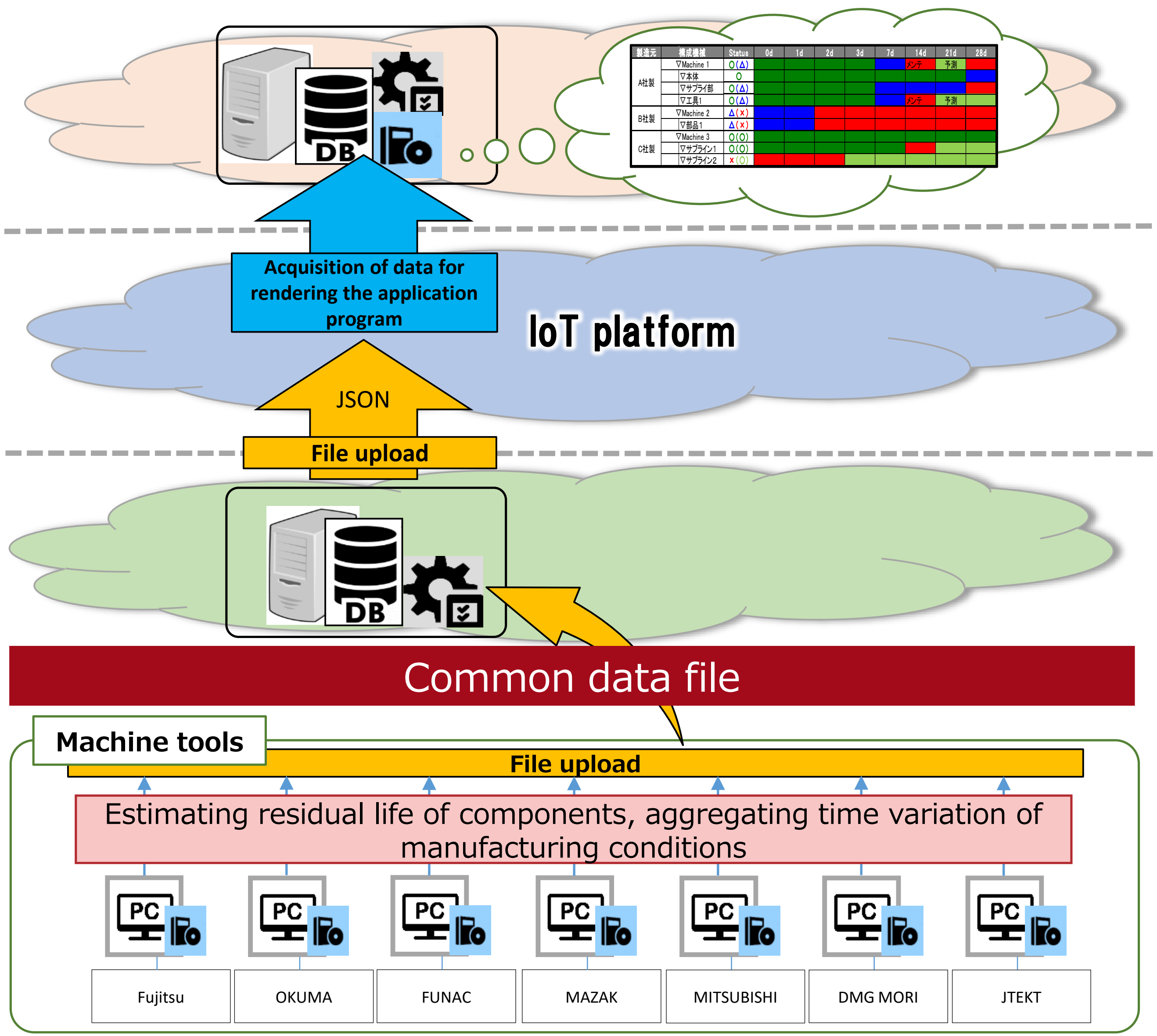

Common data items used in case 1

Index	Name	Description
0	ActivityID	Identifier for the type of activity
1	ActivityString	String explaining the contents of activity
2	SubjectID	...activity
3	Subject...	... of activity
4	ObjectI...	...ctivity
5	ObjectS...	...of activity
6	Time	The time the activity is executed.
7	ClockID	Identifier for the clock which is used in the activity
8	ClockString	
9	MaintenanceItemID	
10	MaintenanceItemString	
11	MeasuredValue	
12	MeasurementMethod	
13	ResetValue	
14	MaintenanceMethod	
15	ThresholdValue	
16	ThresholdSettingMeth...	
17	ComputedMaintenance...	
18	ComputationMethod	

Common data items used in case 2

Index	Name	Description
0	DataID	Identifier for the data itself.
1	DataGenerationTime	The time when the data file is created.
2	MachineID	Identifier for the machine tool
3	GetTime	The time when the records of the data are obtained.
4	WorkID	Identifier for the work that is processed in the machine tool at this time.
5	TCode...	...achine shop tool
6	TCode...	
7	Seque...	...gram.
8	ToolID	Identifier for the tool used at this time.
9	ToolOffsetID	Identifier for the tool offset setting at this time.
10	ToolOffsetString	Detailed description of tool offset setting.
11	WorkOffsetID	Identifier for the work offset setting.
12	WorkOffsetString	Detailed description of work offset setting.
13	ProgramID	Identifier for the machine tool program.
14	ProgramString	Description of machine tool program.
15	OperationStatus	Operation status of the machine tool at this time

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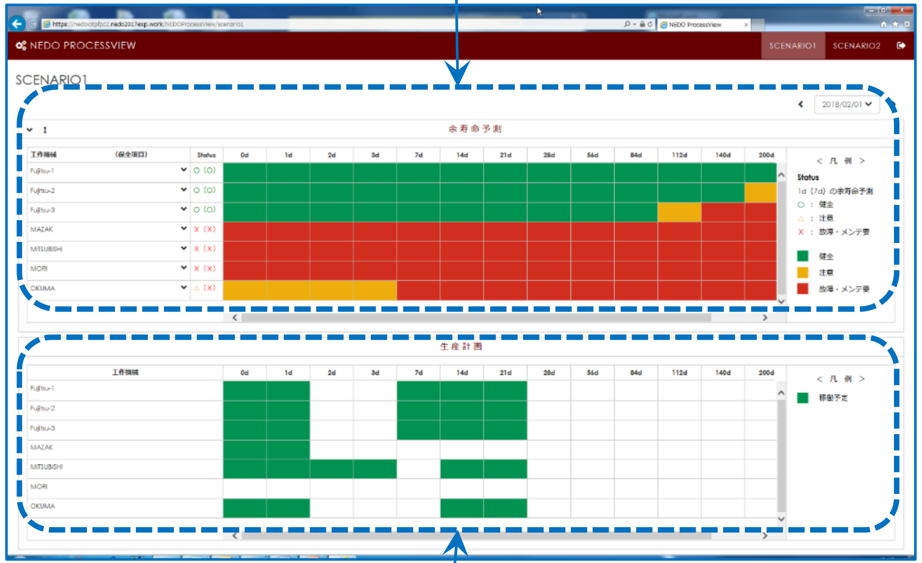
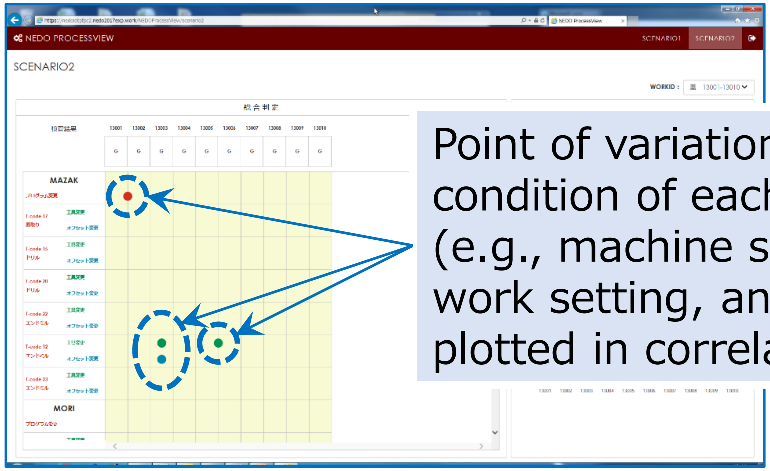
Case 1: Web application program for planning and scheduling of machine tools

Residual life of each component of machine tools over multiple sites over different stakeholders is indicated.

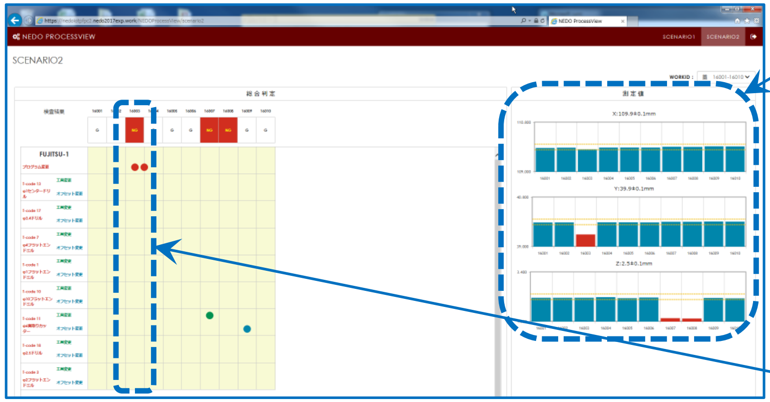


Task assignment of each machine tool for next six months is also indicated so as to determine optimal maintenance schedule considering their availability.

Case 2: Web application program for quality control with sufficient traceability of production data



Point of variation in production condition of each machine tool (e.g., machine shop tool conditions, work setting, and NC program) is plotted in correlation with works.



Inspection result of each work.

Interrelationship between the quality of work and point of variation in production condition can be found.

A part of this work is based on results obtained from a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO).