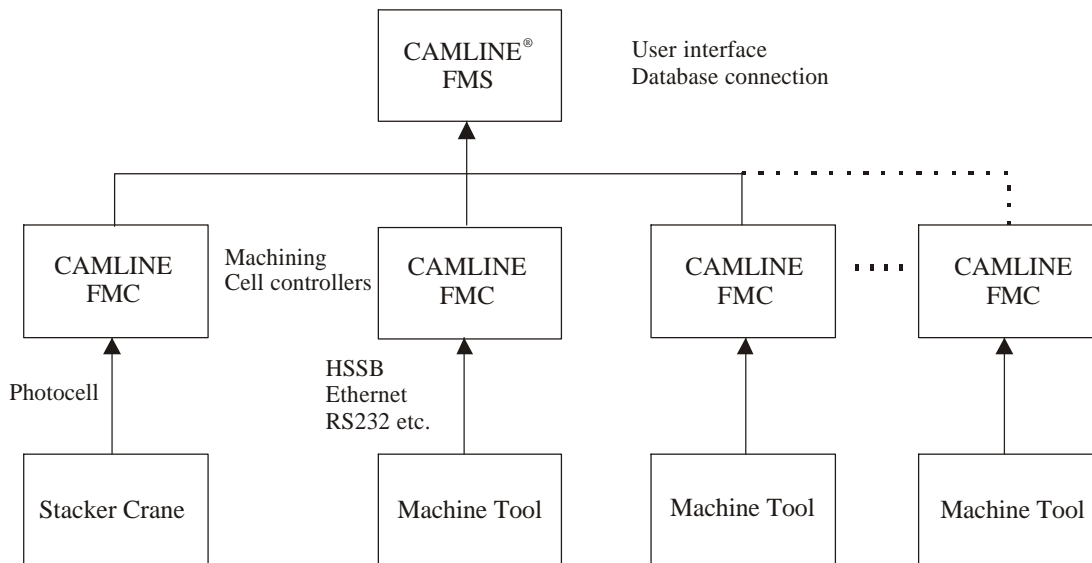


CAMLINER[®] FMS -System description

CAMLINER[®] FMS is a modular PC-based FMS system control concept. This is a basic description of system configuration and functionality. Various options must not be installed in all applications and also customer specific functions can be added as negotiated.



Hardware

CAMLINER[®] FMS consists of a stacker crane, rack, palette (machining and material) handling stations and material automation and computer control system.

Machining pallets have a home position in the rack i.e. when stored in the rack they are always in the same rack position. Machining palette place in the rack have a sheet metal under the palette taking care of the dropping cutting or washing liquid and guiding it to a waste container.

Material pallets can be configured to have a fixed position or free position in the rack. If free position is selected, the palette is stored into the nearest suitable position when it is sent to the rack.

Computer hardware and operating system

Computer hardware consists of PC-computers with Windows 2000,NT, 98 or 95 operating system. A minimum amount of 256 MB RAM is required to run the system. System screens are designed to use 1024x768 pixel resolution.

Database server is either a company network server with minimum of 256 MB RAM or a dedicated server with 256 MB RAM. Database server options are Microsoft SQL-Server (Version 7) or Oracle. Database server must be equipped with a backup functionality. Backups are done automatically every day from the complete database and every half hour from the transaction log.

PC-workstations located at the shop floor are placed in protective cabinets.

Network cabling is CAT5 cabling enabling 10Mbit/s or 100 Mbit/s network communicating rate.

Software

PC-software consists of modular software architecture including an overall user interface program CAMLINE® FMS and cell controllers controlling various individual parts of the manufacturing system. A cell controller is a data process under windows and different cell controllers communicate with each other through the database functions.

User interface

A graphical representation of the system layout is the basic component of the user interface. This layout shows the status of the system. Pointing various sections of the layout, most of the functionality of the user interface can be carried out.

Rack contents, reserved storage places, machining palette positions can be seen on the layout. Updates to the information can be done by selecting the items on the window and filling the correct information to the appearing screens.

Cell controllers

Crane controller

Machining cell controller

Palette washing machine controller

Loading/unloading station cell controller

Material palettes

Material palettes can contain one or more article codes with description and inventory information. Each time a material palette is sent to the rack the inventory information can be verified and corrected if necessary. + and – to the existing value can be used. (Continuous inventory).

Machining palettes

Machining pallets are identified by a palette number and version. A different fixture or different number of work pieces on the fixture can make a different version of the machining palette. Each version of the palette can have the following information.

Machine tools can form a group and when palettes are on the automatic route, can it be sent either to a specific machine tool or a group of machines, which means that palette will be sent to the first available machine tool in the group.

Machining pallets have various statuses depending on the phase on the route. These statuses include:

- Empty
- Loaded. Locked
- Loaded on route
- Machined. This case there is also information of the finishing status of machining like ready or interrupted and cause of interruption.

Route in the system

Route describes the machines the palette goes to when sent to automatic route.

Started program at each machine when on the route

Programs needed at each step on the route

Programs on each machine can be downloaded with the palette or permanent on the machine controller (DNC).

Temporary programs are deleted when palette leaves the machine.



Loading/Unloading of machining pallets

On the loading/unloading cell pallets are brought automatically to the station when station is ready to accept a new pallet. Automatic pallet delivery can also be disabled for example after unmanned period it can be preferred to bring last pallet in first to check the machining quality.

If a material item code is associated with the palette version and automatic material delivery is switched on a material palette is brought to the material palette station next to the loading station. If more than one material palette are needed for machining palette loading those palettes are brought to the station in a predefined order.

A material palette for machined parts can also be brought to the other material palette station.

Ready-machined work pieces are taken from the palette, new raw material is loaded to the palette and palette can be sent back to the rack with the status of "locked" or "on route".

Reports

The system can produce various reports from the actual situation in the system. These include inventory of the storage, storage places and materials. In addition, production reports can be generated.

CAMLIN[®] WinDNC

Managing of NC-programs is carried out by CAMLIN[®] WinDNC-software package. This package includes the following functionality

- NC Editor
- Automatic/Manual file transfer. Upload/Download
- NC-program additional information management. Pictures and other information.

CAMLIN[®] ADC

A software module for measuring the efficiency of the production is included in the CAMLIN[®] FMS-product. This is a standard package CAMLIN[®] ADC, a package for automated data collection. This package includes the functionality for

- Machine utilization
- Machine availability
- Machine failure history
- Machine wait history

Tool management

A specific software package for management of tooling on a CAMLIN[®] FMS-system can be used as an option. CAMLIN[®] WinTOOL-package has the following functionality

- Tool information database, Tcode, duplo number, overall geometry, cutting times
- Tool dimension database. Actual dimensions
- Pre-setter connection. Tool geometry checking on presetting
- Magazine management
- Product management. NC-programs by product, tools by NC-program
- Tool forecast. Tools/cutting times needed for production
- Tool components, cutting values by material

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