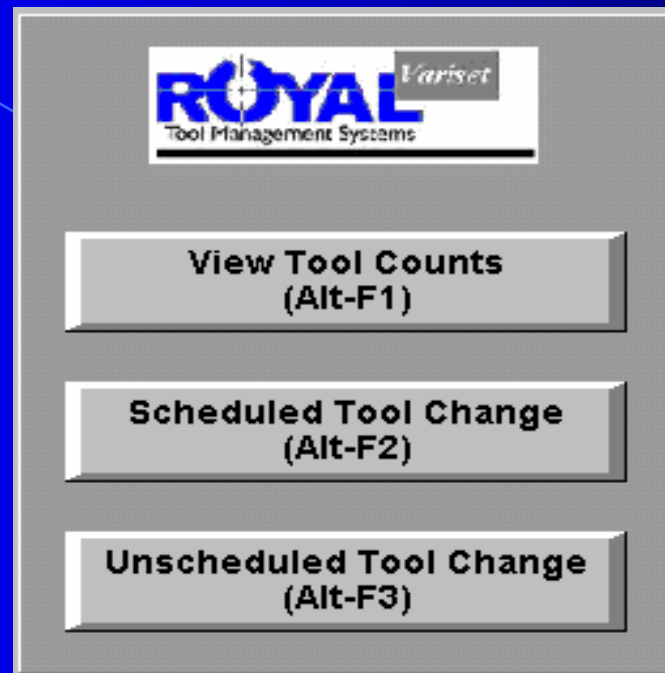


# Royal Variset III TCS



Tool Change Software for HMI's  
With Monitor Pro Interface

# Goals of Royal TCS

- Maximize Tool life
- Identify tooling or spindle problems through tool change history via scheduled or unscheduled history records
- Reduce scrap
- Reduce Tool Float
- Minimize downtime related to tooling

# The Business Side to Royal TCS Software

- Three Simple Screens
  - View Current Counts
    - Tells the operator why the Andon board light is on
    - Color coded for immediate visual interpretation
  - Record a Scheduled Tool Change
    - Not normally used with the “TPS” first part check practice. TPS requires functionality – operator screen interface- at the machine station control level
      - Royal monitors the station level logic and records the Scheduled Tool Change from this activity.
  - Record an Unscheduled Tool Change
  - The Meat is found in the Reports (history)

# How is it Accomplished?

- Every tool has an expected tool life. Each time a part is cut, a register in the PLC is incremented.
- The Royal Polling computer communicates with the PLC's every 10 minutes and updates the Royal database. The database keeps a running record of how many pieces (or cycles) each tool has cut.
- When a tool in a Dept. / Operation is coming due for change it is placed on the scheduled change list and a light is triggered on the Andon board.
- When a tool is changed and recorded in the Royal TCS software, the count is reset (in the database only – Royal does not write to the PLC – read-only) and the count for that tool is reset to zero. The Andon board is cleared.

# Start-UP

Press the F4 key to pull up the Utilities Menu

**Main Screen**  
Chrysler Powertrain  
OPERATION #20L  
08:05:59 Fri 06-09-2000

**Line Mode**  
Single Cyc

**HP COOL**

**UTIL SKID**

**RETURN ALL STATIONS ACTIVE**

**CONSOLE E-STOP** ← You are Here

**Part Status**  
Present  
E-STOP  
CLEAR

**TRANSFER**  
AUTO  
ADV  
RETD  
RAISE  
LOWER  
FAULT  
E-STOP  
GATE

**Unload Status**  
No Part  
E-STOP  
CLEAR

**Clamp Legend**  
no state  
unclamped  
clamped  
seat fault

**06:43:20 Critical: Hyd Pressure Low Active...Press Master Start** ✓

**Main Screen (F1)** **Prod Info (F2)** **Current Faults (F3)** **Utilities (F4)** **Fault History (F5)** **Controls (F6)**

# Utilities Screen

Press the F3 key to get to the Royal Menu

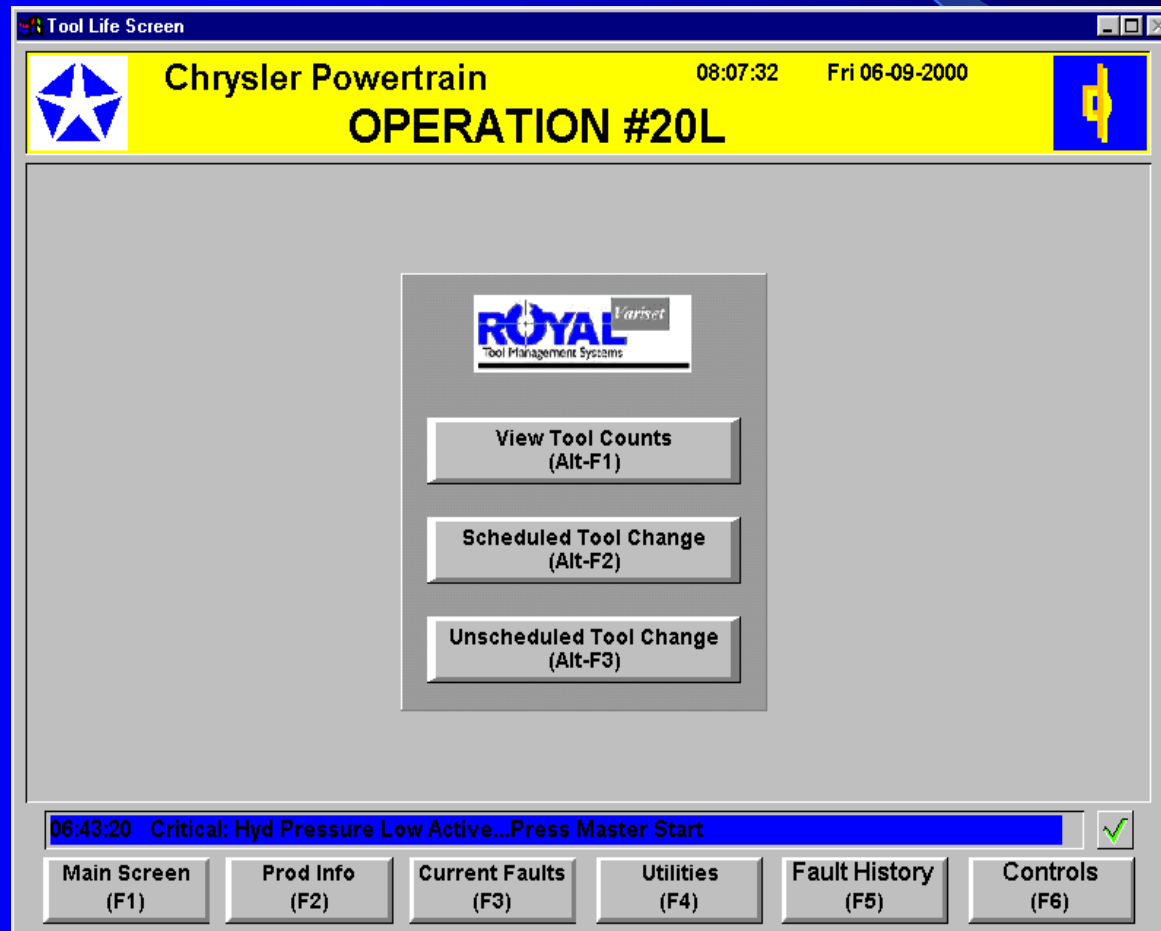
**UTILITIES**

Press the appropriate function key to view a specific utility or ESC to cancel

Fluid Status (F1)	SYSTEM (F4)
Lube Status (F2)	SHUTDOWN Monitor Pro
Tool Mgt. (F3)	Exit Utilities (ESC)
Update RTCs (F7)	Update Status: <b>INACTIVE</b> Next Scheduled Update: <b>52 mins 57 secs</b>

# The Royal Menu

You may now select from the available options.



# Current Counts Screen

The operator can view the current counts and tool life information for the current operation or the entire department

DC Mack Ave II - OP20 - View Current Life Counts

	Kit ID Tool ID	Current Count	Expected Count	Warning Limit	Last Updated	Test Tool
16	3710-0020-11LH--0801 REAM MFG	8842	10000	80%	08/23/01 13:42:58	No
17	3710-0030-03LH--CRK_SEAL 1/2 RND	1349	10000	80%	08/23/01 8:33:55	No
18	3710-0030-05LH--0BH02	8842	10000	80%	06/15/01 8:08:35	No
19	3710-0030-05LH--0BH04	1935	2000	215	01/09/01 08:48:58	No
20	3710-0030-07LH--0BH01	610	10000	80%	08/30/01 13:47:55	No
21	3710-0030-07LH--0BH03	610	10000	80%	08/30/01 13:47:55	No
22	3710-0030-10LH--000JF	9143	10000	80%	08/30/01 13:47:55	No
23	3710-0040-03LH--000FF	11734	10000	80%	08/30/01 13:47:55	No
24	3710-0040-06LH--00112	77	10000	80%	08/30/01 13:47:55	No
25	3710-0040-06LH--00113	1374	10000	80%	08/30/01 13:47:55	No
26	3710-0040-06LH--00118	4678	10000	80%	08/30/01 13:47:55	No
27	3710-0040-06LH--00120	1981	10000	80%	08/30/01 13:47:55	No
28	3710-0040-06LH--00123	1262	10000	80%	08/30/01 13:47:55	No
29	3710-0040-06LH--00126	95	10000	80%	08/30/01 13:47:55	No
30	3710-0040-06LH--CHAIN TENSIONER	77	10000	80%	08/30/01 13:47:55	No
31	3710-0040-06RH--000RF	0	10000	80%	08/23/01 13:56:52	No
32	3710-0040-09LH--000FF	823	10000	80%	08/23/01 13:56:52	No
33	3710-0040-12RH--000RB	0	10000	80%	08/23/01 13:56:52	Yes

Tool Due For Change   
Tool Overdue For Change   
Test Tool

F4 - Move cursor to listbox  
 F5 - Sort List by Color  
 F6 - Show All Tools

F2 - Done      F3 - Print Report       F11 - Un-Sched Screen  
 F12 - Scheduled Screen

# Scheduled Change Screen

This screen will display the tools for the current department and operation that need to be changed. It permits the operator to record the tools changed which resets their current counts to zero.

Kit Id/Tool ID	Date Sched
3710-0020-11LH--0001 SCALLOP #1	2001/09/29
3710-0020-11LH--0004 SCALLOP #4	2001/09/29
3710-0020-11LH--0801 REAM MFG	2001/09/29

Press F5 to enter the scrollable region.  F4 - Show All Tools  
Press F6 to toggle selection status [Ctrl-F6 to toggle all].

F2 - Process Change(s)      F3 - Cancel

F12 - Cur. Counts

# Unscheduled Tool Change

Operator accesses this screen to log unscheduled tool changes. It records abnormal tool changes, such as broken tools, tools out of specification, etc. Only a single tool can be chosen at a time.

DC Mack Ave II - OP20 - Process an Un-Scheduled Tool Change

Tool ID: 3710-0020-03LH--0000A TRANSFER LUG WIDTH

F11 - Select Multiple IDs     F6 - Show All Tools

Reason for Change: BROKEN (CAUSE CORRECTED)

Operator Name: BUTCH

Action Taken

LOOKS LIKE DRILL WAS SET TOO DEEP !  
MACHINE WAS STILL IN RAPID TRANSFER.

Press F4 to jump to Tool ID field.  
Press F5 to jump to Reason field.  
Press F7 to jump to Operator Name field.  
Press F8 to jump to Action Taken field.  
Press Alt-Down Arrow to drop a list down for selection.

F2 - Process Change    F3 - Cancel

F12 - Cur. Counts

# Multiple Unscheduled Tool Change Screen

Similar to the previous screen, it allows multiple tools to be chosen at the same time. All tools selected will have the same reason, operator, and action taken.

DC Mack Ave II - OP20 - Process an Un-Scheduled Tool Change

F6 - Show All Tools  
 F11 - Select Single ID

Tool IDs:

- 3710-0060-18LH--00315
- 3710-0060-18RH--00204
- 3710-0060-18RH--00207
- 3710-0060-18RH--00208
- 3710-0060-18RH--00209
- 3710-0060-18RH--00210
- 3710-0060-18RH--00211
- 3710-0060-20LH--00304
- 3710-0060-20RH--00204
- 3710-0070-02LH--00212
- 3710-0070-02RH--00600
- 3710-0070-02RH--00602
- 3710-0070-02RH--00604
- 3710-0070-02RH--00606
- 3710-0070-02RH--00607
- 3710-0070-04LH--00212
- 3710-0070-04RH--00600
- 3710-0070-04RH--00602
- 3710-0070-04RH--00604
- 3710-0070-04RH--00606
- 3710-0070-04RH--00607
- 3710-0070-06LH--00212
- 3710-0070-06RH--00602
- 3710-0070-06RH--00607

Total Tools: 709 Selected: 3

Reason for Change: **BROKEN (CAUSE CORRECTED)**

Operator Name: **BUTCH**

Action Taken

**MAJOR CRASH! THESE TOOLS MUST HAVE BEEN SET ON A ZOLLER PRESETTER**

Press F4 to jump to Tool ID list.  
Press F5 to jump to Reason field.  
Press F7 to jump to Operator Name field.  
Press F8 to jump to Action Taken field.  
Press F9 to toggle selection(s) (Ctrl-F9 to toggle all)  
Press Alt-Down Arrow to drop a list down for selection.

Note: All changes will have the specified operator, reason, and action taken.

F2 - Process Change(s)      F3 - Cancel

F12 - Cur. Counts

# Andon Board

Orange (amber) light is for Royal Tool Management

- Off – no tool change required.
- On (not blinking) – tool change Scheduled.
- On (blinking) tool change is overdue.



# Tool Life Reports / Actions

Royal Variset for Windows

Tool Gage Inventory Print Utilities Tool Life Help

**Process Un-Scheduled Tool Change**  
Enter Daily Counts  
Process Scheduled Tool Change  
View/Edit/Print Tool Change List

**View Current Cycle Counts**

**Print Un-Scheduled Tool Change Report**  
**Print Scheduled Tool Change Report**  
**Print Combined Tool Change Report**

**Print Un-Scheduled Tool Changes (All Depts)**  
**Print Scheduled Tool Changes (All Depts)**  
**Print Combined Tool Change Report (All Depts)**  
**Print Tools Overdue For Change (All Depts)**  
**Print Tools Due For Change (All Depts)**

**Print Excessive Tool Change Report**  
**Print Average Tool Life Report**

**Edit Expected Tool Life Values**  
**Edit Tool Life Keys**  
**Edit Unscheduled Tool Change Reasons**

**Edit PLC Address**  
**Test Tool Menu**

**Configure Special Tools**  
**Print Special Tools Life Report**

**Gage/Preset a Tool**  
Measure tool dimensions and allow adjustments if necessary.  
The tool must have a known ID and must be set up in the computer already.

**Quick Gage**  
Measure a tool that isn't set up in the computer, or doesn't have a known ID.

**Data Backup**  
Copy all the database information to floppies or to a backup directory.

**ROYAL** Variset  
Tool Management Systems

? Help

# Current Count Screen

View Current Counts

	Kit ID Tool ID	Current Count	Expected Count	Warning Limit	Last Updated	Test Tool	Date Scheduled
1	3730-0020-03LH--00008	7060	7000	96%	01/09/01 08:50:24	No	10-24-03
2	3730-0020-03LH--00004	6808	7000	96%	01/09/01 08:50:23	No	10-24-03
3	3730-0020-04RH--00003	4908	5000	94%	01/09/01 08:50:29	No	10-24-03
4	3730-0020-04RH--00004	4921	5000	94%	01/09/01 08:50:29	No	10-24-03
5	3730-0020-02LH	100	10000	97%	02/16/00 10:57:45	No	
6	3730-0020-02LH--00001	1110	5000	96%	01/09/01 08:50:19	No	
7	3730-0020-02LH--00002	1110	5000	96%	01/09/01 08:50:19	No	
8	3730-0020-02LH--00003	1118	5000	96%	01/09/01 08:50:19	No	
9	3730-0020-02LH--00004	1191	5000	96%	01/09/01 08:50:20	No	
10	3730-0020-02LH--00005	1091	5000	96%	01/09/01 08:50:20	No	
11	3730-0020-02LH--00006	1112	5000	96%	01/09/01 08:50:20	No	
12	3730-0020-02LH--00007	332	5000	96%	01/09/01 08:50:21	No	
13	3730-0020-02LH--00008	1140	5000	96%	01/09/01 08:50:21	No	
14	3730-0020-03LH--00001	6010	7000	96%	01/09/01 08:50:22	No	
15	3730-0020-03LH--00002	5939	7000	96%	01/09/01 08:50:22	No	
16	3730-0020-03LH--00003	6298	7000	96%	01/09/01 08:50:22	No	
17	3730-0020-03LH--00005	6611	7000	96%	01/09/01 08:50:23	No	
18	3730-0020-03LH--00006	4980	7000	96%	01/09/01 08:50:23	No	
19	3730-0020-03LH--00007	2454	7000	96%	01/09/01 08:50:24	No	
20	3730-0020-03RH--00001	2683	3500	85%	01/09/01 08:50:24	No	

Tool due for change   
Tool overdue for change   
Test tool

Sort By Color



### *Tool Change Report*

Report Time: 10/24/200 2:36:58 PM

<b>Tool/Kit Id</b>	<b>Setup</b>	<b>Current Count</b>	<b>Expected Count</b>	<b>Percent Warning</b>	<b>Date Scheduled</b>
3730-0020-03LH--00004	Yes	6,808	7,000	96	2003/10/24
3730-0020-03LH--00008	Yes	7,060	7,000	96	2003/10/24
3730-0020-04RH--00003	Yes	4,908	5,000	94	2003/10/24
3730-0020-04RH--00004	Yes	4,921	5,000	94	2003/10/24



### *Unscheduled Tool Change Report*

Report Time: 10/24/03 2:40 PM

<b>Date Changed</b>	<b>Time Changed</b>	<b>Tool Id</b>	<b>Failed Count</b>	<b>Expected Count</b>	<b>Reason</b>	<b>Operator</b>
2003/10/20	14:17:29	3730-0020-02LH--00007	3,513	5,000	BROKEN (CAUSE UNKNOWN)	ENGINEER
2003/10/21	14:20:47	3730-0020-03LH--00007	4,499	7,000	BROKEN (CAUSE UNKNOWN)	ENGINEER
2003/10/22	14:23:51	3730-0020-04LH--00003	4,966	6,000		PAT EVELEAND
2003/10/22	14:24:04	3730-0020-04LH--00006	5,082	6,000	BROKEN (CAUSE UNKNOWN)	PAT EVELEAND
2003/10/23	14:28:36	3730-0020-03RH--00003	1,556	3,500	BROKEN (CAUSE UNKNOWN)	PAT EVELEAND
2003/10/24	14:31:58	3730-0020-02LH--00007	2,710	5,000	BROKEN (CAUSE UNKNOWN)	ENGINEER

## Tool Management Systems

***Scheduled Tool Change Report***

2003/10/16 00:00:00 -- 2003/10/24 23:59:59

Report Time 2:42:41 PM 10/24/2003

Date Changed	Tool Specifier	Date Scheduled	Expected Count	Changed Count	Operator
2003/10/16 14:01:19	3730-0020-02LH--00005	2003/10/16	5,000	4,990	ENGINEER
2003/10/20 14:19:46	3730-0020-03RH--00001	2003/10/17	3,500	4,164	ENGINEER
2003/10/20 14:19:46	3730-0020-03RH--00002	2003/10/17	3,500	4,187	ENGINEER
2003/10/20 14:19:46	3730-0020-03RH--00003	2003/10/17	3,500	4,144	ENGINEER
2003/10/20 14:19:46	3730-0020-07LH--00003	2003/10/17	6,000	6,259	ENGINEER
2003/10/20 14:19:46	3730-0020-07LH--00004	2003/10/17	6,000	6,625	ENGINEER
2003/10/20 14:19:46	3730-0020-08LH--00001	2003/10/17	1,500	2,159	ENGINEER
2003/10/20 14:19:46	3730-0020-08LH--00002	2003/10/17	1,500	2,159	ENGINEER
2003/10/20 14:19:46	3730-0020-08LH--00003	2003/10/17	1,500	2,170	ENGINEER
2003/10/20 14:19:46	3730-0020-08LH--00004	2003/10/17	1,500	2,165	ENGINEER
2003/10/20 14:19:46	3730-0020-08LH--00005	2003/10/17	1,500	2,173	ENGINEER
2003/10/21 14:22:46	3730-0020-03RH--00004	2003/10/20	3,500	3,874	ENGINEER
2003/10/21 14:22:46	3730-0020-05LH--00008	2003/10/20	5,500	6,275	ENGINEER
2003/10/21 14:22:46	3730-0020-07LH--00005	2003/10/20	6,000	6,468	ENGINEER
2003/10/21 14:22:46	3730-0020-07LH--00007	2003/10/20	6,000	6,498	ENGINEER
2003/10/21 14:22:46	3730-0020-08LH--00006	2003/10/20	1,500	1,277	ENGINEER
2003/10/21 14:22:46	3730-0020-08LH--00007	2003/10/20	1,500	1,277	ENGINEER
2003/10/21 14:22:46	3730-0020-08LH--00008	2003/10/20	1,500	1,278	ENGINEER
2003/10/22 14:25:55	3730-0020-02LH--00001	2003/10/21	5,000	5,420	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-02LH--00002	2003/10/21	5,000	5,554	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-02LH--00003	2003/10/21	5,000	5,742	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-02LH--00004	2003/10/21	5,000	5,923	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-02LH--00005	2003/10/21	5,000	5,554	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-02LH--00006	2003/10/21	5,000	5,733	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-02LH--00008	2003/10/21	5,000	5,524	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-05LH--00002	2003/10/21	5,500	6,024	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-05LH--00005	2003/10/21	5,500	6,180	PAT EVELEAT
2003/10/22 14:25:55	3730-0020-06LH--00004	2003/10/21	5,500	5,916	PAT EVELEAT



### Combined Tool Change Report

Start Date - 10-17-03 00:00:00

End Date - 10-24-03 23:59:59

Report Time: 10/24/2003 2:44:10PM

Changed Date	ToolID	Change Count	Expected Count	Reason	Change Type
2003/10/17 14:07:44	3730-0020-03LH--00006	1,734	7,000	BROKEN (CAUSE UNKNOW	Unscheduled
2003/10/20 14:17:29	3730-0020-02LH--00007	3,513	5,000	BROKEN (CAUSE UNKNOW	Unscheduled
2003/10/20 14:19:46	3730-0020-03RH--00001	4,164	3,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-03RH--00001	4,164	3,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-03RH--00002	4,187	3,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-03RH--00002	4,187	3,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-03RH--00003	4,144	3,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-03RH--00003	4,144	3,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-07LH--00003	6,259	6,000	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-07LH--00003	6,259	6,000	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-07LH--00004	6,625	6,000	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-07LH--00004	6,625	6,000	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00001	2,159	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00001	2,159	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00002	2,159	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00002	2,159	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00003	2,170	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00003	2,170	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00004	2,165	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00004	2,165	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00005	2,173	1,500	Scheduled	Scheduled
2003/10/20 14:19:46	3730-0020-08LH--00005	2,173	1,500	Scheduled	Scheduled
2003/10/21 14:20:47	3730-0020-03LH--00007	4,499	7,000	BROKEN (CAUSE UNKNOW	Unscheduled
2003/10/21 14:22:46	3730-0020-03RH--00004	3,874	3,500	Scheduled	Scheduled
2003/10/21 14:22:46	3730-0020-03RH--00004	3,874	3,500	Scheduled	Scheduled
2003/10/21 14:22:46	3730-0020-05LH--00008	6,275	5,500	Scheduled	Scheduled

Report Time: 10/24/2003 2:46:05P



***Excessive Tool Change Report***

Sep/2003 -- Oct/2003

2 unscheduled changes in 5 days.

<b>ToolID</b>	<b>Amount Changed</b>	<b>Start Date</b>	<b>End Date</b>
3730-0020-02LH--00007	2	2003/10/20	2003/10/24



### Average End Counts

Start Date - 10-23-03 00:00:00

End Date - 10-24-03 23:59:59

Report Time: 10/24/2003 2:47:14PM

**Change counts of zero are NOT included in average.**

<u>Tool ID</u>	<u>Average Change Count</u>	<u>Warning Count</u>	<u>Expected Count</u>	<u># of Unscheduled Changes</u>
3730-0020-02LH--00007	2,710.00	4,800	5,000	1 of 1
3730-0020-03RH--00003	1,556.00	2,975	3,500	1 of 1
3730-0020-04LH--00001	6,861.00	5,700	6,000	0 of 2
3730-0020-04LH--00002	6,572.00	5,700	6,000	0 of 2
3730-0020-04LH--00004	6,639.00	5,700	6,000	0 of 2
3730-0020-04LH--00005	6,627.00	5,700	6,000	0 of 2
3730-0020-04LH--00007	6,657.00	5,700	6,000	0 of 2
3730-0020-04LH--00008	6,467.00	5,700	6,000	0 of 2
3730-0020-04RH--00001	5,486.00	4,700	5,000	0 of 2
3730-0020-04RH--00002	5,258.00	4,700	5,000	0 of 2
3730-0020-05LH--00001	5,890.00	5,225	5,500	0 of 2
3730-0020-05LH--00003	6,382.00	5,225	5,500	0 of 2
3730-0020-05LH--00006	6,411.00	5,225	5,500	0 of 2
3730-0020-05LH--00007	6,422.00	5,225	5,500	0 of 2
3730-0020-06LH--00001	5,488.00	5,225	5,500	0 of 2
3730-0020-06LH--00002	5,478.00	5,225	5,500	0 of 2
3730-0020-06LH--00003	6,326.00	5,225	5,500	0 of 2
3730-0020-07LH--00008	6,408.00	5,700	6,000	0 of 2
3730-0020-08LH--00001	1,221.00	1,200	1,500	0 of 2
3730-0020-08LH--00002	1,222.00	1,200	1,500	0 of 2
3730-0020-08LH--00003	1,220.00	1,200	1,500	0 of 2
3730-0020-08LH--00004	1,220.00	1,200	1,500	0 of 2
3730-0020-08LH--00005	1,221.00	1,200	1,500	0 of 2
3730-0020-08LH--00006	1,231.00	1,200	1,500	0 of 2
3730-0020-08LH--00007	1,322.00	1,200	1,500	0 of 2
3730-0020-08LH--00008	1,241.00	1,200	1,500	0 of 2



### Tool Change Summary (All Departments)

Start Date - 05-13-98 00:00:00

End Date - 11-13-03 23:59:59

Report Time: 11/13/2003 5:26:23PM

<u>Department</u>	<u>Number of Un-Scheduled Changes</u>	<u>Number of Scheduled Changes</u>	<u>Total Changes</u>
DEPT_3710 - 3.7 Liter Block	2,296	2,115	4,411
DEPT_372L - 3.7 Liter Crankshaft Left	645	417	1,062
DEPT_372R - 3.7 Liter Crankshaft Right	724	379	1,103
DEPT_3730 - 3.7 Liter Conn Rod	927	240	1,167
DEPT_3750 - 3.7 Liter Head	388	184	572