



# Linecontrol

## System Overview

February 2009



## SMS Linecontrol Overview

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## Main Interface

The main interface serves as the placement file selection. Functions available to Linecontrol are applied to the selected file(s). Files displayed here are SMS format files.

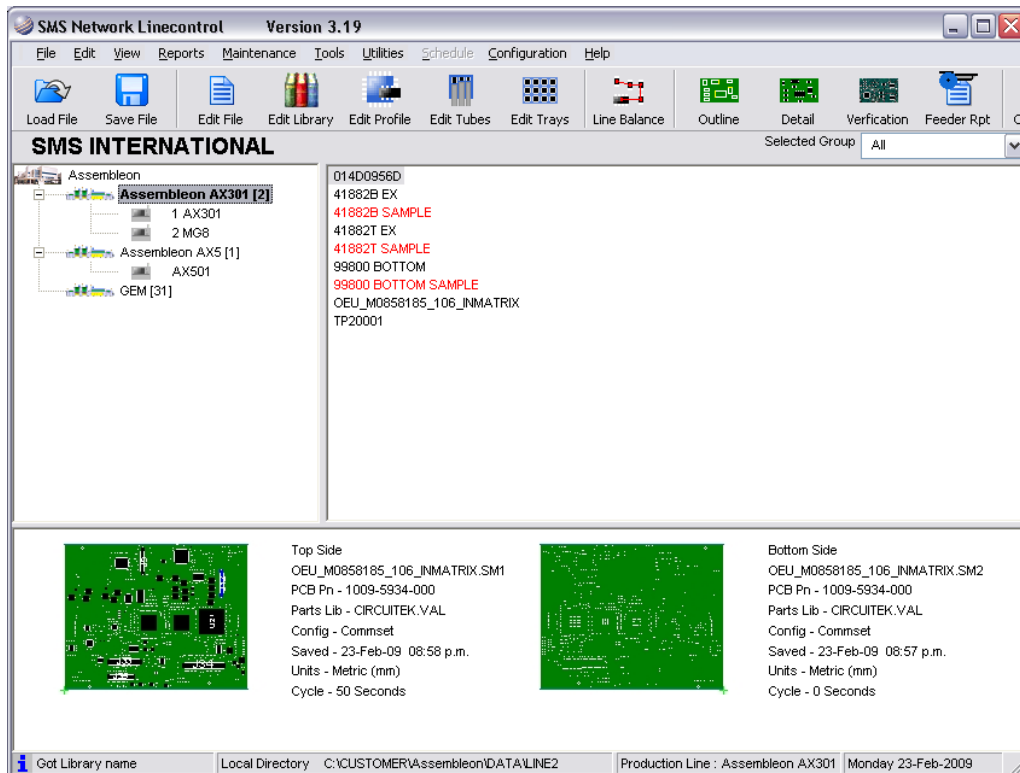
Linecontrol works with one line at a time. Each line is configured with its own machines. The placement files are only turned into machine files when needed. This allows our customers to easily move parts from one machine to another and perform simulations. SMS does not use placement file mastering. Therefore components are not tied to a specific placement machine even if the machine brands are different.

## Interface Options

- **Linecontrol Standard.** The only line shown is the one that is connected to the machines. This configuration is used on the production line and is responsible for creating the final machine programs. One installation is needed for each production line.
- **Linecontrol Network.** All the lines in a factory are available. This is used by off line programmers for data preparation. (Note. Machine programs cannot be created, it is used as an “add on” to Linecontrol standard.)
- **Linecontrol NPI.** All the lines in a factory are available. This is used by off line programmers for data preparation and creating machine programs.
- **Linecontrol Viewer.** This is a read only version. It allows people who are not involved in direct production to view and print various outputs such as feeder reports and overlays. They cannot save any changes. (Note. we also recommend read only network rights.)

See “Linecontrol System Options” chapter for more details.

Linecontrol Network with the Line selection and Information window is shown



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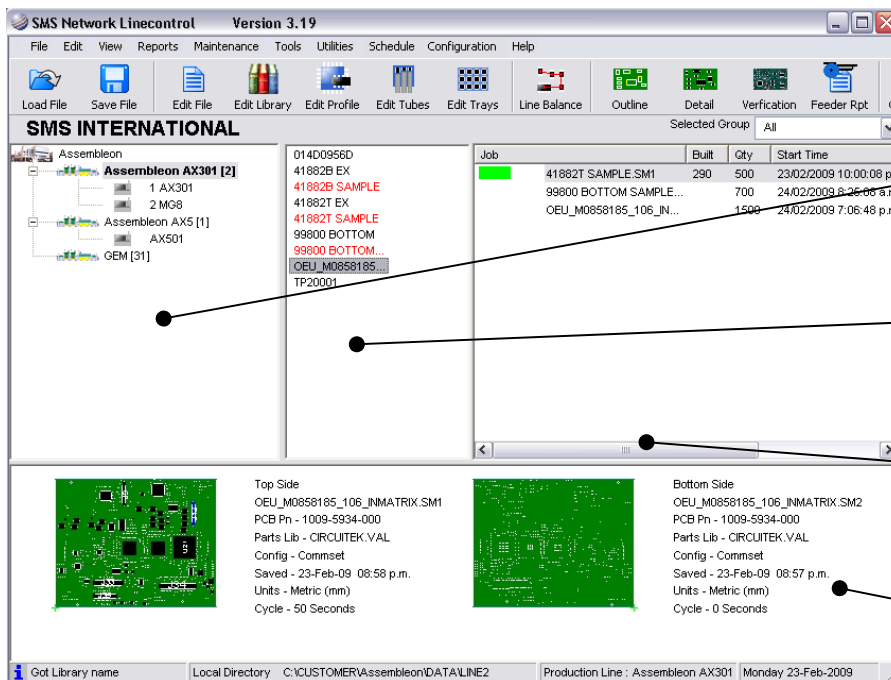
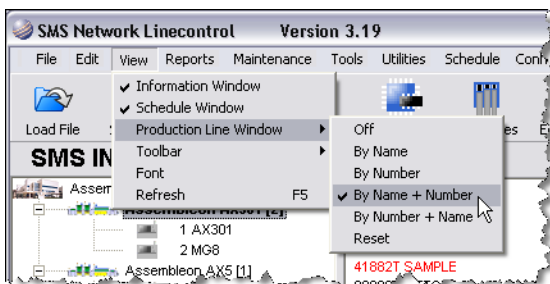
## Display Options

From the main interface screen different job display options are available:

- Colors can be used to signify file conditions.
- Status of a file can be set, then Linecontrol can be configured to only see the allowed status
- Files can be part of a named group. When the group name is selected only those files named in the group will be displayed.
- Locked files can be displayed as bold text.

## Window options

- Placement Files. All placement files are displayed for the current production lines are displayed.
- Line sector. This is used to select production lines
- Information. Summary information and thumbnail picture is displayed on file selection.
- Schedule. If schedule option is enabled



Line Selection

Placement Files

Schedule

Information Bar

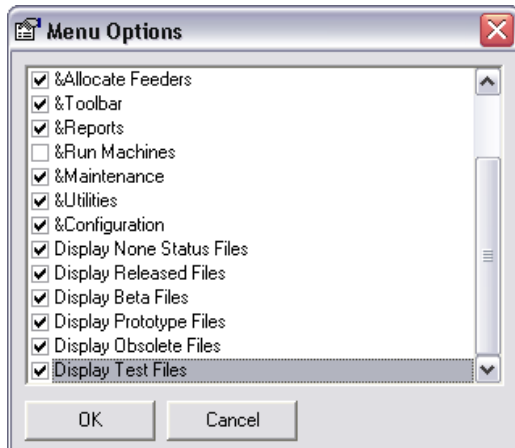
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## Toolbar and Menu Options

There may be the need to restrict users to specific functions. Linecontrol has interface configuration utilities.

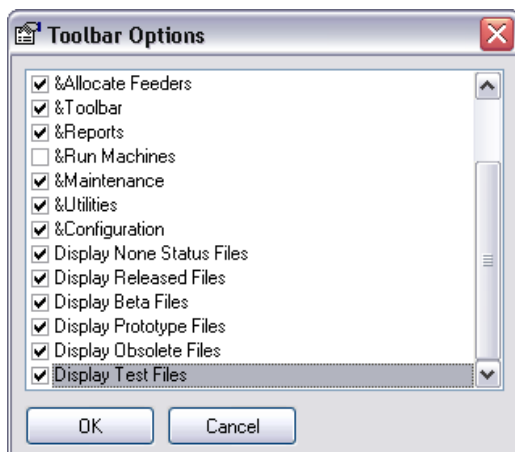
### Menu Options

Menu items can be turned off restricting access to only those permitted. File status options are controlled here also.



### Toolbar Options

The shortcuts on the toolbar can be customised to suit the specific requirements of the individual installation



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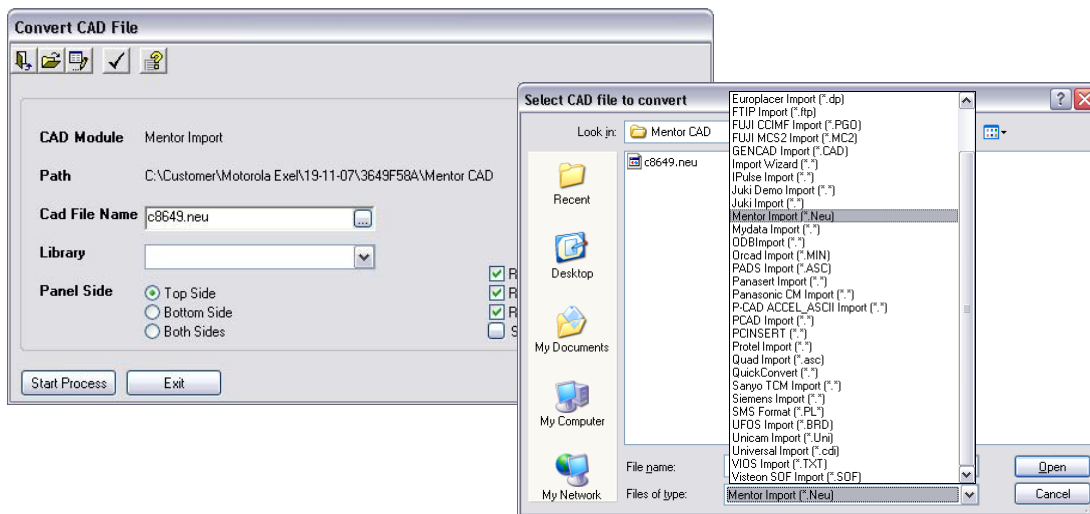
## Importing Data

Data is imported into Linecontrol using the following methods.

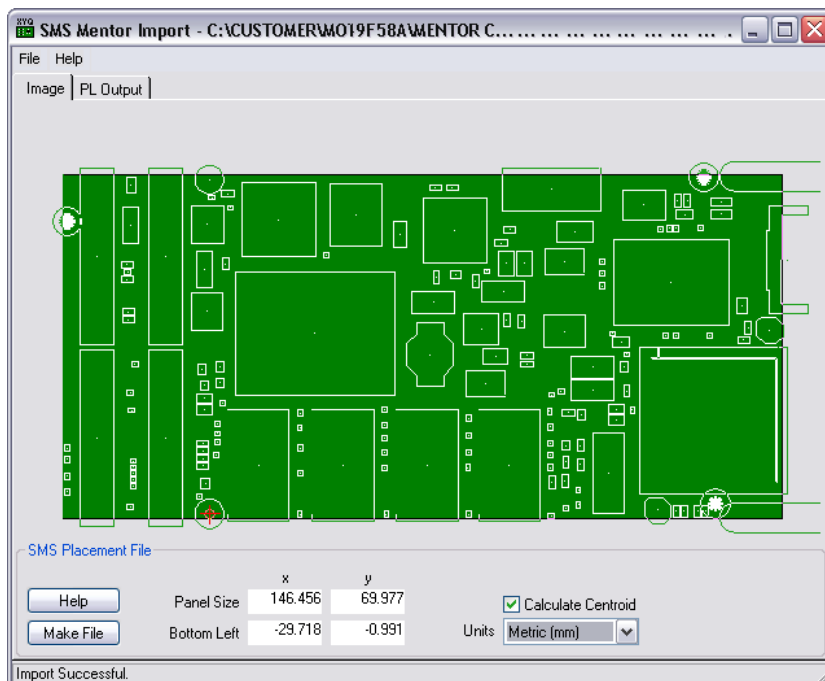
### CAD / Machine Import

Linecontrol is able to read most CAD and Machine formats automatically. If a format is not supported then a user settable import wizard can be used.

The import is started with the selection of the format and file to be converted. In this example we are using Mentor neutral file.



The cad file is displayed in graphical form. This is designed to confirm that the correct file is selected and the user can easily see if the import has worked.



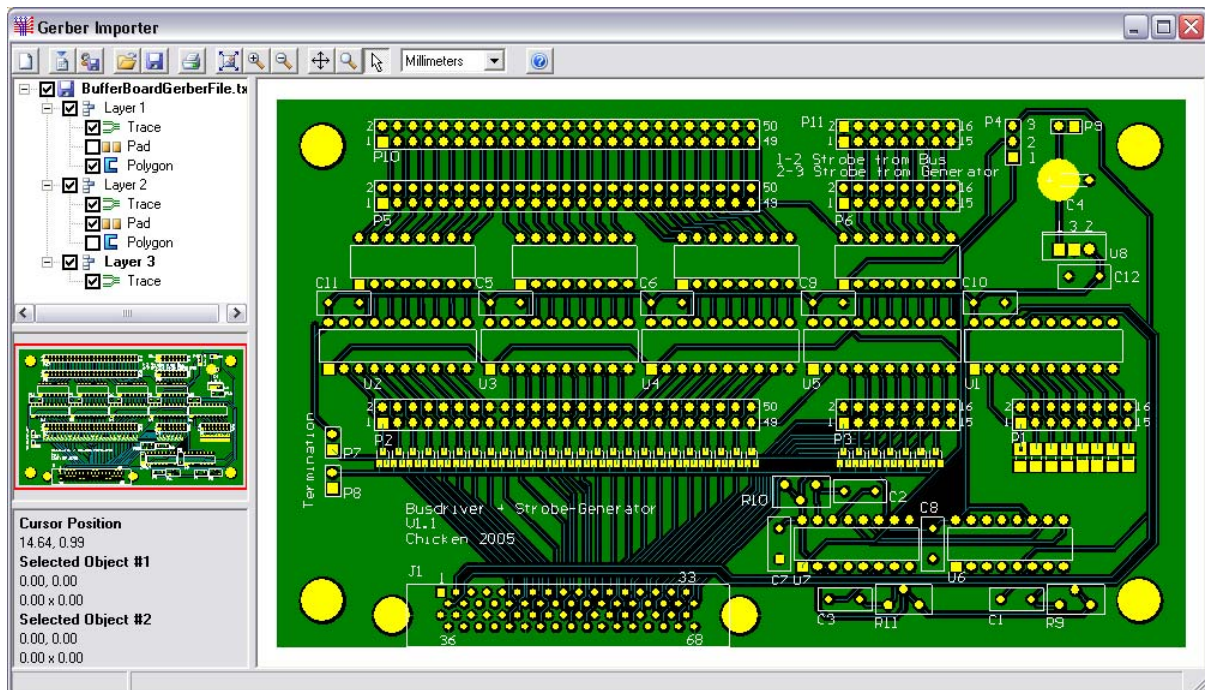
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## Gerber Import

SMS Linecontrol is able to read Gerber RS-274 and RS-274X formats. The individual layers are selected to find the required layers for component identification.

Selected data is transferred to the assembly verification system. Board measurements and shape identification tools are used for centroid extraction.

The importer can also be used as a Gerber viewer. Measurements of pads and fiducials can easily be done using the snap and edge finding tools.



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## BOM Wizard

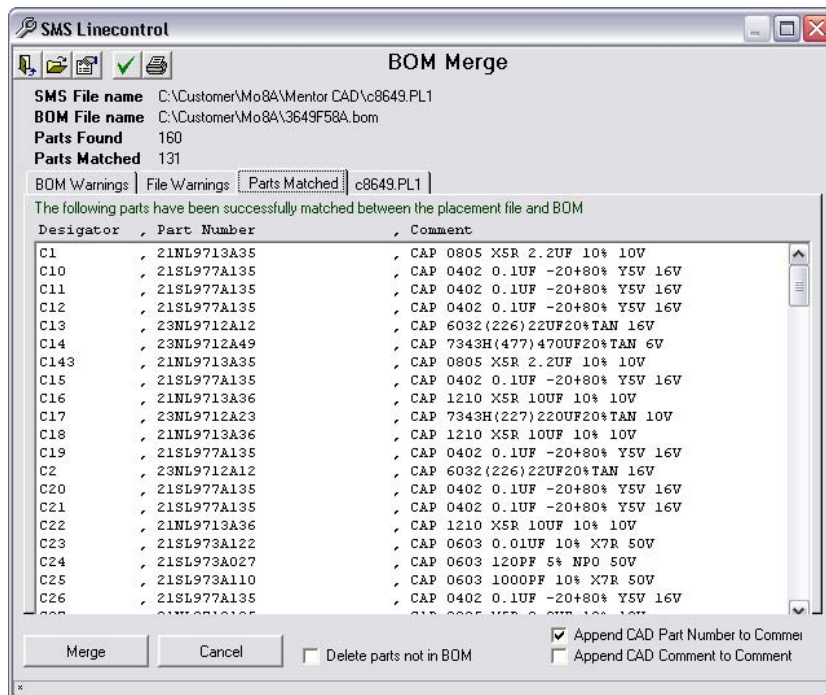
The option to import a BOM file is made available either directly after CAD import or can be done later as a separate process.

In Linecontrol we have a user settable wizard. This is able to cope with most BOM files. There is an option to have a fully customised importer or the BOM can be supplied in SMX format.



## BOM Merge

The option to merge a BOM file is made available either directly after BOM import or can be done later as a separate process. This process examines both the placement file and the BOM, it then reports differences. The user then has the choice of what to accept.



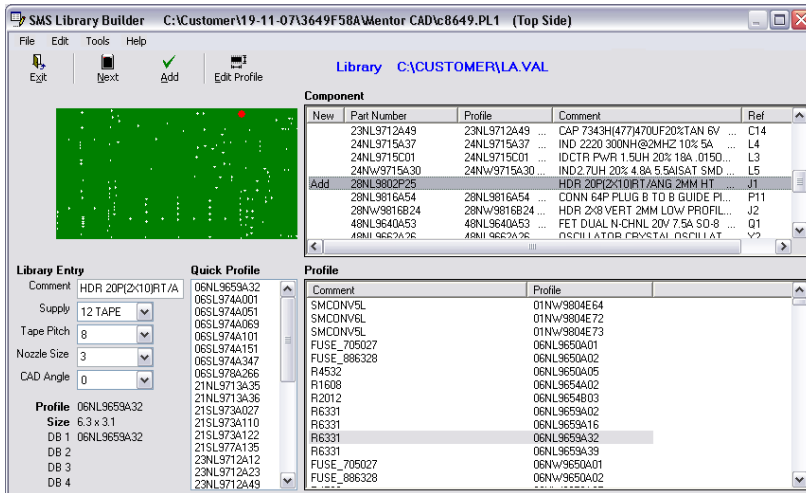


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## Auto Library Build

The option to auto library build is made available either directly after CAD import or can be done later as a separate process.

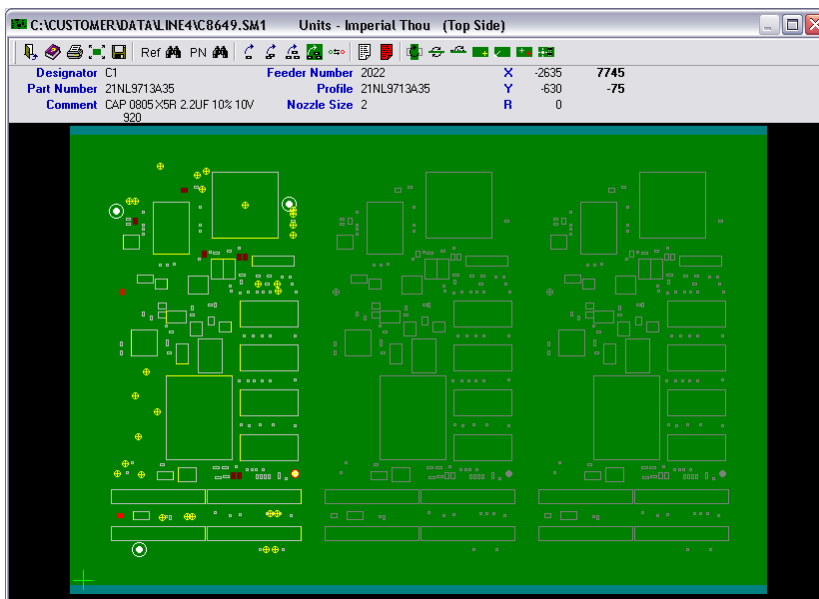
In this process any parts that are unknown to the system are flagged. The user then chooses the correct shape to associate to the part. If the CAD designers use standard part shape names then this process can be fully automated.



## Panel Correction

For the final step of CAD import, the imported board is displayed graphically. In this window you can rotate components, rotate the panel, mirror the panel, set origins, etc.

This process will ensure the correct information is transferred into Linecontrol. The CAD file will now become a placement file as displayed in the **Main Interface**.





## Current CAD Files Imported

Module	FileType	Versions
Cadence	Any	All
GEN CAD	.CAD	All
Mentor	.Neu	
ODB++	Any	All
Orcad	.MIN	Tested to 9200
PADS	.ASC	All
P-CAD Accel	.ASC	
P-CAD	.PNP	
PCInsert	.INS .TXT	Tested to 8.6
Protel	Pick and Place	All
Unicam	Unidat	Tested to 2.1
CAD Wizard	Any Text File	All
BOM Wizard	Any Text File	All
Custom	Any File type.	All

## Current Machine Library Imports

Module	File Type	Versions
Assembleon FCM Library	.CMP	
Assembleon AX Library	.CMP	
Yamaha Database	.TXT .YGX .ID, .FD, .MD, .BD	
Sony Database	.IPD	
Panasert MV Library	.LIB	
Panasonic CM Library		
Fuji	.PGO	
Universal	.CDI .SRFF	



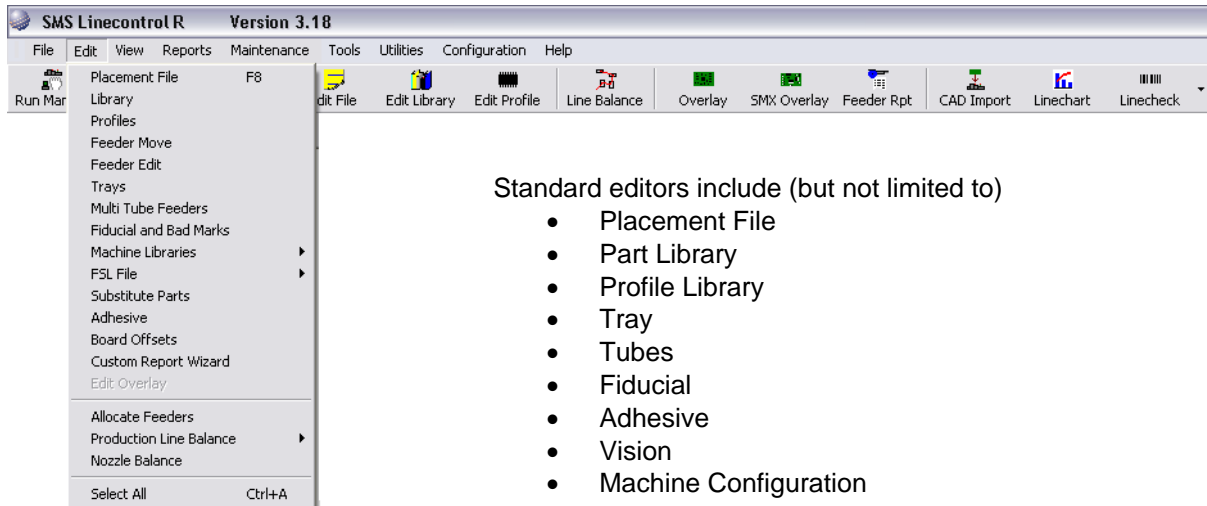
## Current Machine Files Imported

Module	FileType	Versions
Assembleon ASP Import.exe	FCM .ASP	Syntax 2, 3 and 4
	ACM .ASP	Syntax 2 and 3
Assembleon PP Import	XML .PP	All
Assembleon FTIP Import	.FTP	2.0
Eurolacer Import	.DP	Files do not use the version number
FUJI CCIMF Import	.PGO	Files do not have a version number
FUJI MCS2 Import	.MC2	Files do not have a version number
IPulse Import	Binary file set	1.1
Juki Import	600 series	Unknown
	700 series	All
	2000 series	All
	HLC H4H, H5H	All
Mydata Import	TPSys ASCII	2.0
Panasert Import	Panasonic .POS, .SET	Files do not have a version number
Maihime Import Panasonic CM series machines	No extension	All
Quad 4C Import	Autoprogram BRD????XX.DIR	Unknown
Samsung SSA	.SSA	
Sanyo TCM Import	NCZ and NCX files	1 to 9
Siemens Import	Unix QD Text	1.15
Siemens SiplacePro	API	2.1, 3.2, 4, 5
Sony EFG Import	.NCA file set	E1000, E2000 series, F Series, G Series
Sony SSU Import	.NC file set	
Universal CDI Import	.CDI	Version 1
UFOS Import Yamaha/Assembleon	.BRD	Versions up to V532
VIOS Import Yamaha/Assembleon	VIOS Text .TXT	All Versions
Yamaha YGX Import Yamaha/Assembleon	YGX	All

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## Editing Functions

Linecontrol has many standard editing functions. They are selected either from the menus or toolbar.



Standard editors include (but not limited to)

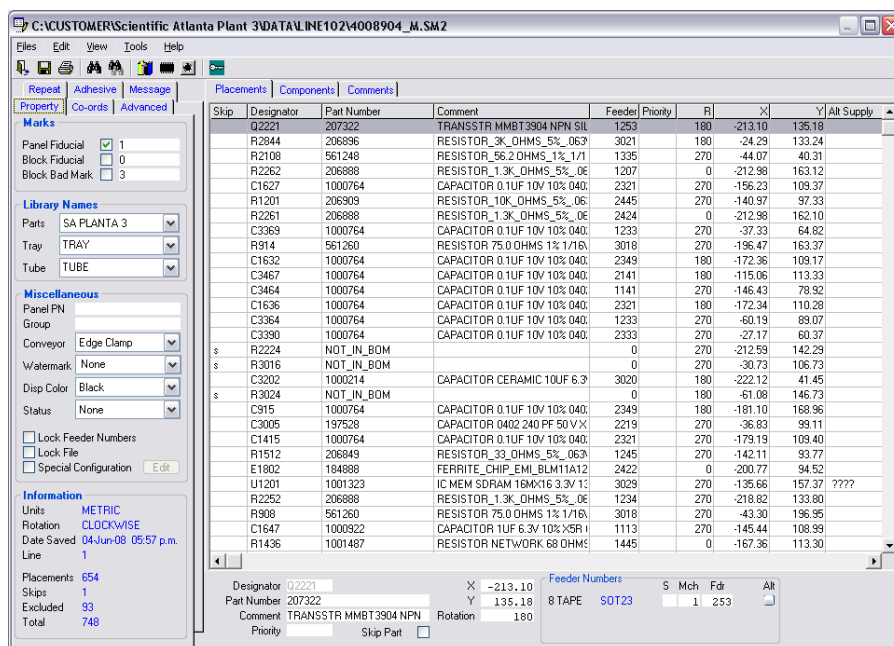
- Placement File
- Part Library
- Profile Library
- Tray
- Tubes
- Fiducial
- Adhesive
- Vision
- Machine Configuration

## Placement File

Data Specific to the assembly is stored here.

For example:

- Placement coordinates.
- Feeder numbers
- Parts Library name
- Tube and Tray file names
- Placement file attributes
- Fiducial Names, etc



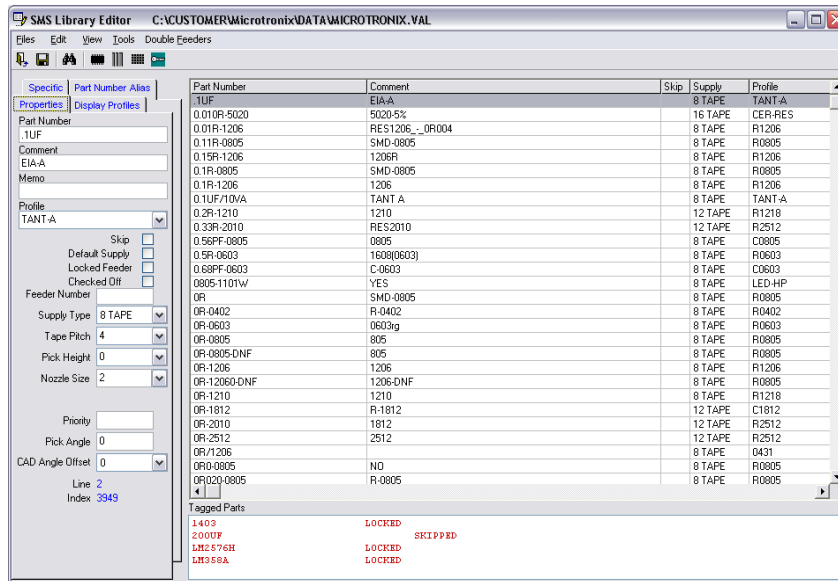
Skip	Designator	Part Number	Comment	Feeder	Priority	R	X	Y	Alt Supply
	Q2221	207322	TRANSSTR MMBT3904 NPN SIL	1253	180	-213.10	135.18		
	R2844	206886	RESISTOR_3K_OHMS_5%_063	3021	180	-24.23	133.24		
	R2108	561248	RESISTOR_56.2_OHMS_1%_1/1	1335	270	-44.07	40.31		
	R2262	206888	RESISTOR_1.3K_OHMS_5%_06	1207	0	-212.98	163.12		
	C1627	1000764	CAPACITOR 0.1UF 10V 10% 040	2321	270	-156.23	109.37		
	R1201	206309	RESISTOR_10K_OHMS_5%_06	2445	270	-140.97	97.33		
	R2261	206888	RESISTOR_1.3K_OHMS_5%_06	2424	0	-212.98	162.10		
	C3369	1000764	CAPACITOR 0.1UF 10V 10% 040	1233	270	-37.33	64.82		
	R914	561260	RESISTOR_75.0_OHMS_1%_1/16	3018	270	-196.47	163.37		
	C1632	1000764	CAPACITOR 0.1UF 10V 10% 040	2349	180	-172.36	109.17		
	C3467	1000764	CAPACITOR 0.1UF 10V 10% 040	2141	180	-115.06	113.33		
	C3464	1000764	CAPACITOR 0.1UF 10V 10% 040	1141	270	-146.43	78.92		
	C1636	1000764	CAPACITOR 0.1UF 10V 10% 040	2321	180	-172.34	110.28		
	C3364	1000764	CAPACITOR 0.1UF 10V 10% 040	1233	270	-60.19	89.07		
	C3390	1000764	CAPACITOR 0.1UF 10V 10% 040	2333	270	-27.17	60.37		
s	R2224	NOT_IN_BOM		0	270	-212.59	142.29		
s	R3016	NOT_IN_BOM		0	270	-30.73	106.73		
	C3202	1000214	CAPACITOR CERAMIC 10UF 6.3V	3020	180	-222.12	41.45		
s	R3024	NOT_IN_BOM		0	180	-61.08	146.73		
	C915	1000764	CAPACITOR 0.1UF 10V 10% 040	2349	180	-181.10	168.96		
	C3005	197528	CAPACITOR 0402 240 PF 50 V X	2219	270	-36.83	99.11		
	C1415	1000764	CAPACITOR 0.1UF 10V 10% 040	2321	270	-179.19	109.40		
	R1512	206849	RESISTOR_33_OHMS_5%_063	1245	270	-142.11	93.77		
	E1802	184888	FERRITE_CHIP_EMI_BLM11A12	2422	0	-200.77	94.52		
	U1201	1001323	IC MEM SDRAM 16MX16 3.3V 1:	3029	270	-135.66	157.37	????	
	R2252	206888	RESISTOR_1.3K_OHMS_5%_06	1234	270	-218.82	133.80		
	R908	561260	RESISTOR_75.0_OHMS_1%_1/16	3018	270	-43.30	196.95		
	C1647	1000322	CAPACITOR 1UF 6.3V 10% XSR 1	1113	270	-145.44	108.99		
	R1436	1001487	RESISTOR NETWORK 68 OHMS	1445	0	-167.36	113.30		

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## Parts library

Part specific data is stored here.

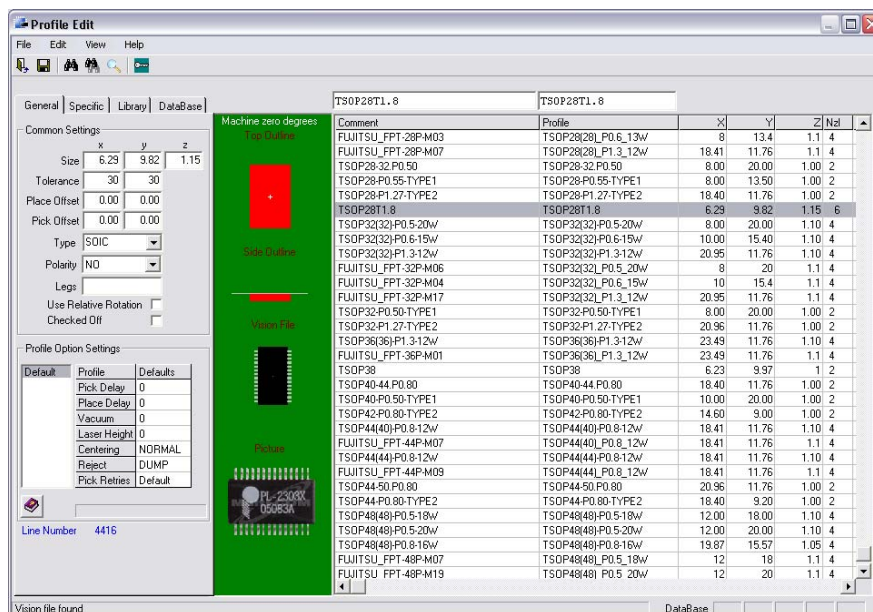
- Supply (Feeder) Type
- Tape pitch
- Pick Height
- Profile link
- Nozzle size
- Priority, etc



## Profile Library

Shape specific data is stored here.

- X, Y and Z outside component dimensions.
- Component Type
- Polarity
- Machine database Links, etc

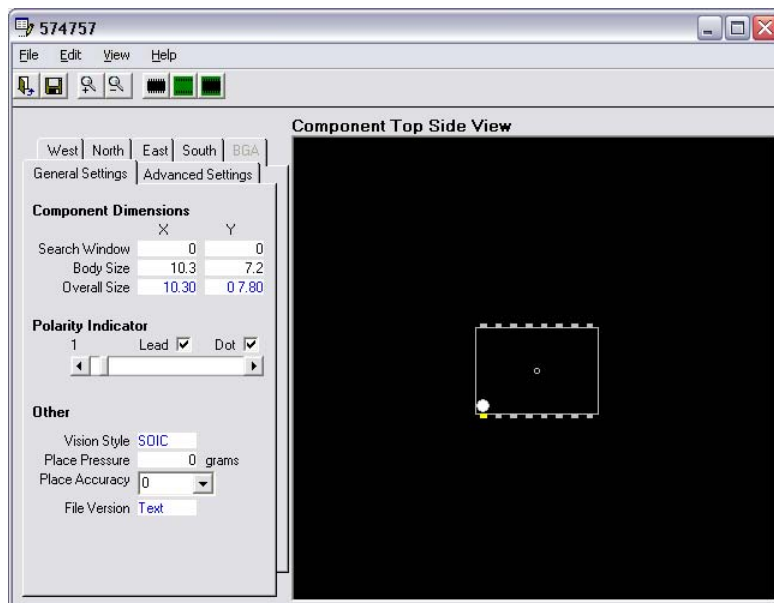


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## Vision File

Shape specific lead data is stored here.

- X and Y body size dimensions.
- X and Y Window size dimensions
- Lead dimensions and position
- BGA ball positions
- Polarity, etc

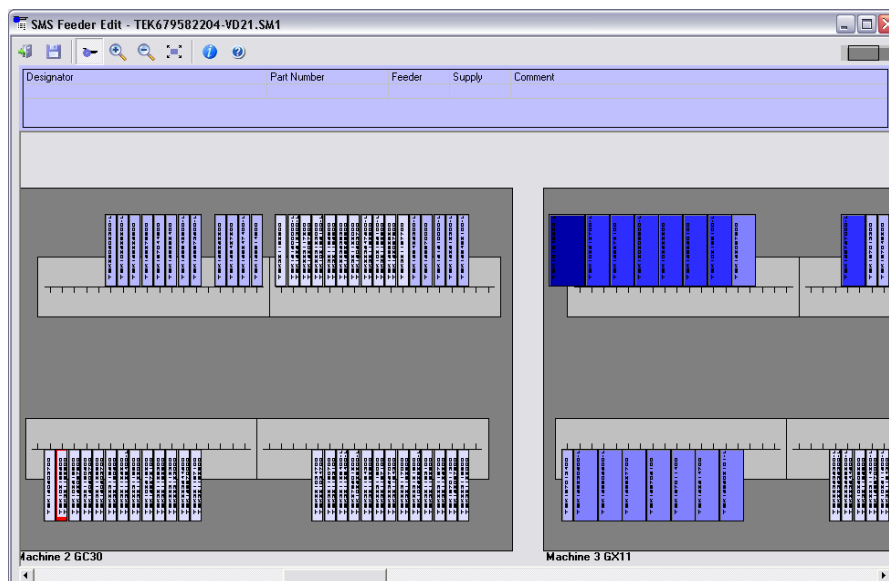


## Feeder Graphical

Feeders can be dragged from one slot to another or to another machine.

The editor supports:

- Standard Tape feeders
- Double tape feeders
- Trays
- Tubes

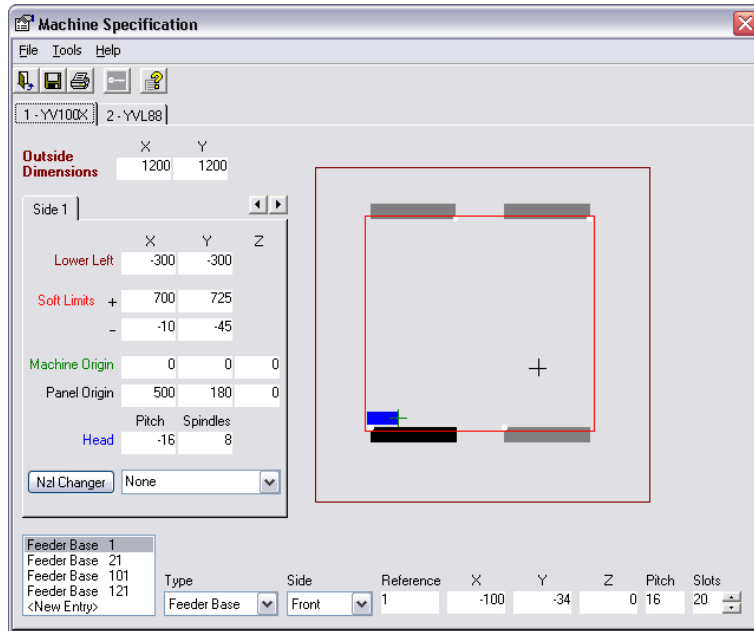


# SMS Technical Document

## Machine Configuration

Machine specific data is stored here.

- X and Y Machine outside dimensions.
- Feeder bank positions
- Soft Limits
- Head and table details, etc.
- Machine wizard can be used to set data.



# SMS Technical Document





## Alternate Supply Selection

On many occasions the same component can be supplied on Tape or Tube or Tray.  
A feature of Linecontrol is the ability to easily select alternate component supply data.

The parts that have alternate will have more than one entry in the "Parts Library". When this happens a popup window will ask how the parts are supplied.

Feeder type, Pre-rotation, and any other data will used. This screen applies to machine program generation, feeder reports and overlays.

Please select the type of feeder you are using

Ok   
  Library Defaults   
  User Defaults   
  Options   
  Print

Part Number			
1001329	<input checked="" type="radio"/> 44 TAPE, 1001329	<input type="radio"/> TRAY, 1001329	
1003356	<input checked="" type="radio"/> TRAY, 1003356	<input type="radio"/> HAND, MANUAL	
1003778	<input checked="" type="radio"/> 12 TAPE, 1003778	<input type="radio"/> TUBE, 1003778	
1003796	<input checked="" type="radio"/> 32 TAPE, 1003796	<input type="radio"/> TRAY, 1003796	
1003822	<input type="radio"/> 56 TAPE, 1003822	<input checked="" type="radio"/> TRAY, 1003822	
1003845	<input type="radio"/> 24 TAPE, 1003845	<input checked="" type="radio"/> TUBE, 1003845	<input type="radio"/> TRAY, 1003845
1003849	<input checked="" type="radio"/> 12 TAPE, 1003849	<input type="radio"/> TRAY, GFP32_P0.50-;	
1003853	<input checked="" type="radio"/> 24 TAPE, 1003853	<input type="radio"/> TRAY, 1003853	
1004076	<input checked="" type="radio"/> 16 TAPE, 1004076	<input type="radio"/> TUBE, 1004076_T	
206775	<input checked="" type="radio"/> 24 TAPE, 206775	<input type="radio"/> TUBE, 206775	

  
    
 Remember User Defaults



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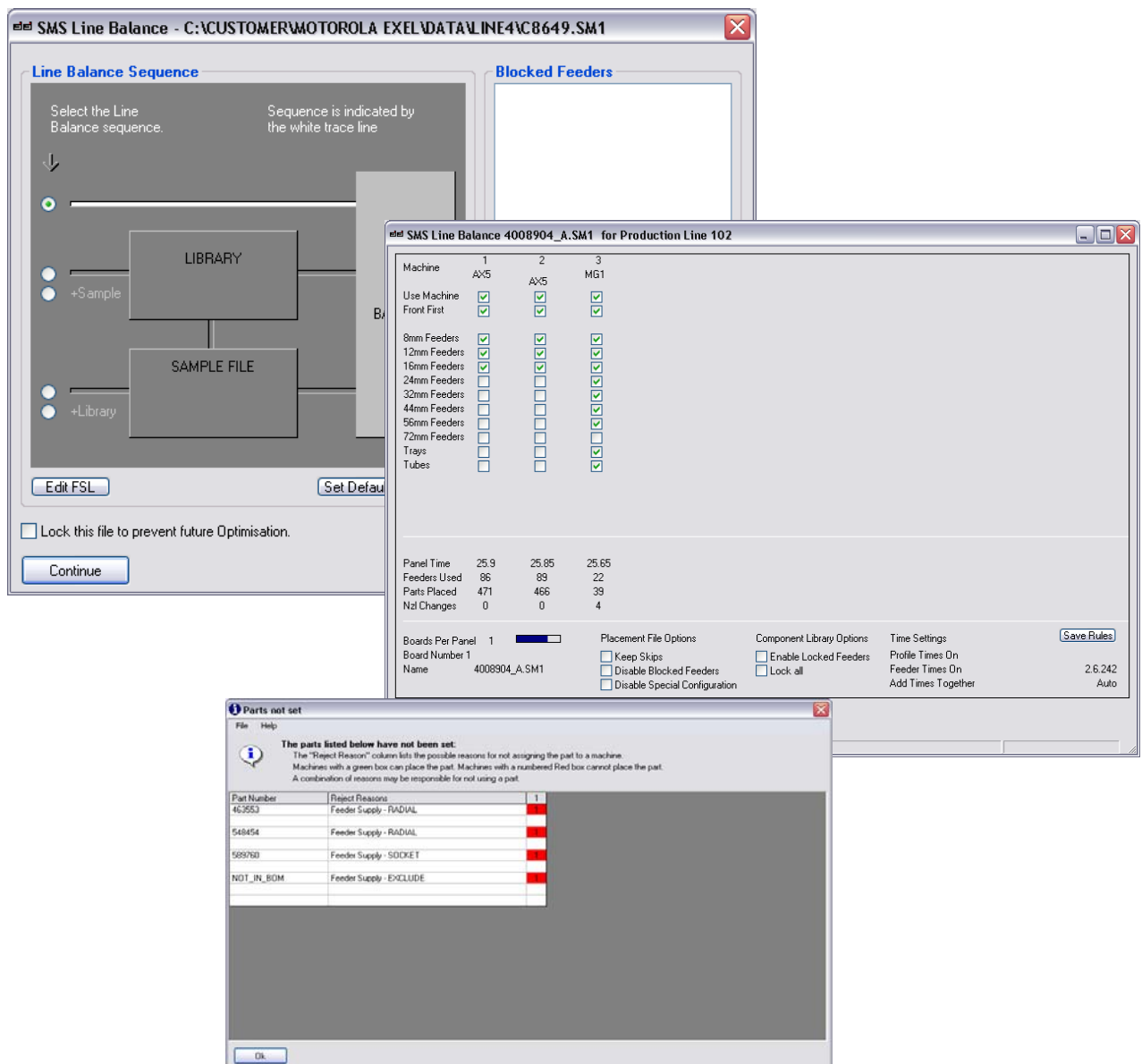
## Line Balance

This process takes a placement file and distributes the parts so that each machine in the production line will operate to the same cycle time as the other machines.

The Line balancer uses machine models as set up in the configuration settings. Nozzle settings, available feeder types, user exceptions, and priority are also taken into account.

The first screen allows selection of blocked feeders, repeat feeders and sample files. The second screen allows different feeder sizes to be selected for each machine.

When balancing is complete the screen will display for each machine; the time, the number of feeders used and the number of parts placed.



The screenshot displays three overlapping windows from the SMS Line Balance software:

- SMS Line Balance - C:\CUSTOMER\MOTOROLA\_EXEL\DATA\LINE4\VC8649.SM1**: The main configuration window. It features a 'Line Balance Sequence' section with a diagram showing 'LIBRARY' and 'SAMPLE FILE' boxes. Below the diagram are buttons for '+5 sample', '+Library', 'Edit FSL', and 'Set Default'. A checkbox for 'Lock this file to prevent future Optimisation.' and a 'Continue' button are also present.
- SMS Line Balance 4008904\_A.SM1 for Production Line 102**: A results window showing a table of machine configurations and performance metrics.
 

Machine	1	2	3
	Ax5	Ax5	MG1
Use Machine	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Front First	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8mm Feeders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12mm Feeders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16mm Feeders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
24mm Feeders	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
32mm Feeders	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
44mm Feeders	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
56mm Feeders	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
72mm Feeders	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Trays	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tubes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Panel Time	25.9	25.85	25.65
Feeders Used	86	89	22
Parts Placed	471	466	39
Nzl Changes	0	0	4
- Parts not set**: A warning dialog box with a table of parts that could not be assigned to machines.
 

Part Number	Reject Reasons	1
462553	Feeder Supply - RADIAL	<input checked="" type="checkbox"/>
548454	Feeder Supply - RADIAL	<input checked="" type="checkbox"/>
585780	Feeder Supply - SOCKET	<input checked="" type="checkbox"/>
NOT_IN_BOM	Feeder Supply - EXCLUDE	<input checked="" type="checkbox"/>

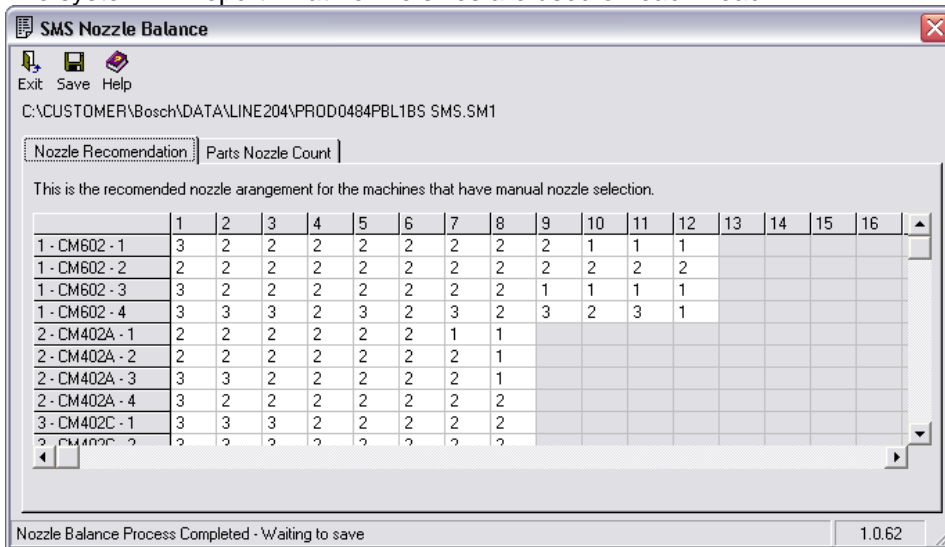
# SMS Technical Document

## Nozzle Balance

This process takes a placement file and distributes the nozzles so that the most efficient nozzle set-up is used for each machine.

This is used for machines that require a manual nozzle change before a job starts or if nozzle auto changes want to be avoided to speed up cycle time.

The system will report what nozzle sizes are used on each head.



**SMS Nozzle Balance**

Exit Save Help

C:\CUSTOMER\Bosch\DATA\LINE204\PROD0484PBL1BS SMS.SM1

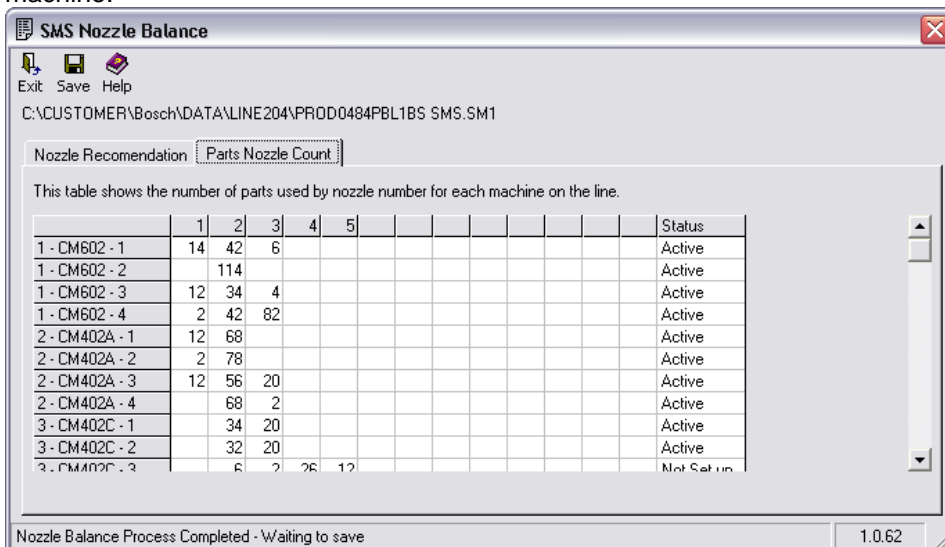
Nozzle Recommendation | Parts Nozzle Count

This is the recommended nozzle arrangement for the machines that have manual nozzle selection.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 - CM602 - 1	3	2	2	2	2	2	2	2	2	1	1	1				
1 - CM602 - 2	2	2	2	2	2	2	2	2	2	2	2	2				
1 - CM602 - 3	3	2	2	2	2	2	2	2	1	1	1	1				
1 - CM602 - 4	3	3	3	2	3	2	3	2	3	2	3	1				
2 - CM402A - 1	2	2	2	2	2	2	1	1								
2 - CM402A - 2	2	2	2	2	2	2	2	1								
2 - CM402A - 3	3	3	2	2	2	2	2	1								
2 - CM402A - 4	3	2	2	2	2	2	2	2								
3 - CM402C - 1	3	3	3	2	2	2	2	2								
3 - CM402C - 2	3	3	3	2	2	2	2	2								
3 - CM402C - 3	3	3	3	2	2	2	2	2								

Nozzle Balance Process Completed - Waiting to save 1.0.62

The system will report how many parts are placed with each nozzle on each placement table on each machine.



**SMS Nozzle Balance**

Exit Save Help

C:\CUSTOMER\Bosch\DATA\LINE204\PROD0484PBL1BS SMS.SM1

Nozzle Recommendation | Parts Nozzle Count

This table shows the number of parts used by nozzle number for each machine on the line.

	1	2	3	4	5													Status
1 - CM602 - 1	14	42	6															Active
1 - CM602 - 2		114																Active
1 - CM602 - 3	12	34	4															Active
1 - CM602 - 4	2	42	82															Active
2 - CM402A - 1	12	68																Active
2 - CM402A - 2	2	78																Active
2 - CM402A - 3	12	56	20															Active
2 - CM402A - 4		68	2															Active
3 - CM402C - 1		34	20															Active
3 - CM402C - 2		32	20															Active
3 - CM402C - 3		6	2	26	12													Not Set up

Nozzle Balance Process Completed - Waiting to save 1.0.62

# SMS Technical Document

## Overlays

SMS Linecontrol uses several methods for overlay drawing. The system is constantly evolving, at the time of writing this document the following main systems exist:

- Assembly Verification
- Gerber Verification
- Outline Overlay
- Detail Overlay

## Assembly Verification

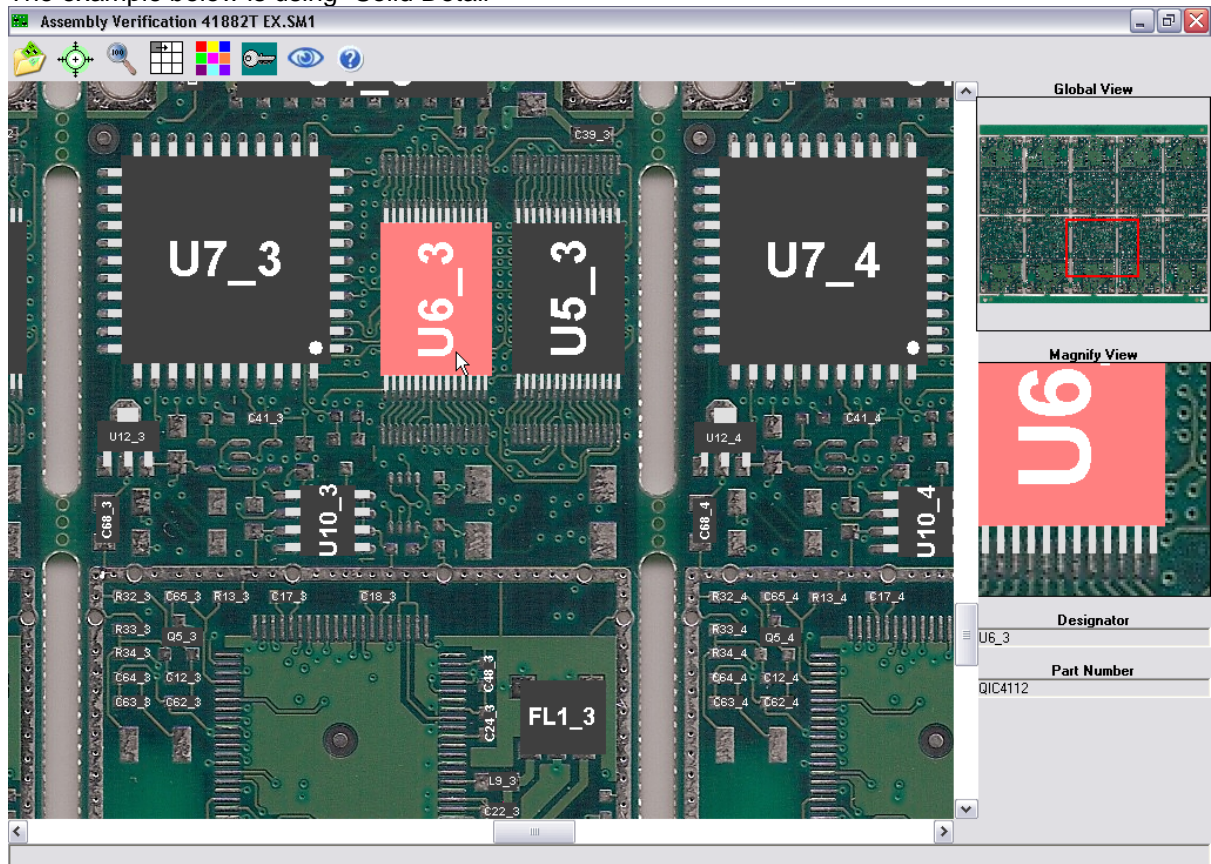
A scanned PCB is set as the background. The placement data used for assembly is drawn over the image. PCB scale rotation and warp.

The following functions are available:

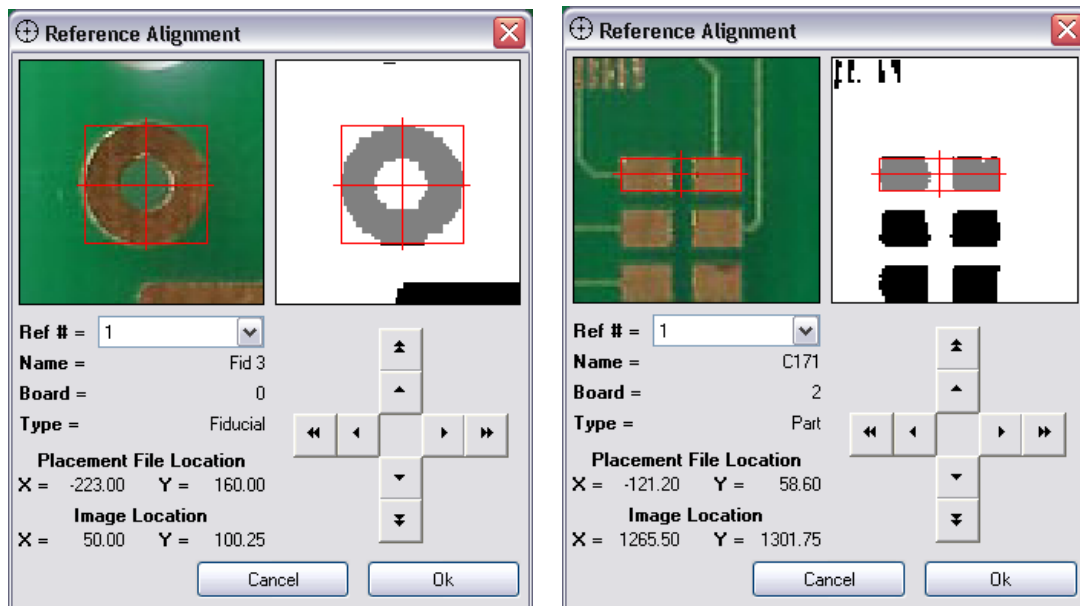
- Component positions can be checked against the PCB. Coordinates and rotations can be changed
- When components or fiducials are missing they can be taught to the scanned PCB
- Component drawings can be overlaid to produce a virtual assembly.

The following drawing modes are available; Solid Detail, Wire Frame, and Centroid

The example below is using "Solid Detail"



Fiducials and Components can be identified using vision detection processing algorithms



# SMS Technical Document

## Gerber Verification & Teaching

The same engine used for “Assembly Verification” is used for Gerber input and verification. The output from the Gerber Importer is brought in and processed.

The tool is used in the following ways:

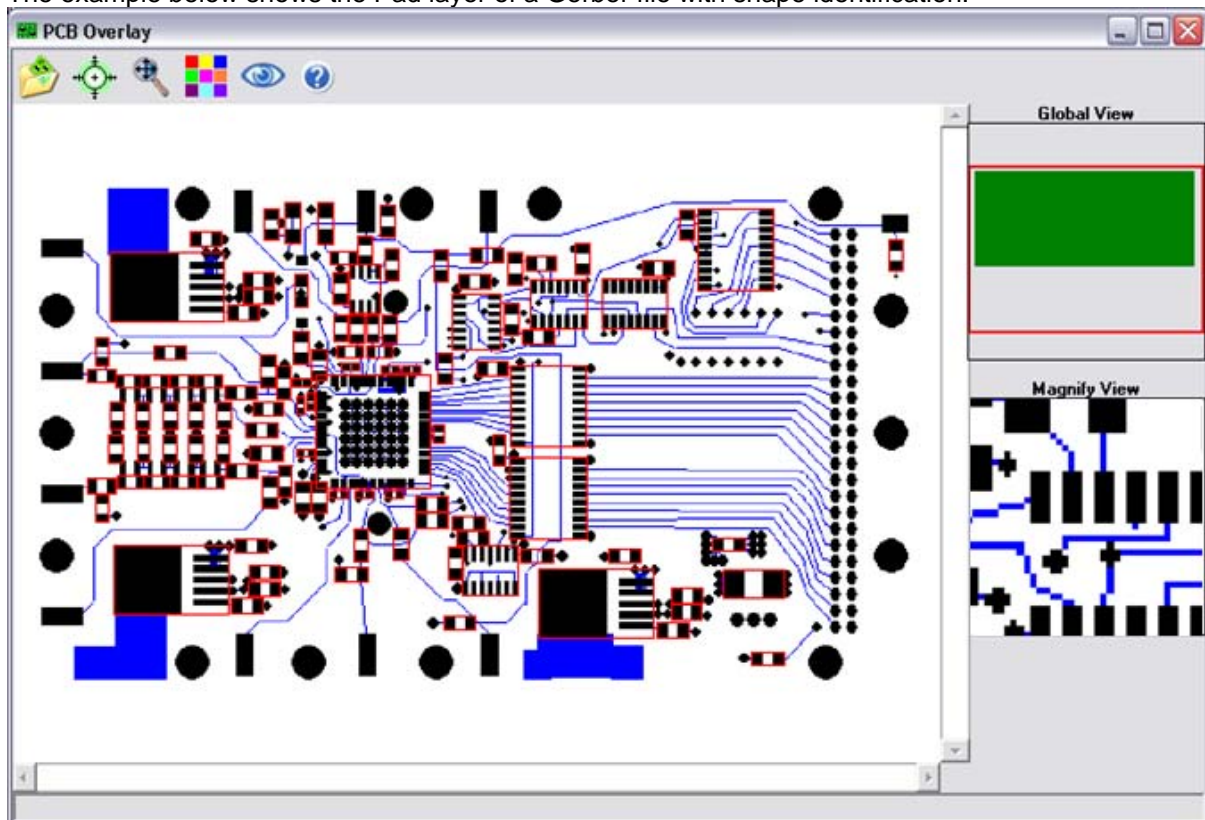
When data exists;

- The overlay of the data can be applied to the Gerber drawing.
- Component shapes and positions can be verified as being correct.

When data does not exist, the tool can become part of the Gerber importer or used by itself:

- Known shapes are identified using the shape identification system.
- Shapes not known to the system can be taught using the edge detection tool.
- Centroids are calculated from the shape rules set.

The example below shows the Pad layer of a Gerber file with shape identification.

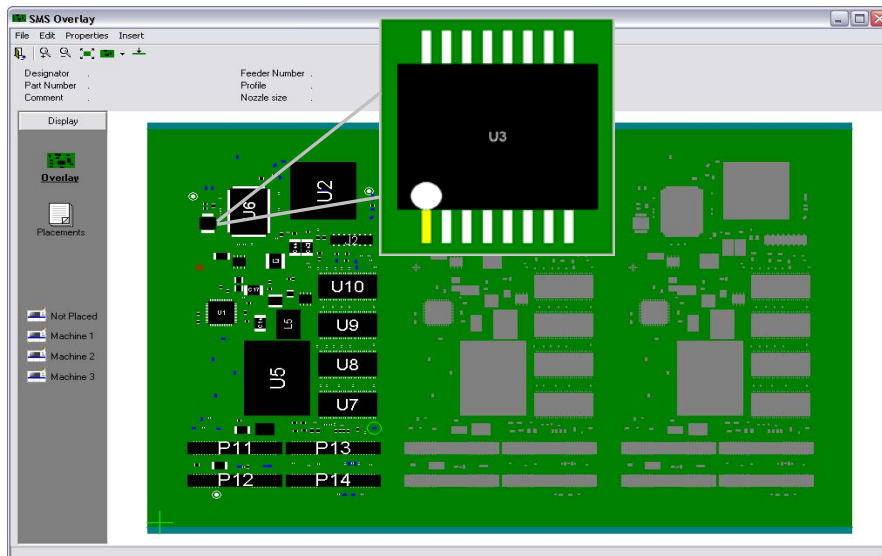


# SMS Technical Document

## Detail Overlay

This tool allows users to check that all vision registered parts are drawn correctly and are in the correct position.

Note. This tool will become obsolete because “Assembly Verification” will take over its functions. We still use it because it is very fast at drawing and still has features not yet available in “Assembly Verification”.



## Outline Overlay

This tool is the fastest drawing tool. It is used to quickly verify data and find parts quickly. It also is used for data manipulation such as rotating components and or groups of components, it can rotate and mirror the whole PCB and reset the origin correctly so machines can use the data.





# SMS Technical Document

## Reports

The examples shown here a small part of what is available.

### Feeder Report

This is used for setting up the machines.

The report is a standard format. Users can change the column order and data order. Printouts can be customised and extra data can be attached by way of a RTF file attachment.

### Custom reports

User settable reports can be generated using the report wizard. Once the report template is made the template name is called from the reports dropdown whenever the report is required, users do not see the wizard.

The examples below are user generated reports

### BOM

4008904\_M.SM2

Feeder Report - Wednesday, 4 June 2008

No. DEV	No. PARTE	DESCRIPCION	USO	TIPO DE FEEDER	ESQUEMATICOS DE REFERENCIA	PIN	MAQUINA
509	561515	RESISTOR 0603 39.2K OHM 1% 1/16W 100PPM	3	8 TAPE	R2805, R2820	2	AX5 2
510	197484	CAPACITOR_0402_1000.OPF_50V	3	8 TAPE	CS42	2	AX5 2
511	561521	RESISTOR CHIP 45.3K OHM 0603					
512	561290	RESISTR CHIP 158 OHM 0603 1%					
513	1003758	RESISTOR NETWORK 100 OHMS					
514	561392	RESISTOR 0603 1.91K OHM 1/16W					
515	561495	RESISTOR 0603 24.3K OHM 1% 1/16W					
516	206888	RESISTOR_1.3K_OHMS_5%_063					
517	206909	RESISTOR_10K_OHMS_5%_063					
518	206875	RESISTOR_390_OHMS_5%_063					
535	1000922	CAPACITOR 1UF 6.3V 10% XSR					
536	206865	RESISTOR_150_OHMS_5%_063					
537	561495	RESISTOR 0603 24.3K OHM 1% 1/16W					
538	181495	RESISTOR 0603 8.2K OHM 1/16W					
539	561354	RESISTOR_75M_OHMS_5%_0_06					
540	206886	RESISTOR CHIP 1.1K OHMS 5% 0					
541	206849	RESISTOR_33_OHMS_5%_063M					
542	207254	RESISTOR_7.5M_OHMS_5%_0_06					
543	207104	CAPACITOR 1210 10UF 10V XSR					
544	206875	RESISTOR 390 OHMS 5% 063					

### SMS Nozzle Report

6002J10432\_V01.SM2

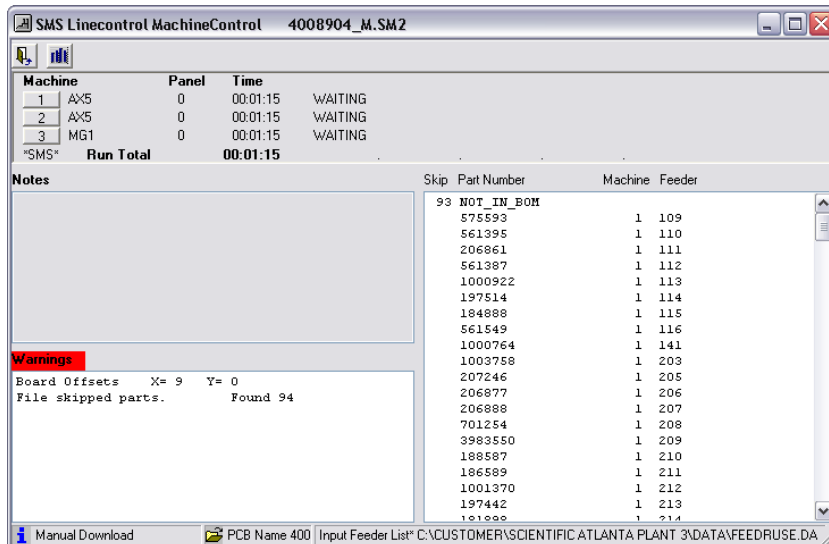
Report date - Friday, 5 September 2008

Skip	Part Number	MNo	Feeder	Supply	Hzi	Machine	Profile	VIOS	E1000	E2000	AX5	Pana HS	Pana MF
	1267375033	2	109	8 TAPE	2	CM402A	SOT143					115	1001
	1267360111		113	8 TAPE	2	CM402A	R2012_0805					115	1001
	1267360322			8 TAPE	2	CM402A	R0603_1608					115	1001
	1267360312		114	8 TAPE	2	CM402A	R0603_1608					115	1001
	1267360103		115	8 TAPE	2	CM402A	R2012_0805					115	1001
	1267370501		118	8 TAPE	2	CM402A	C1608_0603					115	1001
	3337617281			8 TAPE	2	CM402A	C1608_0603					115	1001
	1267360331		120	8 TAPE	2	CM402A	R0603_1608					115	1001
	1267360204		205	8 TAPE	2	CM402A	R3216_1206					115	1001
	8905958495		207	12 TAPE	3	CM402A	SOP08-P1_27-8.0W					120	1002
	1267360147		214	8 TAPE	2	CM402A	R2012_0805					115	1001
	1267360318			8 TAPE	2	CM402A	R0603_1608					115	1001
	1267377403		220	8 TAPE	2	CM402A	SOT23					115	1001
	1267360223		222	8 TAPE	2	CM402A	R3216_1206					115	1001
	3337617279			8 TAPE	2	CM402A	C1608_0603					115	1001
	1267360333		309	8 TAPE	2	CM402A	R0603_1608					115	1001
	1267360211		314	8 TAPE	2	CM402A	R3216_1206					115	1001
			413	8 TAPE	2	CM402A	R3216_1206					115	1001
	3337617155		414	12 TAPE	3	CM402A	SOT223					120	1002

# SMS Technical Document

## Machine Program Generation

Once the placement file is properly set-up machine outputs can be made.



In Linecontrol there are several ways to get files into machines:

- Outputs can be saved to file
- Files can be sent via RS232C
- Files can be sent via TCP/IP

For most machines Linecontrol has its own internal optimizing engines:

- Gang Pick
- Rotary Turret
- Multi Machine

## Internal Optimisation

For SMS internal optimizing engines we do all optimization on the fly. This allows us to make the actual machine files when needed (normally 30 seconds)





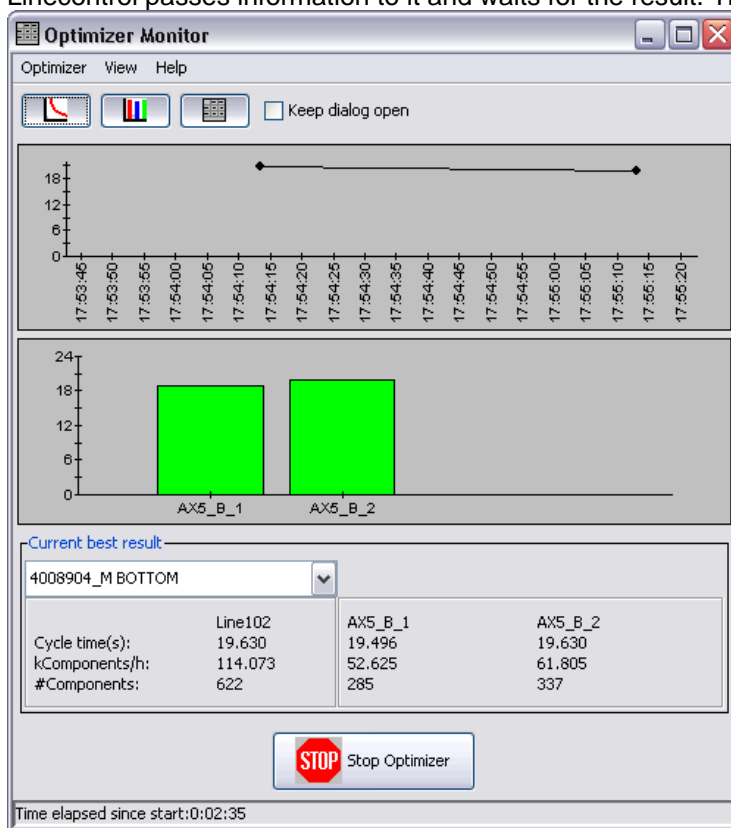
## External optimisation

For external optimization as supplied by machine manufacturers where optimization involves feeder movements such as the Assembleon Optimizer, we use 2 methods.

- Method 1. We let the optimizer set-up all aspects and then feed the new feeder set back into Linecontrol.
- Method 2. If method 1 has already been used we allow the optimizer to run with fixed feeders. This is usually used when an existing program needs to be reloaded into a machine or a small change has been made.

Below is the Assembleon optimizer interface.

Linecontrol passes information to it and waits for the result. The process is seamless.





# SMS Technical Document

## Supported machines

The table below lists current machines supported. This is a generic list, for more specific information about machine models please contact SMS or your software vendor.

Brand	Model Group	Optimisation	Output	Delivery
Assembleon	CSM	SMS gang engine	UFOS Text	Floppy disk RS232C
	GEM	SMS gang engine	VIOS Text	Floppy disk RS232C TCP/IP
	MG	SMS gang engine	YGX	Network USB TCP/IP
	AX	Assembleon Optimizer	XML PP	Floppy disk Network
	FCM	SMS FCM engine	ASP	Floppy disk
Europlacer	All models	Europlacer	Text	Floppy disk
Fuji	CP	SMS turret engine	MCS2 CCIMF (PGO)	MCS30 F4G Fujicam Flexa
	IP	SMS gang engine	MCS2 CCIMF (PGO)	MCS30 F4G Fujicam Flexa
	QP	SMS gang engine	MCS2 CCIMF (PGO)	MCS30 F4G Fujicam Flexa
	NXT	Fuji Optimiser	CCIMF (PGO)	Fujicam Flexa
	XP	Fuji Optimiser	CCIMF (PGO)	Fujicam Flexa
Hitachi	TCM	SMS turret engine		Floppy disk
iPulse	M series	SMS gang engine	i-PMS	Network Floppy disk
JUKI	KE Series	Juki Optimiser	Juki Binary	Network Floppy disk
	KM Series	Juki Optimiser	Juki Binary	Network Floppy disk
	HLC	Juki Optimiser	H4H,H5H, H6H	Network Floppy disk
Mydata	MY Series			



## SMS Technical Document

Panasert	MV	SMS turret engine	NC	Floppy disk RS232
	MPA	SMS gang engine	NC	Floppy disk RS232
Panasonic	CM Series DT Series	SMS gang engine	Maihime	PT200 Floppy disk Network
Samsung	CP Series	Samsung optimiser	SSA	EasyOLP Floppy disk Network
Siemens	Windows based	Siemens	Siplace API	Siplace Pro direct link
	Unix Based	Siemens		
Sony	E Series F Series G Series	SMS gang engine	PWB Data file set	Floppy disk RS232C
Universal	GSM	Universal	CDI SRFF	UIC
Yamaha	YM		UFOS Text	Floppy disk RS232C
	YV		VIOS Text	Floppy disk RS232C
	YG		YGX	Network USB TCP/IP



## Linecontrol Schedule Option

The scheduling tool manages start times and job durations and readjusts itself dynamically as jobs progress.

Reports can be generated to view how many parts are needed and when parts are going to run out. The reports are adjusted automatically based on actual production progress. Reports can be printed or automatically sent to other manufacturing systems that may be used.

The scheduler makes use of other data collected by other SMS software such as Linecheck and Linechart to improve its accuracy.

The following functions are available:

- Create the schedule. Jobs are dragged from the job screen to the schedule screen
- Set the schedule order. Jobs can be dragged and dropped to change the schedule order
- Start times can be set automatically or by manual input.
- Set build quantities for each job.

**SMS Network Linecontrol Version 3.19**

File Edit View Reports Maintenance Tools Utilities Schedule Configuration Help

Load File Save File Edit File Edit Library Edit Profile Edit Tubes Edit Trays Line Balance Outline Detail Verification Feeder Rpt CAD Import Linechart

**SMS INTERNATIONAL** Selected Group: All

Job	Built	Qty	Start Time	Build Time
120V TORRO YAM.SM1	600	600	10/02/2009 8:00:00 a.m.	10:50:00
525P5_ALL_SD SM1	264	400	10/02/2009 6:50:00 p.m.	05:13:20
788TKAF.SM1	0	800	11/02/2009 12:03:20 a.m.	10:26:40
829BEAV EXPAND.SM2	0	400	11/02/2009 10:30:00 a.m.	05:13:20
844-4 525P5 230V EXP...	0	700	11/02/2009 3:43:20 p.m.	09:08:20
829BEAV EXPAND.SM2	0	300	12/02/2009 12:51:40 a.m.	6:25:00
828TKAF.SM1	0	600	12/02/2009 7:16:40 a.m.	07:50:00
845-2 230V TORRO EXP...	0	900	12/02/2009 3:06:40 p.m.	11:45:00

Top Side  
120V TORRO YAM.SM1  
PCB Pn -  
Parts Lib - F&PA\_VAL  
Config - Commset  
Saved - 23-Feb-09 11:54 p.m.  
Units - Metric (mm)  
Cycle - 65 Seconds

Got Library name Local Directory C:\CUSTOMER\F&p Electronics\DATA\LINE5 Production Line : F&P FCM Monday 23-Feb-2009

## Materials Report

When the schedule has been made the materials report can be generated. This report displays what parts are being used for a job and when parts are expected to be changed.

The idea of this report is to let operators know ahead of time when feeders are likely to run out and to make sure all materials are available to complete the job

## Linecontrol System Options

Linecontrol can be configured to suit any situation.

This can range from a single machine NPI (New Product Introduction) solution to a full multiline system where all machines are monitored.

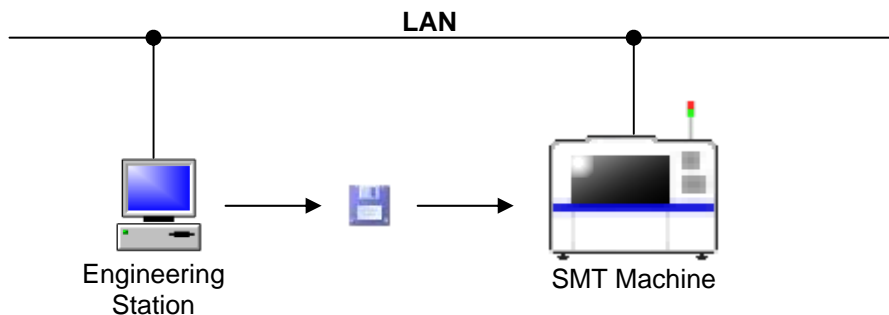
### NPI Single machine

Linecontrol is configured to program one SMT machine using an office located PC.

- Machine programs are transferred by network or floppy disk.
- Linecontrol is sold for the one machine on one line.

In the scenario shown below the following configuration is needed.

Product	Quantity
Linecontrol Entry	1



# SMS Technical Document

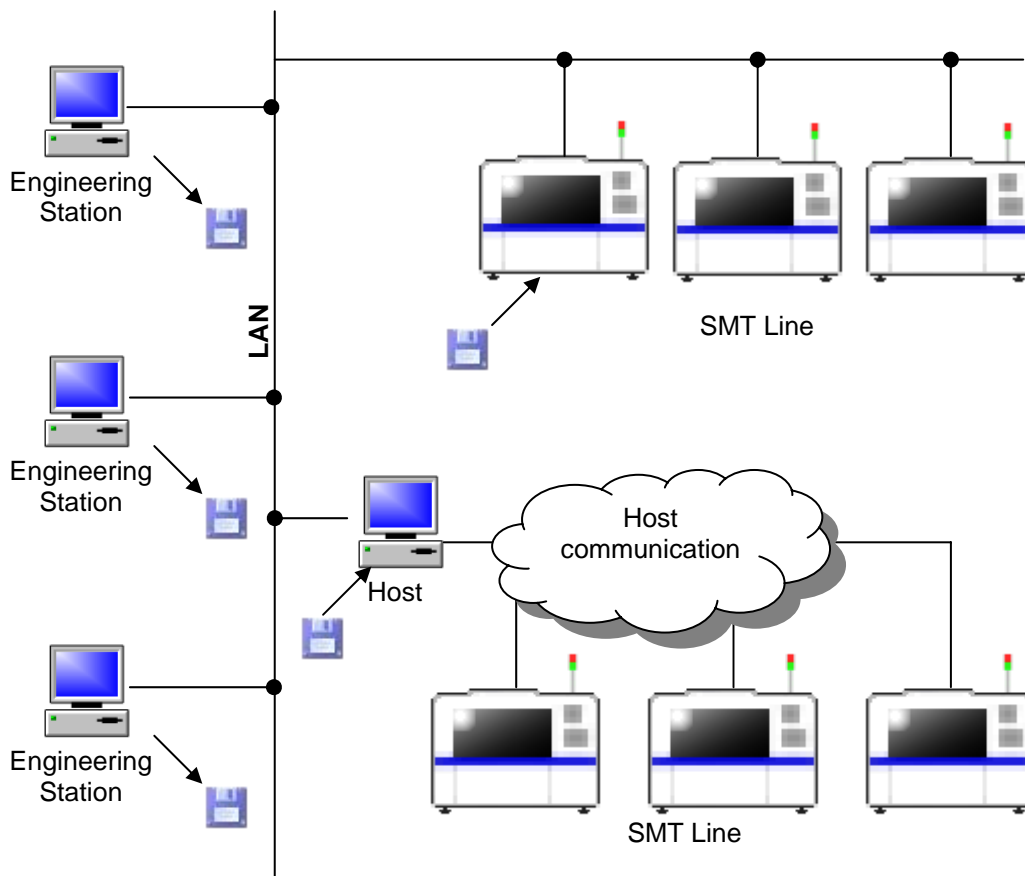
## NPI Multi-line

Linecontrol is configured to program one or more production lines from any single PC.

- Engineering stations are located at engineer's desks, this allows for data preparation away from the production lines. These PC's can see all the production lines available. Each PC is capable of producing files for any line.
- Machine programs can be transferred to machines or host by network or floppy disk.
- The Software is sold per production line

In the scenario shown below the following configuration is needed.

Product	Quantity
Linecontrol NPI	3



# SMS Technical Document

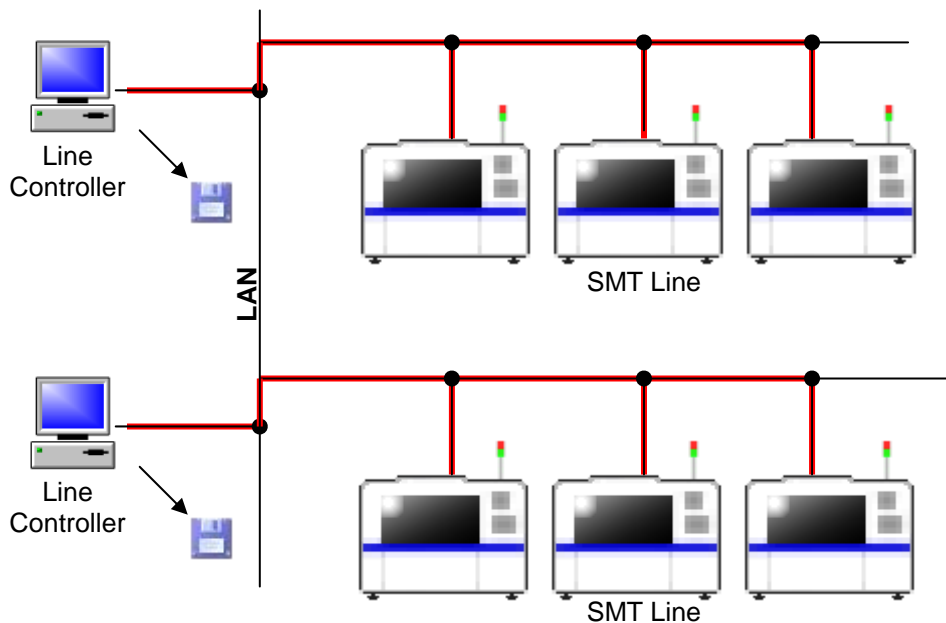
## Linecontrol Multi-line

Linecontrol is configured to program one production line from any single PC.

- The “Line Controllers” are located the production line. Each PC can see its own line. All work is done at the production line.
- Machine programs can be transferred by network or floppy disk.
- Machines can be connected using RS232 or TCP/IP if available on the SMT machine.
- The Software is sold per production line

In the scenario shown below the following configuration is needed.

Product	Quantity
Linecontrol Standard	2



# SMS Technical Document

## Linecontrol Network Multi-Line

Linecontrol is configured to program one or more production lines from any single PC.

- Engineering stations are located at engineer's desks, this allows for data preparation away from the production lines. These PC's can see all the production lines available.
- Linecontrol Viewer is a read only version. It can view files, feeder reports, overlays etc.
- The "Line Controllers" are located the production line, these PC's are responsible for the machine data generation and can only see the line they are configured for.
- Machine programs can be transferred by network or floppy disk.
- Machines can be connected using RS232 or TCP/IP if available on the SMT machine.
- The Software is sold per production line plus a network license. Linecontrol viewer is not charged for.

In the scenario shown below the following configuration is needed.

Product	Quantity
Linecontrol Standard	2
Linecontrol Network	2
Linecontrol Viewer	1

