

APPENDIX A. FLEET MANAGEMENT SOLUTIONS



Fleet Management Solutions

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FLEET MANAGEMENT SOLUTIONS

Introduction

Maintenance is a complex activity involving such variants as equipment, statistics, cost administration, productive activity, and business. These variants must be well administered in order to be efficient. In the past, maintenance decisions have been limited to what kind of action to use (corrective or preventive) and to the definition of such variables as best frequency, best predictive technique, and best information organization.¹ Today, due to the changing role of fleet management and maintenance, decision-makers also must also consider the coordination of the human, physical, logistical, and logical structures of maintenance, which in turn must be combined with previous variables to create an integrated administration.

Maintenance may be seen as a group of interrelated structures that share the common objective of supporting and/or executing actions to maintain or repair.¹ In the case of fleet vehicles, the variants are even more evident.² Factors such as size, responsibility of the task carried out, fleet complexity, market characteristics, and competition level vary markedly from one activity branch to another, or even from among geographical areas.

Traditionally, the information required to manage a fleet of vehicles has been derived from observations made at the maintenance facility, utilizing mileage,

¹ Frederico Freire de Carvalho Matos, (2000) "Methodology for Planning Fleet Maintenance Systems"

² Dolce, J., (1998) "Analytical Fleet Maintenance Management." SAE 2° ed. USA

consumables, operator defect cards, and other data.³ Today, more advanced technology allows vehicles to generate and store observations aboard the vehicles themselves. In this report we discuss some cost-effective technological solutions available to help fleet managers better manage their facilities.

Changing role of fleet managers

New organizational structures and expanded computing options have dramatically changed the nature of fleet management. Twenty years ago, maintaining equipment was generally the only responsibility that the maintenance manager had, and he did this within a budget allocated to him by upper management.

Today, the role of the fleet manager has expanded from "fleet only" to total maintenance management.⁴ Fleet managers must not only complete tasks but must also take responsibility for outcomes. The role of a fleet manager has changed:

- From operations specialists to marketing and communications experts
- From hoarding resources to sharing resources
- From a total focus on cost to total customer satisfaction
- From viewing departments as separate entities to embracing cross-functional responsibilities and outcomes
- From a focus on downtime to one on reliable availability
- From shop mechanic to computer technician
- From total ownership of all equipment to the maximization of capital and technology

³ Abrams E., Hide H., Ho L., McKnight C., O'Sullivan J., Price J., Schiavone J., Stark S., Venezia F.; (2000) "Transit Fleet Maintenance", Transportation Research Board publications

⁴ Nelson, P. (2000) "Reengineering Fleet Management" TRB Transportation Research E- Circular E-C013

- From owning and operating all fuel sites to a combination of strategies, including the universal card
- From outsourcing warranty work to becoming certified to do it "in house"

In order to keep up with their changing roles and that of technology in fleet maintenance management, fleet managers have had to adopt a systematic approach toward planning maintenance systems, with the objective of optimizing the different aspects involved in maintenance.

Planning maintenance management systems

Planning for fleet maintenance management systems begins with analyzing the requirements of the company (the operational requirements of the vehicles and the needs of the organization) with regard to fleet maintenance.⁵ These requirements further translate into technical objectives to be met by the planned system. Several different characteristics are analyzed: the organization, the vehicles, and operation conditions. While assessing the needs of the company, the following parameters need to be considered: environmental demand, commitments to punctuality, supply chain, quantity demand, security requirement, and human resource management.⁶

After analyzing the requirements of the facility, the fleet manager establishes a general idea of the functions and functional flow necessary for fleet maintenance involving, for example, inventory and parts ordering, scheduling for preventive maintenance, etc. Furthermore, each function is analyzed based upon available solution alternatives: manual or computerized management system, basic category of maintenance

⁵ Frederico Freire de Carvalho Matos, (2000) " Methodology for Planning Fleet Maintenance Systems.

⁶ Riis JO, Luxhoj JT, Thorsteinsson U (1997) " A Situational Maintenance Model." International Journal of Quality & Reliability Management v. 4

(regular inspections, corrective maintenance or preventive maintenance) and the basic repair functions (from non repair to complete repair of the vehicle).⁵

Finally, a fleet management solution is designed or chosen based on manual or computerized management options. Some aspects that need to be considered while choosing a computerized management solution are:

- Functional requirements that need to be met
- Cost effectiveness
- System flexibility
- Ease of use; and
- Training requirements and flexibility.

Computerized fleet management solutions

Fleet management incorporates many of the vehicle-based APTS (Advanced Public Transportation Systems) technologies and innovations for more effective vehicle and fleet planning, scheduling, and operations. It focuses on the vehicle by improving the efficiency and effectiveness of the service provided (the "supply side"), as well as on passenger safety. By making transit more efficient and reliable, it should be more attractive to prospective riders, transit operators, and the municipalities that are served.⁷

The need for the detailed and accurate recording of maintenance activities and resources has long been recognized. Because of the trend toward more powerful processing technology at continually decreasing costs, there has never been a more exciting opportunity to make significant advances. Increasing numbers of fleet

⁷ Casey, R., Labell L., Holmstorm R., LoVecchio J. (1996) "Advanced Public Transportation systems: The State of art", update '96, Federal Transit Administration

maintenance organizations are using computerized fleet management solutions (62% of fleet maintenance facilities use fuel management programs).⁸ Explanations for this practice include:

- Information availability: Computerized fleet management (with the help of the internet) allows real-time information to be made available to mechanics and supervisors on the shop floor, as well as to analysts and managers.
- Better decision-making: Fleet maintenance managers are in a position to make better decisions, if given the access to required information.
- Allows fleet managers adequate staff time to plan, design, and implement major investments. Simply running the operation consumes most available resources.
- Automation also allows fleet managers to evaluate the necessary trade-offs during the design and subsequent purchase of replacement vehicles. The key here is to strike a balance between the complexity of the vehicle and the ability of the workforce to maintain it.
- Fleet management systems help managers evaluate cost-effectiveness as a function of vehicle age.⁹

Fleet management systems allow for planned and scheduled maintenance. Planned or scheduled maintenance is considerably less expensive than running repairs performed in response to in-service failures. Industry consultants estimate that planned maintenance can effectively reduce per-incident maintenance costs by 50%. Shops that

⁸ <http://www.fleet-central.com/bf/fuel/stats.htm>

⁹ Abrams E., Hide H., Ho L., McKnight C., O'Sullivan J., Price J., Schiavone J., Stark S., Venezia F.; (2000) "Transit Fleet Maintenance", Transportation Research Board publications

take a proactive approach to this work by proper planning and scheduling can improve overall productivity by as much as 15% to 20%.¹⁰

There are many computerized fleet maintenance/management solutions available in today's market, providing such services as: maintenance programming and scheduling, work order management, fuel management, cost management, inventory management, warranty management, and human resource management.

Today's fleet management systems have evolved into powerful, high-tech tools that impact both the day-to-day operation of a maintenance department and the overall performance of a transit agency.¹¹ Fleet financial data once important only to the accounting department is now generating profit-and-loss information at the repair-shop level. Data that was once difficult to access is now at one's fingertips and can easily be manipulated into a variety of management formats.

Along with this accessibility has come the ability to analyze data, through querying the database for all sorts of information, resulting in big-picture, life-cycle cost figures as easily obtained as the cost of a single oil filter. Meanwhile, integrated features like shop-floor bar-coding and automated fueling systems not only increase system ease of use, accuracy and timeliness of data being collected, they also boost workplace productivity along with the quality of the work.¹¹

¹⁰ http://www.richer.ca/Enrich_overview.htm

¹¹ Paulits J., (1999) "Transit agencies turning to fleet management systems for tighter cost control", Mass Transit

Comparison Table

The table below compares some of the available software solutions, based on the range of desired services provided. An overview of the four software programs and their components follows.

Services \ Software	Enrich Fleet Management System	AutoManager-Lite	RTA Fleet Management Software	Vehicle Tracker by Squarerigger
Preventive maintenance	+	+	+	+
Materials/Parts/Inventory management	+	+	+	+
Fuel management	Optional	+	+	+
Work order management	+	?	+	+
Reporting/Budgeting (Cost management)	Optional	+	+	+
Human Resource management	Optional	N/A	N/A	+
Time keeping	Optional	N/A	+	+
Accident management	+	+	N/A	N/A
Software Package Price	N/A	\$4400-6900	N/A	\$2100-7150

❖ "Enrich Fleet Management System" from Richer Systems Group

Target Audience: medium to large fleet size maintenance facility

Package Includes:

1. Core system for preventive maintenance
 2. Integrated applications to manage vehicles, equipment, and component parts
- (Optional modules available at additional cost)

THE CORE PROGRAM

Preventive maintenance

Enrich provides the capability of recording and acting on any measurement applicable to the transportation industry.

Potential pre-defect triggers include:

- Brake pad thickness to trigger impending brake job
- Engine oil analysis to trigger engine repairs prior to failure
- Tire tread depth to signal rotation or replacement
- Engine ECM fault codes to identify defects
- Fuel economy deterioration to trigger maintenance

Warranty recovery

The system will advise technicians and supervisors about warranties in effect for work being performed on a vehicle and/or component and automatically generates recovery

letters, and calculates all costs incurred, including replacement and/or repair of the part, and the labor involved.

Parts and inventory optimization

A perpetual on-line inventory control system keeps track of all parts at all sites and the automatic updates saves data entry time and improves the accuracy of inventory tracking.

On-line vehicle history/repair assistance

The program maintains complete information on each vehicle and its component parts. Technicians can view images of parts or consult repair manuals from within the on-line work order screen.

Work order management

Enrich generates work orders for scheduled planned maintenance, work orders for parts rebuilds, and on-demand work orders for unscheduled maintenance and repairs. Each work order records the parts, labor, and material costs associated with each separate task on the work order.

OPTIONAL MODULES

- Asset Management
- Lease Rental
- Fuel Tax / Fuel Billing
- Payroll
- Human Resources
- Electronic Time Keeping
- Ad Hoc Report Writer
- Financials

Further information can be accessed at their website, *www.richer.ca*

❖ "AutoManager-Lite" from eFleet

Target Audience: Smaller fleets - 20 to 250 vehicles.

Package includes: All listed modules. Price is based primarily on size of fleet.

CORE MODULES

Vehicle Management

Displays summary information on vehicle servicing, driver history, financing, and performance details. The Vehicle Management module also stores all fuel card details. Including products approved for purchase and odometer/PIN prompts.

Cost Management

Provides the Fleet Manager with control of servicing, repairs, fuel and financing costs. Cost Management stores line-by-line invoice detail and maintenance history for each vehicle.

Fleet Reporting suite

Customized reports can also be created within the system, using the AutoManager 'Query Wizard'. This can be used for viewing or printing records from the system. AutoManager also has an 'Export' facility. This means you can export any data to other systems, such as Microsoft Excel and Access.

Fuel Management

Allows for the electronic import of transactions from your chosen fuel suppliers.

Accident Management

Process and store insurance details, claims history, third party details, repair details, and records required actions and notes. Accident Management provides the Fleet Manager with comprehensive reporting for accident analysis.

Driver Management

Stores all Driver Details, and allows for the allocation of Drivers to Cost Centers or Company Divisions providing extensive Cost Center analysis and FBT Reporting.

PRICE

50 vehicles or less: \$4400.00; 51 - 100 vehicles: \$5500.00; 100+ vehicles: \$6900.00. All prices are inclusive of GST. [Prices as of 7/1/02]

Further information about the product is available at www.efleet.com.au.

❖ "RTA Fleet Management Software" from Ron Turley Associates

Target Audience: General fleets, including trucking and taxi industries.

Content: RTA Fleet Management Software is a highly customizable package, with many user-definable features and options. Included are full ranges of reports, which give you immediate feedback on your fleet's performance.

CORE MODULES

Vehicles Module

Contains vehicle fleet information: each vehicle's history, current status and scheduled maintenance. PM's can be figured by days, hours, miles, kilometers or even gallons of fuel used. When a service is performed, the computer instantly updates the vehicle file, schedules future service, and resets the PM meter. Shop, labor, parts, tire, fuel per mile and a wide variety of other costs are also readily available.

Parts Module

The Parts module allows for automatic materials management. Parts used are automatically deducted from inventory, and inventory reorder points can be personally set or automatically set by the computer. The program tracks warranty parts and tells when a warranted part has been replaced or needs to be replaced. The system also tracks parts failure statistics, quantity used, warranty and price history, thus simplifying inventory control. The software creates part number and bin location tags in a standard

or bar code format thereby avoiding mistakes in part stocking, processing, and retrieval usually encountered with bar coded labels.

Work Orders Module

Updates the vehicle repair history, deduct parts used from parts inventory, updates and resets the vehicle's "PM meter", calculates and displays mechanic productivity, updates all repair cost reports, produces an audit trail, and creates customer invoices automatically. Records and paper work are completed as and when the work is performed, not as a separate task, thereby making work orders less work.

Fueling Module

Provides the control of fuel inventory and consumption. It tracks information about fuel use, i.e. the fuel delivered to, or used from, each tank, or dispensed from every pumps, as well as fuel purchased on the road. Fuel taxes are automatically calculated and charged from fuel tickets. Miles and gallons are used to update PM schedules and to provide information for vehicle cost reports. Updates to the vehicle cost per mile are calculated by the computer as fueling entries are made.

ADDITIONAL ADD-ON MODULES

Motor Pool

Keeps track of vehicle maintenance and fleet equipment. Custom billing rates, reservations, invoices, check in and checkout are a few of the features of this package.

IQ Report writer

Helps create custom printed reports, generate charts, and produce graphs. Information can easily be transferred to other program, due to its flexible formatting feature.

Multi- User System

Allows the use of the RTA software in more than one location, such that information can be accessed and updated from multiple computer terminal workstations, spreading the work to extra work areas.

Paperless Shop

Allows the fleet manager to track work as it is being done. Paperless Shop acts as a time clock and work order, thus eliminating the need for paper in the shop. Tracks start/end time, lunchtime, breaks and other user- defined categories. Paperless Shop is a great tool for tracking productivity and shop floor execution and control.

Tool Module

Allows maintenance and tracking inventory of tools within the RTA system. It records the purchase information, tracks availability status of the tools, the range of tools used and the costing.

RECENT UPDATES IN VERSION 5.8 (see website for a complete list)

4-digit Region Codes

Has the ability to group facility records into regions. Up to 4-characters can be used to categorize region codes. The region code is specified in the facility record (MFM or

8211) and user record (SUM or 8121). Users will be allowed access only to the facilities in their region or division. The End of Period processes for Vehicles and Parts have been adjusted to allow periods to be closed by region or by facility. The PM reports have also been modified to work with the region codes.

Facility Cost Summary (RA or 8214)

The Facility Cost Summary report has been modified to include facility overhead in the total costs.

PRICE

N/A

Further information about this software can be accessed from www.rtafleet.com.

❖ Squarerigger Corporation's "Vehicle Tracker"

General features

1. Maintain accurate history of equipment maintenance
2. Capture all costs related to equipment operations
3. Identify costs by fleet, group or individual units, and identify abnormal costs
4. Provide service and labor cost analysis for informed management decisions
5. Generate reports for governmental safety compliance
6. Track work orders, fuel, tires, parts, labor, employees, vendors and vendor prices, expiration dates, departments and customers

Preventive maintenance features

1. Flexible scheduling
 - a. Set by day, miles, hours or kilometers
 - b. Cascading (PM's within PM's) links eliminate duplication of work
 - c. No limit to the number of PM's you can create
2. 'Next Service Due' report lists equipment based on miles, days, hours or combinations
3. Meter change/rollover accurately handled.
 - a. PM's are based on the new readings
 - b. "Total miles" stay accurate
 - c. Cost per mile and mile per gallon values are unaffected
4. Full meter reading history regardless of source

- a. Bad readings are immediately obvious as they are displayed in red
 - b. Edit all values from one screen
5. Mass assign PM's to all vehicles or a select group
 6. PM forecasting based on average usage per normal work day

Repair features

1. Assign multiple mechanics, each with different labor hours, to a single service
2. Reason code can be assigned to each service, not just to the work order
3. Each service on work order may have a different date and/or meter reading
4. Service procedure checklist may be printed for mechanics signature
5. VMRS compliant but may include your own codes
6. Compliant with hazardous waste (HAZMAT) tracking
7. Custom labor rates (including flat rate pricing) tailored for each customer
8. Custom parts markup tailored for each customer
9. Rapid entry of random costs without a work order
10. Flexible work order billing by department or customer
11. Customizable line item billing
12. View part and service history while in the work order
13. Add parts, services, equipment or customers from inside a work order, 'on-the-fly'
14. Mass work order billing

Parts inventory features

1. Issue parts from any warehouse, in any unit of measure regardless of how purchased
2. Automatically alert and generate Return Merchandize Authorization (RMA) for part warranties
3. Buy out of stock or non-stocking parts, which automatically generates a purchase record, receives and issues the part – all ‘under the covers’
4. Use flat rate, margin or markup pricing
5. Select valuation method – LIFO, FIFO or last paid
6. Provides inventory level and valuation for any requested day
7. Complete audit trail of all part transactions
8. Stock levels may be different for each warehouse
9. Barcode parts or bins
10. Automatically create part requisitions based on stocking levels and order points
11. Automatically reorder parts and consolidate purchase orders to produce one purchase order per vendor
12. Sell parts with the over-the-counter sales function
13. Mass PO printing

Fuel tracking features

1. Eliminates data entry by importing outside vendor or Fuel Island Assistant™ fuel records directly into Vehicle Tracker™ fuel tracking
2. Links to automated fuel systems like Gasboy, Fuelman, PetroVend, etc.

3. Thorough analysis reporting can be summarized by any group and/or date range you choose
4. Easily transfer interstate fuel tax sums to state reporting forms
5. Fast, reliable, data entry with pick lists and automatic calculations
6. Full detailed IFTA data report

Tire tracking features

1. Cradle-to-grave tire wear analysis
 - a. Tread depth log by 32nd of an inch for each tire
 - b. Tread wear tracked by position on vehicle.
2. Recap tracking, sales tracking
3. Quick tire rotation
4. Miles per 32nd and cost per 32nd reports

Detailed analysis reporting

1. Mechanic productivity for services, comparing mechanics times to budgeted hours or company averages
2. Inventory level justification – slow moving or dead parts identification
3. Vehicle cost per unit of measure (miles, hours, kilometers)
4. Miles per gallon
5. Tire cost per mile

Other features

1. Full equipment component tracking includes parts, specifications, capacities, serial numbers, etc.
2. Customizable BIT & DOT report templates
3. Reports have powerful yet simple filtering to see only those items of interest
4. Fully customizable security may be tailored for each user
5. KwikView gives specific information fast and easily for each vehicle through an “Explorer” type interface

Current pricing information

Up to 50 vehicles: \$2100, (\$3600 with inventory tracking); 100 vehicles: \$5200 with inventory tracking; 150 vehicles: \$5850; 200 vehicles: \$6500, 250 vehicles: \$7150.

Future pricing information

Software will be available for small users (<50 vehicles) as Vehicle Tracker "Classic Edition", at a reduced price (but with less tech support).

Further information about this software can be accessed from:

<http://squarerigger.com/products/VTWin/index.htm>

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