



SMS Technical Document

Linecontrol Schedule

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Introduction

This document describes how the optional scheduling tool available in Linecontrol is used for effective scheduling of multiple jobs.

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.

Prerequisites

- The scheduling software is part of SMS Linecontrol and cannot function without it.
- Placement files that are machine ready need to have been created in Linecontrol.
- Each placement file needs to have a cycle time set. The scheduler uses this to set the total build times and start times.
- Part quantities for partial reels need to be correct. Note this is back flushed whenever a reel is replenished, actual component wastage is also added during the jobs progress.

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Schedule Screen

The normal main screen in Linecontrol is replaced with a schedule screen. The Job name, quantity to be built, progress, start time and build times are displayed. All operations that are normally available in Linecontrol are still available from this screen

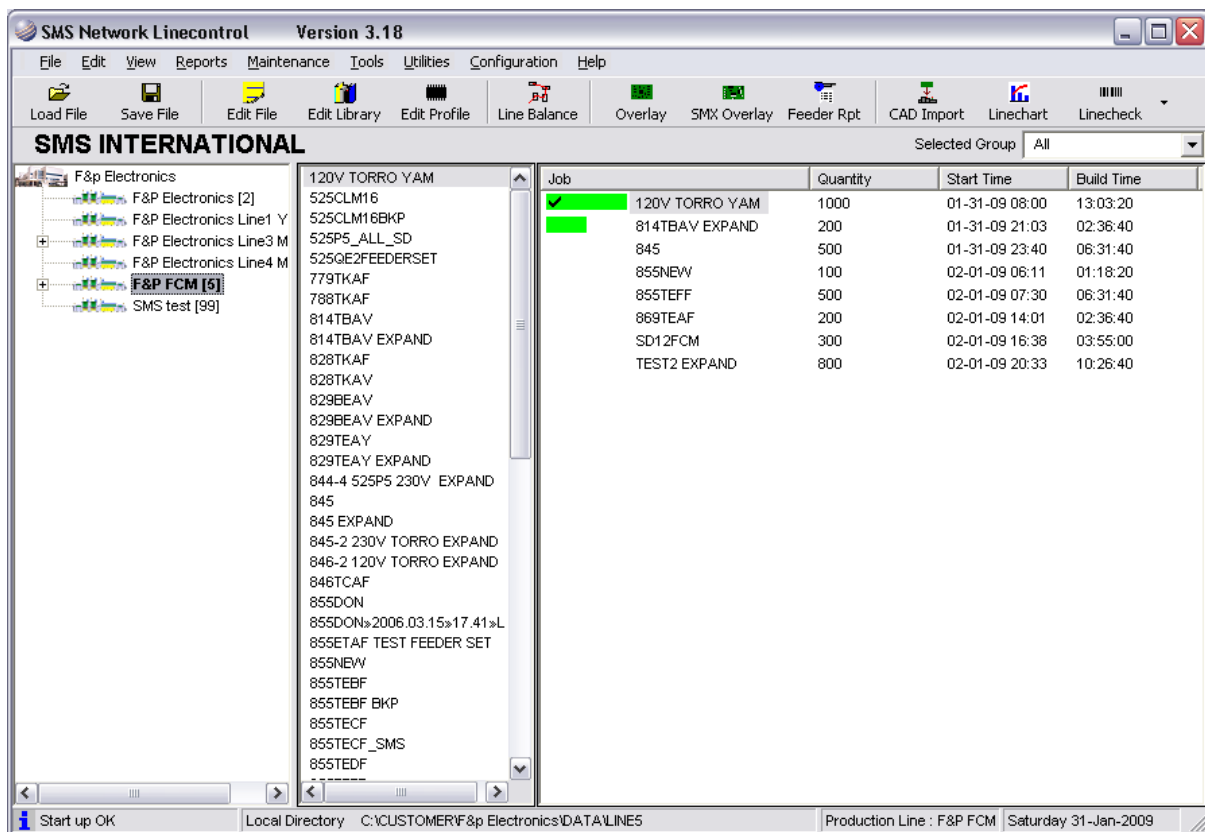
There are 2 modes available.

Supervisor mode

Supervisor mode is used to create and manage the schedules. All the functions found in Production mode are available

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.



The screenshot shows the SMS Network Linecontrol software interface. The title bar indicates 'SMS Network Linecontrol Version 3.18'. The menu bar includes File, Edit, View, Reports, Maintenance, Tools, Utilities, Configuration, and Help. The toolbar contains icons for Load File, Save File, Edit File, Edit Library, Edit Profile, Line Balance, Overlay, SMX Overlay, Feeder Rpt, CAD Import, Linechart, and Linecheck. The main window is titled 'SMS INTERNATIONAL' and shows a tree view on the left with 'F&P FCM [6]' selected. The main area displays a table of jobs with columns for Job, Quantity, Start Time, and Build Time.

Job	Quantity	Start Time	Build Time
120V TORRO YAM	1000	01-31-09 08:00	13:03:20
814TBAY EXPAND	200	01-31-09 21:03	02:36:40
845	500	01-31-09 23:40	06:31:40
855NEW	100	02-01-09 06:11	01:18:20
855TEFF	500	02-01-09 07:30	06:31:40
869TEAF	200	02-01-09 14:01	02:36:40
SD12FCM	300	02-01-09 16:38	03:55:00
TEST2 EXPAND	800	02-01-09 20:33	10:26:40

The status bar at the bottom shows 'Start up OK', 'Local Directory C:\CUSTOMER\F&p Electronics\DATA\LINE5', 'Production Line : F&P FCM', and 'Saturday 31-Jan-2009'.



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Production mode

This mode is what is used for production. Operators cannot change the schedule order or any other schedule parameters.

The following functions are available:

- Jobs are selected placement programs are generated.
- Job progress is updated either automatically or manually.
- Jobs are marked as finished.
- Materials reports can be printed for single jobs or multiple jobs.

Job	Quantity	Start Time	Build Time
✓ 120V TORRO YAM	400	01-31-09 08:00	05:13:20
814TBAV EXPAND	100	01-31-09 13:13	01:18:20
845	500	01-31-09 14:31	06:31:40
855NEW	400	01-31-09 21:03	05:13:20
855TEFF	200	02-01-09 02:16	02:36:40
869TEAF	400	02-01-09 04:53	05:13:20
SD12FCM	600	02-01-09 10:06	07:50:00
TEST2 EXPAND	300	02-01-09 17:56	03:55:00



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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

Materials Report

Board: 585_DW525_LCD_DISPLAY2 Bottom side PN: 66754 16:50, 01/29/2009

Job Start: 11:56 am, 01/29/2009 Job End: Not Started

Part Number	Comment	M	F	Current QTY	Units	Restock Schedule				
						1 11:56am	50	100 3pm	150	200
3989088	CAP CESMD 0603 10N 50V 55/125°C 10% "C0603B_BOT	3	25	50	4	●		●		●
196986	RESISTOR 0603 4.7K 1/16W 1% "R0603B_BOTTOM"	2	25	3704	2		●			
3985004	RESISTOR SMD 0603 CE 22E 0W06 1% "R0603B_BOT	3	26	803	2				●	
3985632	OBS;RES ARRAY SMD 8 22E 0W06 5% 1 "RN0003_B	1	26	3255	1	●				
197042	RESISTOR 0603 33 OHM 1/16W 1% "R0603B_BOTTOM"	2	28	2806	1					
561243	RESISTR CHIP 49.9HM 0603 1% 1/16W "R0603B_BOTTOM"	3	24	3379	1	●				
185242	CAPACITOR_CHIP_0.1UF_10 %_16V_0603	2	24	3690	1					
197046	RESISTOR 0603 47 OHM 1/16W 1% "R0603B_BOTTOM"	1	25	3678	1					
3987563	FILTER SMD BEAD 0805D 1K "R0805B_BOTTOM"	3	28	2977	3		●			●
188967	CAPACITOR 0603 1000PF 50V 10% X7R "C0603B_BOTTOM"	2	26	3424	1					
561460	RESISTOR CHIP 10.0K OHM 0603 1% 1/16W "R0603B_BOTT	3	27	21	3	●		●		●
3986840	IC SMD SSOM28 MAX3241E "SSP28B_BOTTOM"	0	0	2573	1					
3984975	RESISTOR SMD 0603 CE 330E 0W06 1%	2	27	3270	1					
197047	RESISTOR 0603 470 OHM 1/16W 1% "R0603B_BOTTOM"	3	23	3894	2			●		
561366	RESISTR CHIP 1K OHM 0603 1% 1/16W "R0603B_BOTTOM"	2	23	2606	1					
3983072	JWMD2 C MBT P40 E1AU SPR "HW40B_BOTTOM"	0	0	1135	2					●
3984966	RESISTOR SMD 0805 CE 1E 0W12 1% "R0805B_BOT	3	22	3488	1	●				
197029	RESISTOR 0603 120 OHM 1/16W 1% "R0603B_BOTTOM"	3	21	2831	1					
188933	CAPACITOR 0603 10PF 50V +/- .5PF COG "C0603B_BOTTOM	1	24	416	2				●	

Report Benefits

The materials report can be used to

- see how many parts are needed for the whole job before the job starts
- Adjust parts requirements as the job progresses. This is useful if for example partial reels of components are used for replenishment if full reels we expected.
- At the end of the job, report how many parts are left on each reel. This is important for the next job, or stores if the parts are going to be booked back. Parts wastage will be added to improve accuracy.
- If the report is saved as a file it can be automatically used by other manufacturing systems.

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Parts Consumption and Wastage

When parts exhaust Line Schedule can be used to reset parts counts and report parts wastage.

Parts consumption is tracked using feedback from the machine, board count signals. At the time of feeder change the following data is entered:

- The quantity of parts supplied.
- The sequence number (step).

This can either be done using Linecheck or manually in the schedule editor.

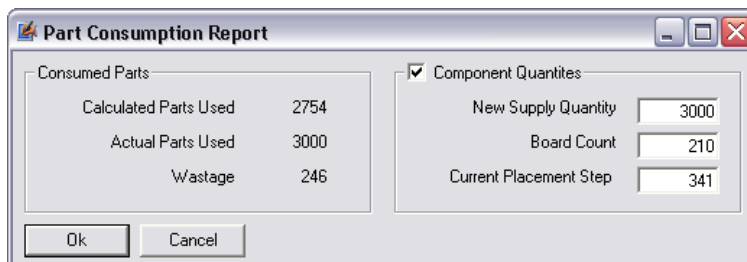
The expected usage will be calculated from the number of parts on each board multiplied by the boards built (and or partially built)

Options available

- Save to Log file
Data is saved to the placement file log file. The file will contain the; Part number, Slot number, Expected consumption, Actual consumption, difference (scrap)

```
@Define, PARTSUSED, Data, Time, Part_Number, Feeder, Calc_Used, Actual_Used, Wasted, Board_Count
PARTSUSED, 121000B, 16-07-2009, 14:01, 2-044-1, 2754, 3000, 246, 157
PARTSUSED, 322001A, 16-07-2009, 14:42, 1-022-1, 4623, 5000, 377, 178
PARTSUSED, 160011A, 16-07-2009, 15:12, 3-112-1, 3754, 4000, 246, 196
PARTSUSED, 131000B, 16-07-2009, 15:39, 3-125-1, 2433, 3000, 567, 210
```

- Data Entry Report screen
This screen allows the user to enter information for the part replenishment and see what the wastage actually is.



Consumed Parts	
Calculated Parts Used	2754
Actual Parts Used	3000
Wastage	246

Component Quantities	
<input checked="" type="checkbox"/>	Component Quantities
New Supply Quantity	3000
Board Count	210
Current Placement Step	341

If Linecheck and Linecontrol are communicating with the placement machines The component quantities may be entered automatically.

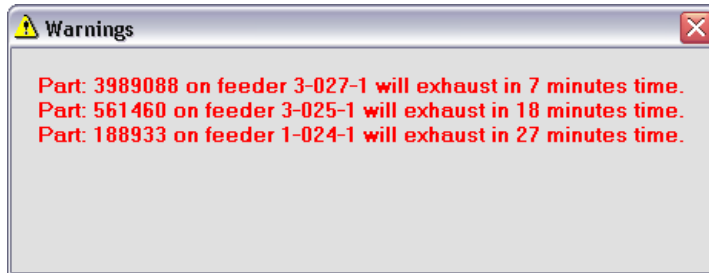
Parts consumption in this system does not use the machines wastage reporting system. The part wastage data is obtained by subtracting the "expected parts used" from the "actual parts used"

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Exhaust Warning System

An exhaust warning time can be set.

Any parts that are within the time specified will be added to the exhaust warning list. This will pop up and update the screen every time a new warning happens. The screen can be dismissed at any time.



Other Benefits

The scheduling tool can be more accurate if other software systems are in place

Linecheck

Linecheck records when parts are loaded to machines or replenished.

At the time of scanning reel quantities and the time of replacement or load are recorded. This information is used to update the schedule, improving the accuracy of the system.

Linechart Data Collectors

The Linechart data collectors record all component wastage reported by the machines. This information is used to report the actual component usage instead of the theoretical component usage.

