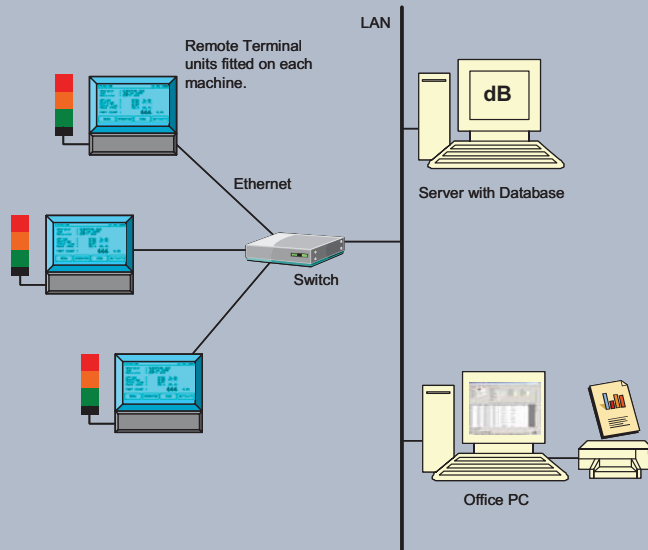


# The Decade M.A.R.S. (Machine Activity Recording System)



System Layout (Ethernet fixed wiring show).

## Decade production recording system

The Production Recording System has been designed to provide a flexible and inexpensive solution to measure and record machine production activity in a manufacturing plant or cell. The system is designed to be simple to use and install and fills the gap between a 'paper' system and an integrated MES (Manufacturing Execution System). You can monitor just one or many machines in the factory, or just target a problem process.

A compact, low cost Remote Terminal (RT) unit can be fitted to each machine you want to measure, or you can use a Decade 160/260 control system. These units then monitor the machine run/stop activity and operating speed by a suitable input signal. A LCD touch screen provides a simple, easy to use interface for the operator. 'Traffic Light' status beacons can also be connected to the unit and an output prevents the machine from being started when operator input is required. Either an Ethernet or Wireless network link is made from each remote terminal back to the server PC. This server PC is used to hold the system database, host the web application and also provide connectivity to each of the Remote Terminal units.

Once production activity data has been collected from the remote terminals downtime analysis and OEE reports can quickly be produced..

## The Decade M.A.R.S.

This cost-effective shop floor data capture system places the accent on effective networking, accuracy and structure and utilises the latest in technology to keep you up to date.

As a web application, it produces a variety of key reports:

- Networked SFDC (Shop Floor Data Capture) System for repetitive manufacturing processes
- Accurately records machine activity - run times, stop times, run rates, actual and reject outputs, shifts and job times
- Web application produces OEE reports (availability, performance, quality & OEE) over shift or job periods, produces pareto charts for downtime analysis
- Structured method of operators selecting downtime activities gives up to 512 reasons in three presses. Activities can be assigned as changeover, planned or unplanned downtime
- Cost effective system designed to automate & replace paper recording systems
- Generate SMS alerts for each machine activity item when a machine is idle for longer than a pre-set time
- Job scheduler facility that can be linked to ERP systems for automatic update of shop order data
- Reject quantities can be grouped into twelve different user-defined reasons
- All data stored in a central SQL database. Uses existing Ethernet network or Wireless (802.11b) network for connection to machine terminals



## Collecting production activity data

The Remote Terminal (RT) unit has a microprocessor which is programmed to monitor the machines stop-start activity. When the machine starts running the RT logs this start time in the system, and while the machine is running it also periodically logs time, rate and count values to the system.

After the machine stops or its rate has fallen below a minimum value the RT will prompt the operator for a "downtime activity", the operator simply selects an activity from the RT screen list. The stopping of the machine and selecting of the downtime activity are logged by the system, this provides accurate time & date information of all machine stoppages along with reasons why.

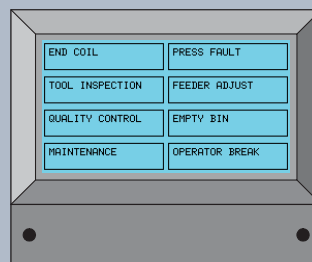
It's also possible to categorise downtime reasons as Planned or Unplanned downtime so you can generate accurate OEE results. When the machine eventually starts running again when it's rate rises above a set limit the RT end the downtime activity and starts to log run time as before.

Over a period of time this pattern of run - stop activity is build up in the system giving an accurate record of machine activity over time. This data is then used to generate the various downtime and OEE reports for analysis.

Activity during this shift (most recent first):

JobName	Activity	StartTime	Duration	Actual	Reject	CodeL1	CodeL2
Job Test	Unknown	16:23	00:21:04	0	0		
Job Test	Production	16:06	00:17:21	1000	0		
Job Test	Planned	16:03	00:02:57	0	0	No Material	Feeder
Job Test	Production	15:46	00:17:20	1000	0		
Job Test	Planned	14:48	00:57:19	0	0	Training	
Job Test	Production	14:31	00:17:31	1000	0		
Job Test	Planned	14:26	00:05:16	0	0	No Material	Electrica
Job Test	Production	14:08	00:17:20	1000	0		
Job Test	Planned	13:49	00:19:50	0	0	Breaks	Afternoon
Job Test	Production	13:14	00:34:11	2000	0		
Job Test	Planned	13:02	00:11:58	0	0	Breaks	Lunch Br
Job Test	Production	13:00	00:02:49	129	0		
Job Test	Unknown	13:00	00:00:04	0	0		

Example of run - stop activity data collected over a period of time



RT Unit downtime activity selection.

The screen shows a list of eight reasons or categories for the operator to choose from by simply touching the screen. There can be three levels of screen giving 512 possible downtime activities.

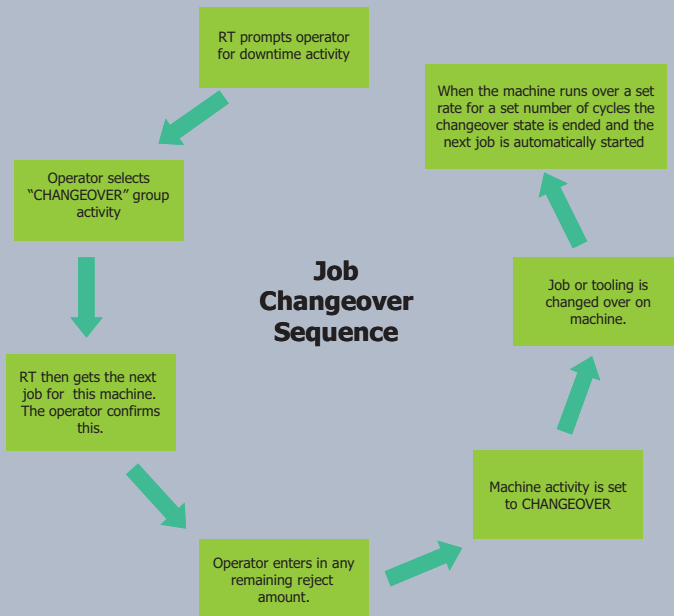
## Job tracking

The system provides a method to track jobs that are running in the connected machines, to do this a list of all jobs is created with information such as Ideal Run Rate, Planned Changeover Time, Count Factor. Each job entry can be assigned a list of machines it can be run on. There is also the facility to schedule jobs for each machine so the operator always knows what job is next.

When the operator starts a new job a new record is created, which allows you to track when jobs have been run, for how long and how often. You can also generate OEE and downtime activity reports for the period the job was in that machine.

By assigning a group of downtime activities to 'Changeover' this can be used to start a job changeover sequence. When the remote unit requests the operator for a downtime activity they would select one from the 'Changeover' group. When the operator has selected the next job the remote unit now records all time in the current job as changeover time until the machine start production with the next job.

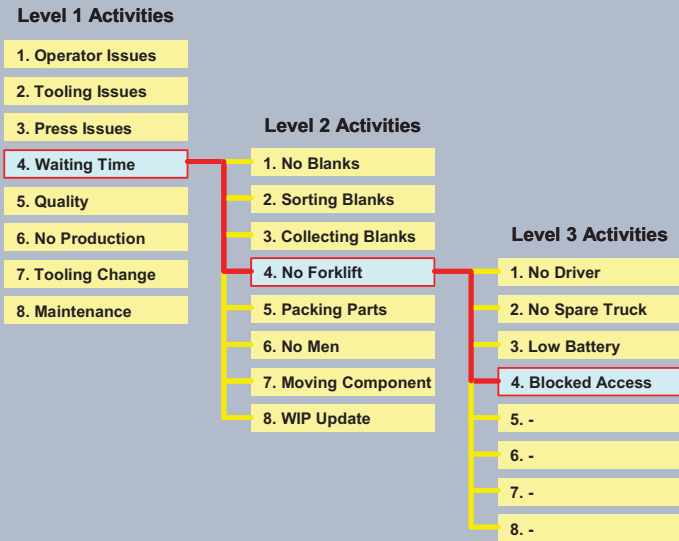
### Job Changeover Sequence



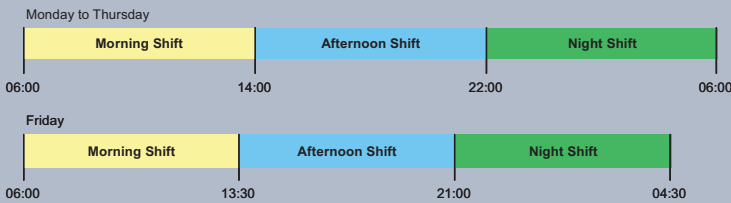
## Downtime activity reasons

When the remote terminal needs a downtime activity reason from the operator it displays a choice of eight 'level-1' reasons, the operator simply touches the screen at the appropriate reason. After selected, a further eight 'level-2' reasons can be displayed for the operator to make a second choice from. And if required a third eight 'level-3' reasons can also be displayed.

This 'tree' or 'hierarchical' list of downtime activities means downtime reasons can be grouped into categories for easy selection by the operator, and gives a total of 512 possible downtime activity reasons. All these downtime activities are held in the database and can be different for each machine.



With downtime activity selection it only takes 3 steps to select from 512 possible reasons.



The system can have up to ten different weekly shift periods for each machine.

## Shift based recording

The remote terminal only monitors machine activity during working hours, and to do this a list of 'shifts' are held for each machine. When inside a shift period machine activity is recorded, each shift has its own database record which means you can get machine activity reports for individual shifts.

The system supports weekly shifts or 4-shift 3-on-3-off schemes.



## Report generation

The web application can generate a variety of views and reports using the data logged from the various remote units on the machines. Reports are viewed on the web browser or can be produced in PDF format which can be printed or sent via email.

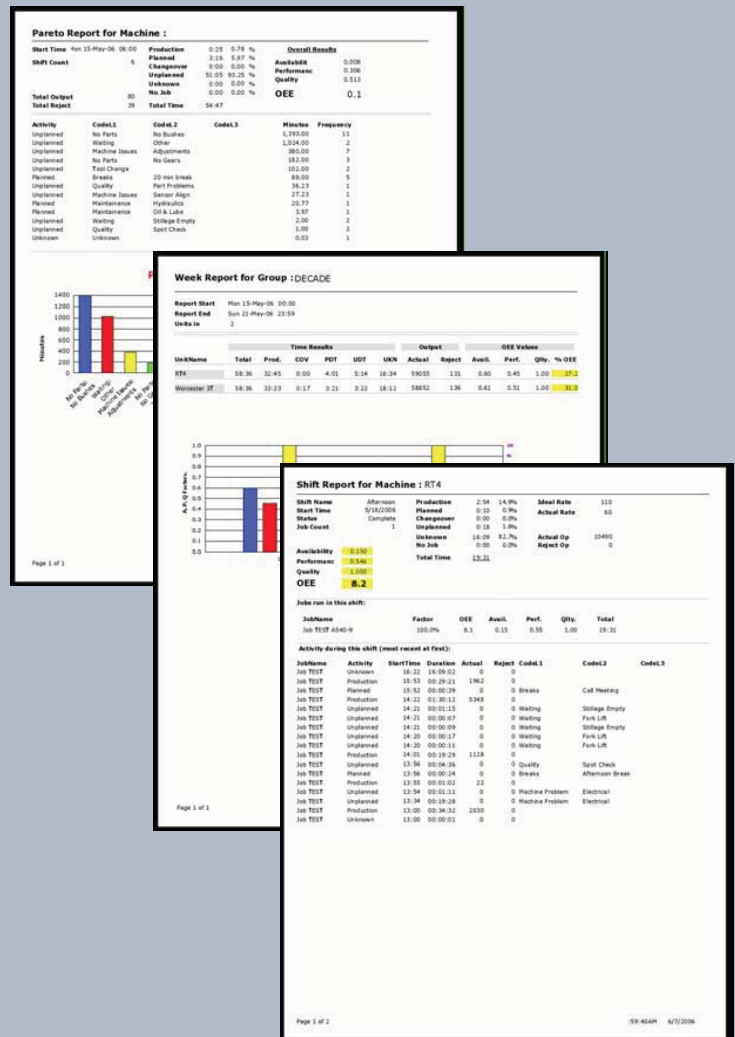
You can currently generate the following types of reports, but we will be adding to this list as part of the ongoing development with customers.

**Activity Report for a Period of Time** (i.e. shifts, days, weeks, months, quarters). This report lists all the activity recorded in chronological order as a list, it also calculated the total & percentages for Production, Planned & Unplanned downtime, Changeover & No Job.

**OEE Report for a Shift or Job.** This report lists all the activity in chronological order, totals & percentages. It also calculates the OEE values for Availability, Performance, Quality & OEE. For shift OEE the calculation takes into account each job that has been run during the shift and proportions each job's OEE results to obtain the overall Shift OEE. The availability calculation also takes into account the maximum changeover time for each job, if the time is over this maximum it is then treated as unplanned downtime.

**Pareto Chart of Downtime Activity.** Use to identify the worst offending downtime activities over periods of time.

**Grouped Total Reports for a Period of Time.** Shows totals of activity groups recorded in time-spent order.



## General specifications

**Remote Terminal Units :** Requires permanent 85-265vac 50Hz supply. Requires cyclic signal from machine for run status and rate measurement. Volt-free contact for start-inhibit and beacon outputs. Ethernet connection 10BaseT or WiFi 802.11b, TCP/IP protocol fixed IP address. Size 210w x 180h x 90d. Time and Date synchronized from Server PC. LCD display with backlight and resistive touch screen.

**Server PC :** Dedicated PC required to hold database (MySQL) and run server and web applications to connect to the RT/160/260 units. Min of 20 Gbyte of disk space for database storage. PC must have fixed IP address for remote units to connect to. Windows2K (SP4) / XP / Server operating system required. This computer would be running 24:7 to serve requests from remote units.

**Application Software :** Microsoft ASP.Net Web Application.

DECADE has a policy of continuous development of products with customers and users. Information in this sheet was current at the time of writing, however specifications may change in the future as a result of development. Document Revision 2. June 2006.

