

# SYSTEM OVERVIEW

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## DINGO LUBE PROFESSIONAL



D i n g o  
Maintenance Systems

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Dingo Lube Professional System Overview

#### **USA**

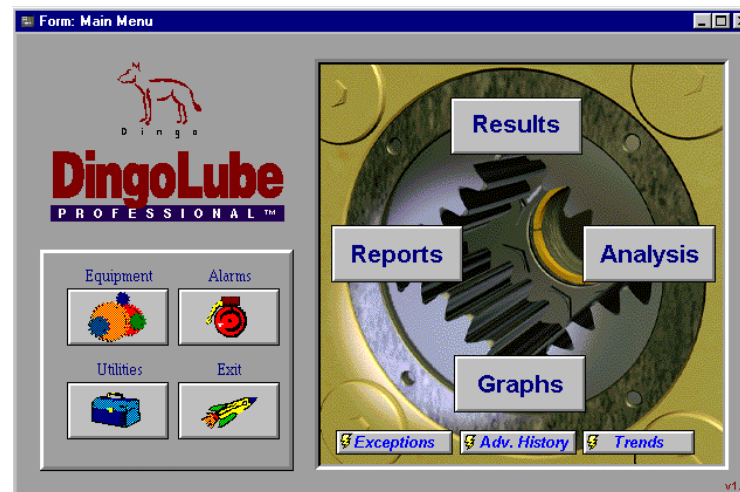
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# INTRODUCTION

Dingo Lube Professional is a powerful oil analysis management software system designed for those who manage critical lubricated assets. This software receives analysis results electronically, via e-mail, the internet or a modem from multiple laboratories on an automated user definable schedule. Alarm levels and rules that are implemented within the software allow important problems highlighted quickly for immediate action.

Dingo Lube Professional is a powerful condition monitoring tool:

- Faster detection of trends means reduced equipment failures
- Management by exception saves time and reduces paperwork
- Statistics based on actual history reduces the number of false alarms
- Eliminate time spent filing and reviewing paper reports
- "Set and forget" lab modules means fast, current data for decisions
- Handles all oil analysis tests for complete diagnosis
- Lubricant database for convenient quick reference

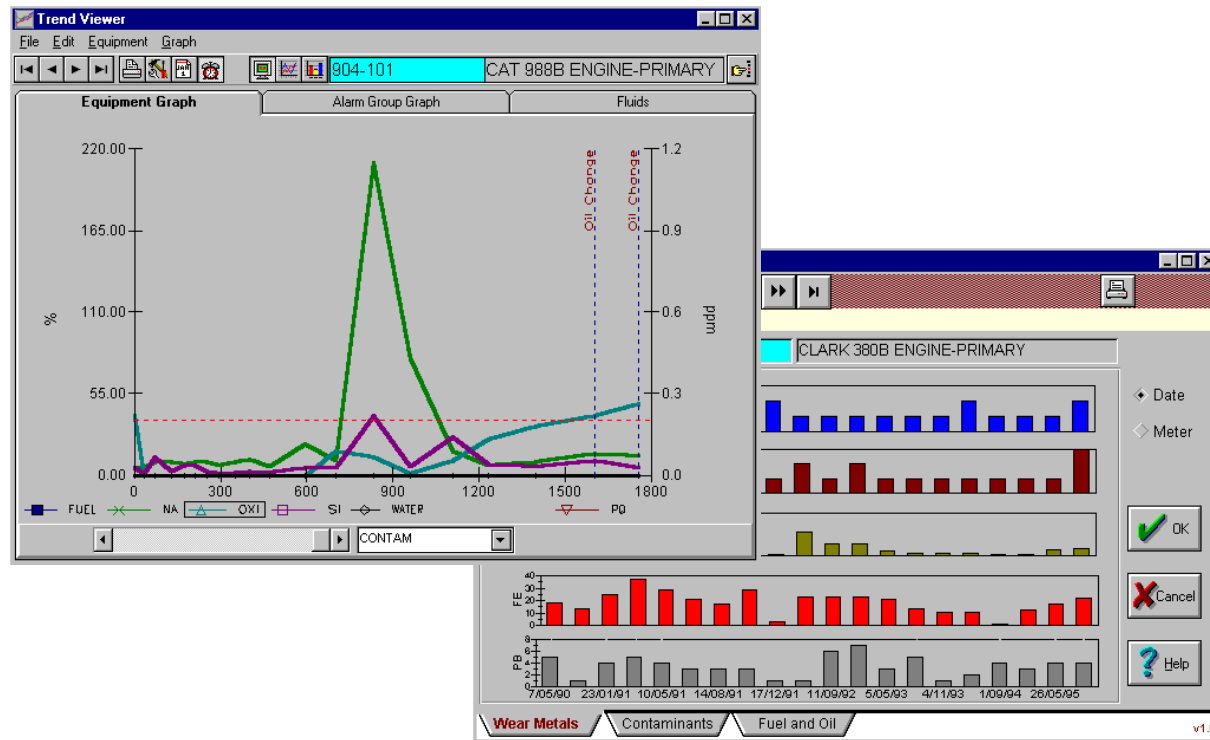


## System Features

- Delphi and Paradox for Windows designed interface
- Runs on Windows 95 or NT
- Paradox Database
- Multi user systems available for use on a LAN
- Unlimited drivers for receiving data from oil analysis laboratories
- Receives data direct from on site oil testing equipment
- User Definable Security

# TREND GRAPHS

Detecting a problem trend early before the damage is done is the heart of condition monitoring best practice. Use Lube Professional to view groups of trends together like wear metals, contaminants and particles. Detect problem trends by overlaying alarm limits. View similar equipment in groups to detect patterns and avoid failures. Examine correlation to determine the cause. Plot samples by either date or unit hours and view important events like oil changes on the screen.



## Features

**Group Trends** – User definable trend groups. Eg: view Wear Metals, Contaminants, Oil physical and chemical properties.

**Alarm Group Graph** – View an individual unit overlayed on all similar units and group alarm limits, to improve analysis of trends.

**Events** – Show time stamped events such as oil changes, component changes and meter changes.

**Analyst Comments** – Click on a sample event to read laboratory analyst comments.

**Alarm Limits** – view either user defined or statistical alarm limits.

**Zoom** – drag and zoom in to any area of interest for more detail.

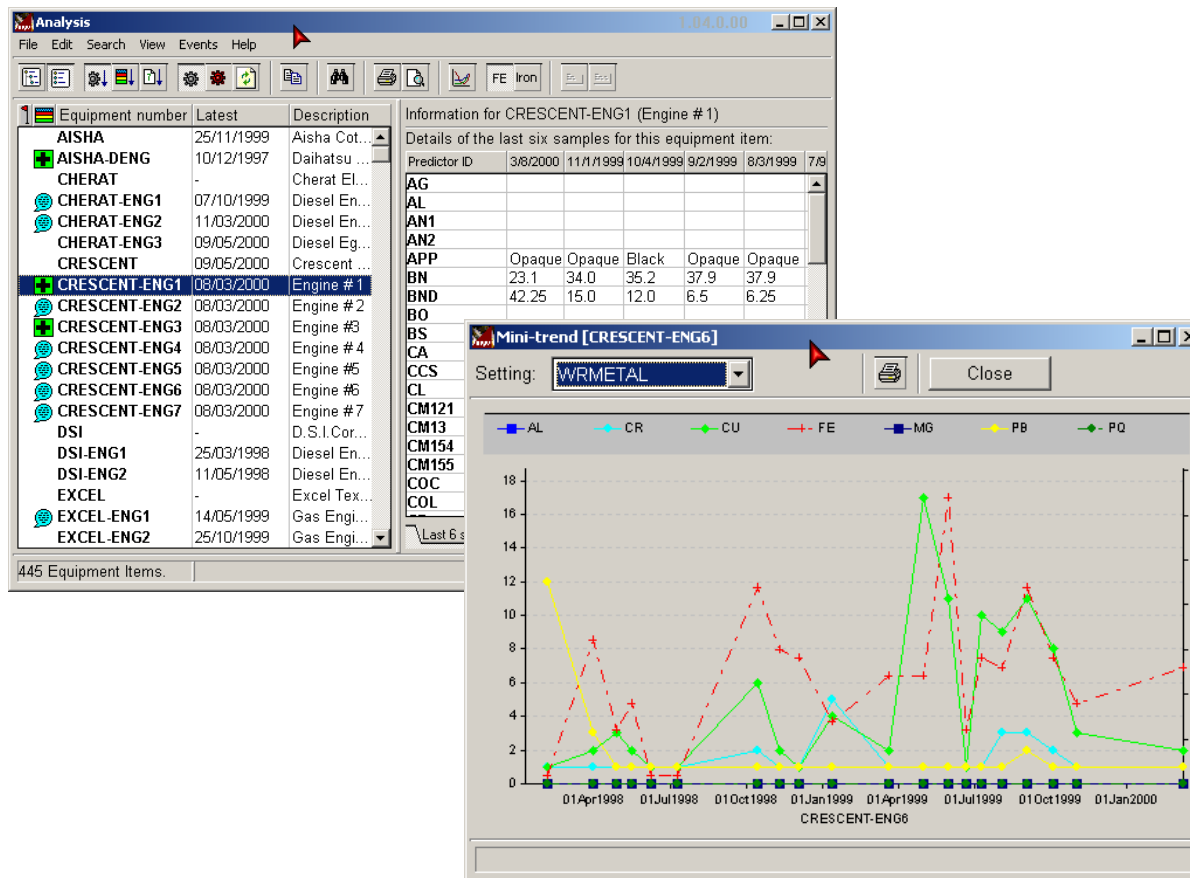
**Unit Hours or Date** – Use machine hours or dates on X-axis. Missing samples can also be easily seen.

**Stacked Bar Charts** – enable a powerful view of correlation.

**Curve Fit** – Fit lines and curves and use statistical trends to predict the future.

# EXCEPTION ANALYSIS

Focusing quickly on the samples which show problems, means a better chance of heading off failures and downtime. Lube Professional lists the problem equipment and then provides the diagnostic tools to help determine the causes and appropriate action quickly. Use action checkboxes to acknowledge alarms and record events such as the corrective work order raised.



## Features

**Exception Overview** – lists all parent equipment that has a potential problem. Alarms are sorted and color coded in order of severity.

**Exception Details** – drill down to see more details, analyse the cause of the problem and decide on what action to take.

**Action Flags** – tick a box to show that each alarm has been actioned. The alarm is then removed from the list and stored in history.

**Alarm Data** – view current sample which has triggered along with the limits, rules and previous history of triggers. Apply filters to focus on key equipment, dates etc.

**Mini Trend** – Analyze trend groups to determine the cause – eg: is an increase in dirt (silicon) causing wear (iron) to increase?

**Event Notes** – View or record important event notes – oil changes, laboratory analyst comments, Work Order numbers issued.

**Results Sheet** – view the entire lab report with all numerical data and comments.

# SAMPLE MANAGEMENT

Accurate sample labels are important to communicate key information to the testing laboratory. Printing computer-generated labels for sample bottles reduces errors caused by handwriting, saves time and creates a record of each sample sent for matching with those received.

The screenshot shows the 'Sample Labels' application window. At the top, there is a menu bar (File, Label, View, Options) and a toolbar with icons for file operations. Below this, a header area displays information for a selected item: '1504.407 DEHAVILAND PRATT \_WHITNEY 120A ENGINE 8513'. To the right, there are input fields for 'Top up amount' (5), 'Hours on oil' (8513), and 'Days on oil' (0). A checkbox for 'Oil changed' is present. A 'Comments' text box is also visible.

The main area contains a table with the following columns: Print, Equipment number, Description, Meter, Sample date, Requested, Top up, o/c, InfoSrc, o/c mtr, o/c days, and Comments. The table lists several equipment items, with '1504.407 DEHAVILAND PRATT & WHITNEY' and '1504.408 DEHAVILAND HYDRAULIC SYSTEM' highlighted in blue.

Two detailed view windows are shown, both titled 'ACME Company'. The top window is for 'Equipment Number: 1504.408' and 'Serial #: 1V07392'. It includes sections for 'Laboratory' (CATM), 'Customer details' (Company: ACME Company, Address: PO Box 1234, Site: Cloncurry Site), 'Sample details' (Sample date: 15/05/99, Request date: 15/05/99, Oil changed: Yes, Days since oil change: 0, Oil added since oil change: 2, Hours since oil change: 8513), 'Equipment information' (Description: DEHAVILAND HYDRAULIC SYSTEM, Make: , Model: , Lubricant capacity: ), and 'Comments'.

The bottom window is for 'Equipment Number: 1504.422' and 'Serial #: 1V07392'. It follows the same layout as the top window, with 'Sample details' showing 'Oil changed: No' and 'Hours since oil change: 8513'.

## Features

**Sample Batches** – Group equipment to print labels in batches. Record sample volume and tests requested.

**Label Wizard** –A wizard leads users through the steps to create complete accurate labels every time. Select a batch or individual equipment items.

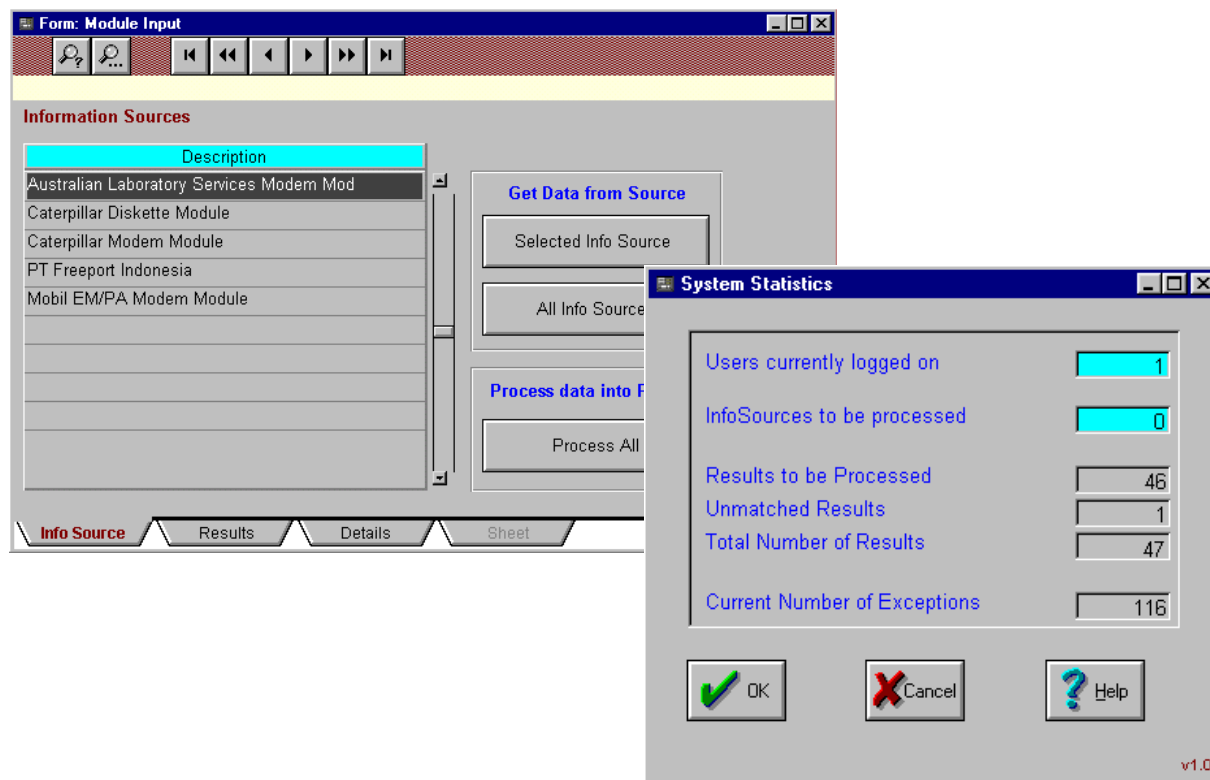
**Labels** – Select a standard label supplied with Lube Professional or design your own custom label.

**Print Flags** – check flags against those labels generated to select for printing. Select all, none or selected.

**Sample Matching** – match the sample sent with results received to ensure all nothing is lost.

# RESULTS

Receiving results electronically reduces paperwork, lost information and missed problems. Lube Professional automates the results process freeing up time for the more important work of analysis and determining what action to take.



## Features

**Interface Modules** – These programs receive results from each laboratory or test device used. They decode the results file and place the information into Lube Professional's database along with all other samples for this unit.

**Automated receiving** – modules can be easily configured to receive results on a completely automated schedule. Set them and forget them.

**Multiple Labs** – Use as many different laboratories or testing machines as needed. Lube Professional handles them all.

**Matching of results** – before committing results to the database, Lube Professional provides a checking stage to ensure that the database is kept accurate.

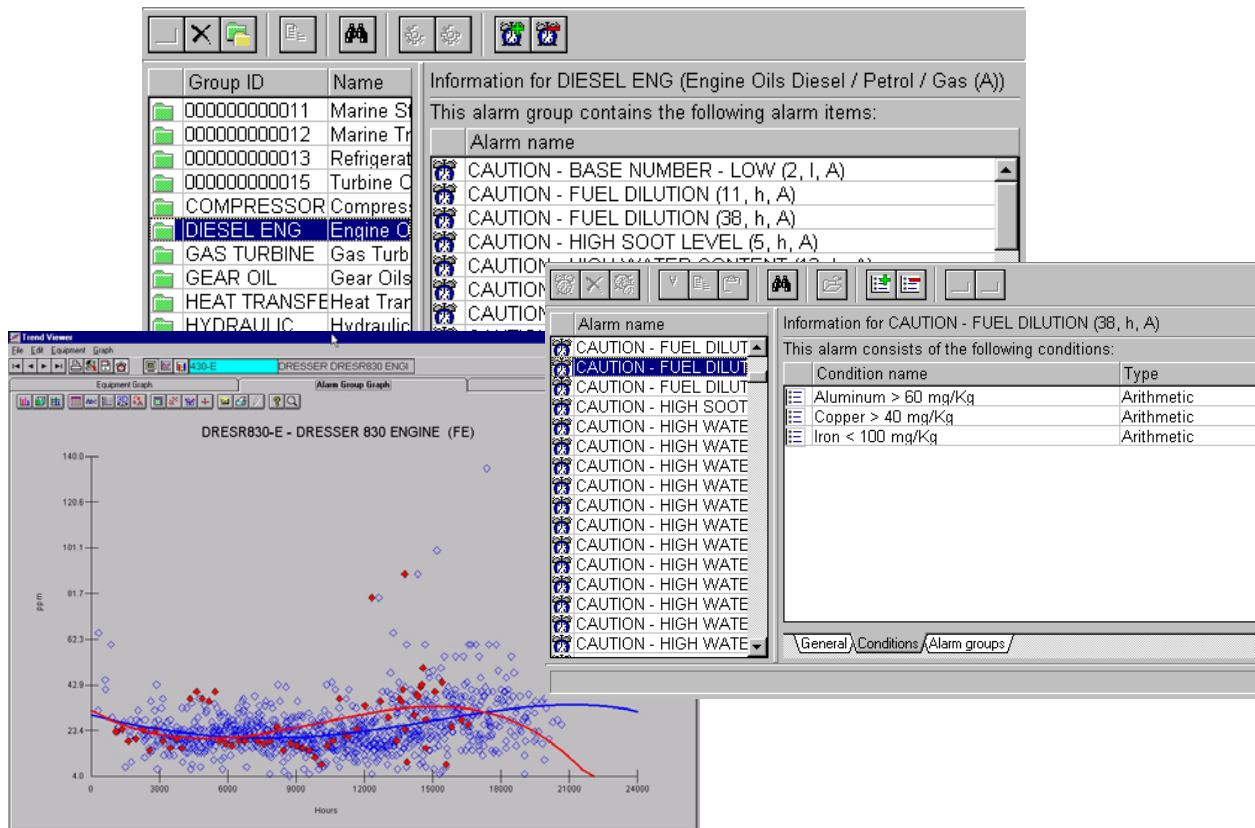
**Lab Reports** – Print lab style reports automatically as results are received.

**System Statistics** – Set a popup window which alerts of new samples at login.

**Infosource Log** – keeps a log of all results files received and processed.

# ALARMS

Automated triggering of samples which produce an alarm condition means a quicker response and higher chance of heading off a breakdown. Using actual historical machine data to generate these alarms and setting them appropriately means that local conditions are taken into effect. The net effect is less false alarms and more early warning.



## Features

**User Defined Alarm Limits and Rules** – Set user defined moderate, high and extreme alarm limits. Display alarm lines on graphs. Build rules based on threshold, trend, arithmetic, ratio-value and ratio-ratio conditions.

**Statistical Alarms** – use historical sample data to generate an alarm limit at a number of standard deviations from the mean..

**Trend Alarms** – Trigger an alarm based on trends such as 3 samples in a row increasing (or decreasing) or an unusual spike.

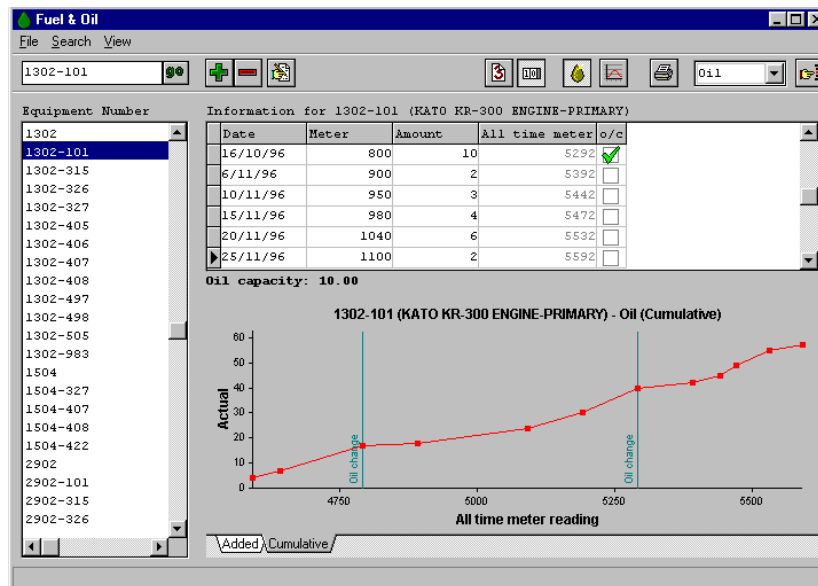
**Alarm Groups** – combine similar equipment into groups and generate statistical alarms based on the history of the group.

**Wear Rate or Absolute Values** – Chose to trigger alarms based on absolute values (eg:ppm) or rates of change (wear rates ppm/hour).

**Alarm Group Graph** – View an individual component superimposed over all similar components.

# FUEL & OIL

Changes to patterns of use of fuel and oil often indicate changes to the machine itself. Lube Professional provides a convenient way to keep records of fuel and oil additions and to examine them for changes.



## Features

**Fuel and Oil** – Record and view Fuel and Oil added to any component.

**Added or Cumulative** – Graph fuel and oil added as either raw data or cumulative line to detect changes in usage.

**Date or Meters** – View graphs by either date or meters.

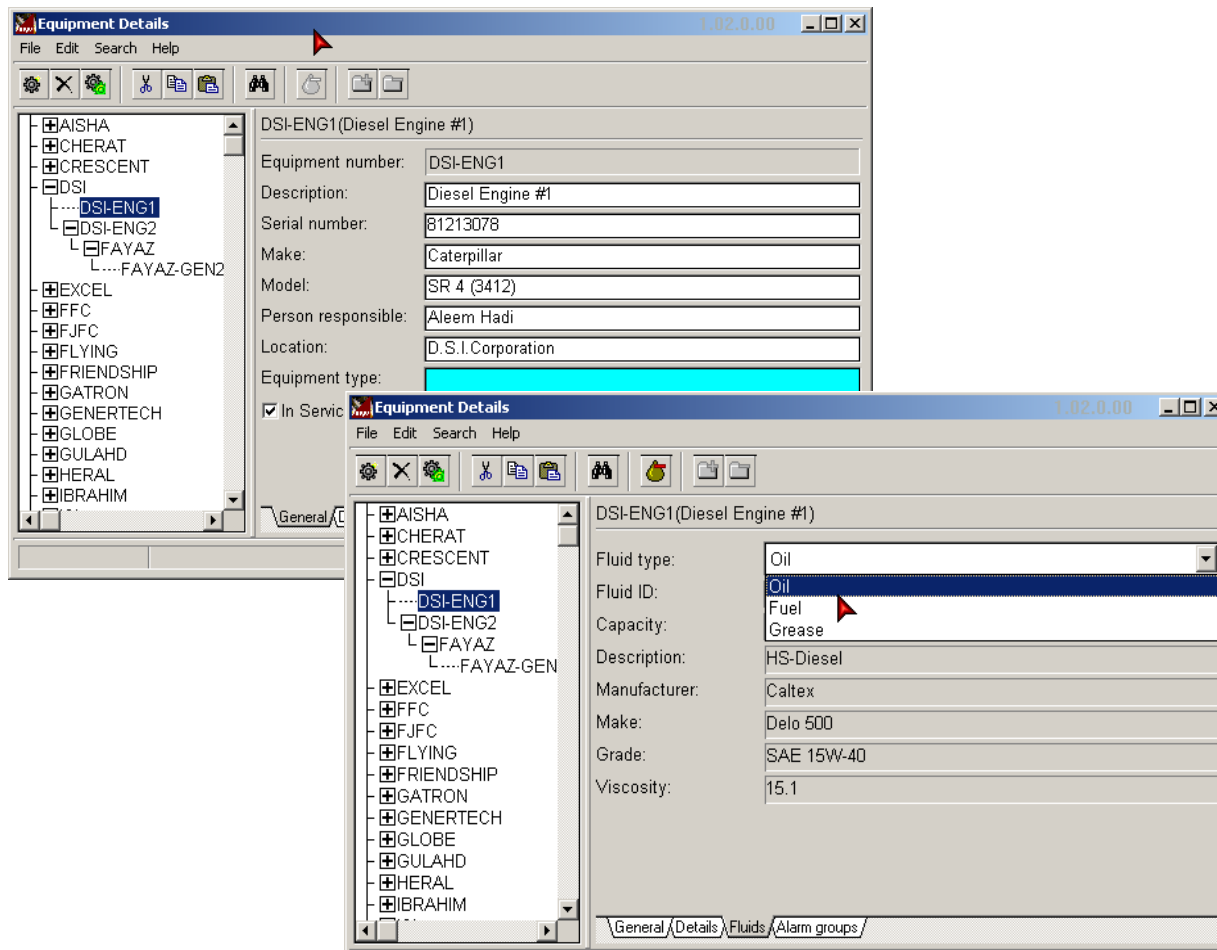
**Oil Changes** - Show oil changes on screen.

**Edit Fluid Entry** – edit or add entries for fluids added to components.

**Normalize for Oil changes** – remove the effect of oil changes from graphs by normalizing.

# EQUIPMENT AND LUBRICANTS

Establish a simple database of equipment and fluid information. Quick, simple access to this basic information aids in diagnosis of faults. Store details of the sample frequency and oil change interval.



## Features

**Equipment Database** – keep details of the equipment or sample points which are tested – Description, make, model, serial number, person responsible, alarm group, location.

**Equipment Hierarchy** – Unlimited parent child relationships. View all components at a glance.

**Meters or Dates** – Manage a component by either meter units (hours, miles etc) or by date.

**Fluid Information** – store and refer to lubricant and fuel information including capacity, viscosity, grade, sample interval, change interval, manufacturer and make.

**Alarm Groups** – Place equipment into multiple alarm groups for group reporting and statistical analysis.

# HISTORY

Dingo Lube Professional stores all historical lab test results in a single database. Laboratory alarm statuses are highlighted in color on the screen for easy reference.

The screenshot displays two overlapping windows from the Dingo Lube Professional software. The top window, titled 'Form: Main History', shows a table of historical lab test results. The bottom window, titled 'Form: Results Sheets', displays detailed information for a specific lab test, including company, equipment, and oil analysis results.

**Form: Main History**

Date	All Time	Meter	Predictor	Value	Re-Calc
13/03/91	3,518.00	2,228.00	Aluminium	1.00	Wear Rates
1/08/91	3,518.00	188.00	Chromium	1.00	Re-Calc
14/01/92	3,768.00	438			
17/07/92	4,021.00	69			
1/02/93	4,317.00	98			
4/05/93	4,519.00	1,188			
24/12/93	4,519.00	15			
10/08/94	4,759.00	39			
15/03/95	4,985.00	62			
20/12/95	5,254.00	89			

**Form: Results Sheets**

EqNum : 307-924      Date : 13/11/95  
 Description : BE 295B1 NO2 SWING G/BOX      Meter Reading : 49,000.00

CATERPILLER S.O.S.

```

-----
Company      : ACME Company
Equipment    : 307 { } BUCYRU 295B1 SN:
SBE140337
Compartment  : NO2 SWING G/BOX 924
Date Sampled: 13-11-95 Received: 15-11-95
Label Number: 413 Lab Control Number: 95K65731
Evaluation   : A
Oil Change   : N
Oil Type     : Oil Brand :
Oil Age      : 9500
Oil Added    :

A  AL  CR  CU  FE  FUEL  DEP  MEM
-   5   1   1  39   N   -   -
  
```

## Features

**History Database** – Maintain all oil analysis historical data in one convenient database.

**Physical and Logical Meters** – view actual meter readings along with logical or “all-time” meter readings.

**View as lab results sheets** – Keep a computer file of individual lab results sheets. Save time on filing and looking through.

**Advanced Oil History** – Select and print a complete history report for one or more components.

# REPORTS

Access popular reports preview and print them quickly and simply. Flag particular equipment of interest or report on the entire database.

**Exception List - Detailed**

Report date: 22/05/99 Page: 1

Equipment Number	Alarm Level	Predictor	Current	Alarm	Previous 1	Previous 2	Previous 3
<b>21/02/96</b>							
525-401	EXTREME	AL	0.08	0.08	0.00	0.02	0.00
	EXTREME	AL	26.00	19.57	1.00	5.00	1.00
	EXTREME	PCT	11.50	5.65	3.75	5.79	0.80
	EXTREME	PCT	3592.00	1990.12	1390.00	1822.00	390.00
604-315	SAFE	OH	0.08	0.00	0.00	0.02	0.02
	SAFE	OH	54.00	0.00	0.00	29.00	20.00
	EXTREME	OH					
	EXTREME	PCT					
	EXTREME	PCT					
	EXTREME	PCT					
<b>16/01/96</b>							
1504-327	EXTREME	CU					
1504-407	EXTREME	W6					
	EXTREME	PCT					
	EXTREME	PCT					
	ACCELERATING	PCT					
	EXTREME	AL					
	EXTREME	AL					
EXTREME	W6						
EXTREME	PCT						
EXTREME	PCT						
EXTREME	SI						
EXTREME	SI						

**Alarm Group Correlations**

May 22 1999 ACME Company Page 1 of 1

Alarm Group : R120E-401  
Description : EUCLID R120E RT FINAL DRIVE

Number of Equipment in Group : 1  
Total Fluids in Group : 0  
Total Replacement Value of Group : \$0  
Average Down Time Cost Per Hour : \$0

Equipment in Alarm Group:  
525-401

**10 Strongest Correlations:**

	AL	CU	FE	NIT	OXI	PB	PCT	SI	ST	WA
Aluminium	1.0	.2	.6			.0	.7	.8		
Copper	.2	1.0	.3			-.1	-.1	.2		
Iron	.6	.3	1.0			-.1	.6	.6		
Lead	.0	-.1	-.1			1.0	-.2	.2		
Nitration				1.0						
Oxidation					1.0					
Particle Count	.7	.1	.6			-.2	1.0	.5		
Silicon	.8	.2	.6			.2	.5	1.0		
Soot									1.0	
Water										1.0

## Features

**Oil History**– show values for either 10 or 20 selected predictors in columns for entire component life.

**Exception List**– report showing samples which have triggered alarms.

**Advanced Oil History Report**– select and print for a number of components.

**Equipment List**–print both simple and detailed equipment reports.

**Top Ten Report**– show the ten pieces of equipment which are generating the most alarms.

**Lubricant Summary**– Show a list of each component using a particular lubricant

**Fluid In Equipment**– graphical summary of all lubricants on site, including total volumes and costs.

**Alarm Reports** – Print alarm limits for an alarm group.

**Alarm Analysis** – print correlations and statistics for alarm groups well as correlations.

# UTILITIES

Utilities enables a user to configure Lube Professional to suit the needs of their site and the system users.

The image shows two overlapping windows from the Lube Professional software. The top window is titled 'Form: System Parameters' and contains a table of system parameters. The bottom window is titled 'Form: Fluid Type' and contains a form for entering fluid details.

Description	Value
Display Results Statistics?	True
Exception History On ?	False
Match Results against Labels?	False
Results Match Equipment Look	
Auto Process Results?	
Auto Calculate Exceptions?	
Auto ReCalculate Alarms?	
Auto Print Unmatched Results?	
Auto Print Summary Exceptions?	
Auto Print Detailed Exceptions?	
Print Graph Standard, Metafile c	

FluidID :	RIMX-15W-40
Description :	Rimula X 15W-40
Manufacturer :	Shell
Make :	Rimula
Grade :	15W-40
Viscosity :	40.00
Units Of Measure :	gallons
Amount In Bulk Tank :	9,000.00
Price :	\$17.00
Comments :	Formerly Shell low ash oil 15W-40

## Features

**Security**– Configure access to different menus and screens for different users. Set and maintain passwords.

**System Parameters**– Configure defaults for reports. Set up processes such as modem dialling to occur automatically or manually.

**System Data**– Enter and maintain system data such as fluid and predictor data.

**Log File**– view a transaction history of all data imports.

**Interface Modules** – Add laboratory driver modules and select which are active.

# SYSTEM REQUIREMENTS

This table outlines the hardware and operating system requirements and recommendations for Dingo Lube Professional's optimum speed and performance.

## Workstation

Operating System	Windows 95 or Windows NT 3.51 or higher
Processor	Pentium 166
RAM	32 MB for Windows 95 48 MB for Windows NT 3.51 or higher
Hard Disk Space	340 MB with 11 ms or faster access time.
Installation Footprint	3 MB for installation
Monitor	SVGA color with 800 x 600 resolution
Graphics Adaptor	1MB RAM
Parallel Port for Printer	Recommended
Mouse	Required

## Hardware Supported

Pall	Particle Counter PCF200
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## Oil Laboratories Supported

Australia	Amdel Australian Laboratory Services Mobil Oil Australia (EMPA & SOAP) Gough & Gilmore Australian Defence Industries Caterpillar SOS – Gough & Gilmore, Hastings Deering Dingo Lab Manager Industrial and Technical Services Spectrotech Laboratories
USA	Analysts Inc. CTC Analytical Services Butler Machinery Company Caterpillar SOS Darr Equipment Empire Machinery Ingelube (DDF) Insight Laboratories Minnesota Valley Testing Laboratories NC Machinery National Tribology Services The Oil Analysis Lab Inc Oil Tec Laboratories Inc Petroleum Technologies Quaker State Corporation Titan Labs Tractor and Equipment Co USX Engineers and Consultants Inc United Testing Group Vermont Non-Destructive Testing Wagner Equipment Company Wheeler Wyoming Machinery Company