3rd
EDITION

Plant and Vehicle Management Manual

Institute of Public Works Engineering Australia Limited

IPWEA
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA

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Plant and Vehicle Management Manual

Third Edition, July 2012

ISBN: 0-646-43419-5

Important Note to Readers

While information contained in this Manual is believed to be correct at the time of publication, the Institute of Public Works Engineering Australia, and their working parties and agents involved in preparation and publication, do not accept any liability for its contents or for any consequences arising from its use.

Foreword

What was your first experience with plant and vehicle fleets? Unless you are a plant and vehicle management expert, your experience might have been a bit like mine.

I first learned about the application of plant and vehicles in a Project Management elective during my undergraduate studies in Civil Engineering. This was followed, in greater depth, at the School of Military Engineering. The emphasis, in both cases, was on the application of plant and vehicles to engineering construction tasks. If there was anything on the management of fleets, it left absolutely no impression on me.

In retrospect, some of my military postings involving workshop operations, the specification and purchase of engineering plant and establishment of one-time repair limits, provided useful background to what lay ahead. However, the concepts of hire rates, optimum fleet sizes, plant and vehicle economics and the like were quite foreign to me after 16 years of military life.

My first appointment in local government was as works engineer to a capital city council. My responsibilities included management of the entire plant and vehicle fleet and the council workshops. But there were much more exciting things to be done, such as project management of the city's first pedestrian mall! I lived and breathed that project until one day the city engineer visited me on site and quietly advised me that the Plant and Vehicle Account was not looking very healthy at nine months into the fiscal year, and I should do something about it.

So began a very much deeper interest in fleet management. Unfortunately, the IPWEA *Plant and Vehicle Management Manual* was not available at the time, so I had to start from scratch, using whatever reference material was available at the time, and develop my own systems. Fortunately, they worked and, I'm relieved to find, share many of the principles contained in this Manual.

The importance of good plant and vehicle fleet management should not be underestimated. The Toowoomba City Council's plant and vehicle operations have recurrent expenditure of $7 million and capital expenditure of $3.5 million per annum—roughly 8% of the total budget. It represents a significant small business and any improvement in efficiency can reap significant rewards. In another local government, optimisation of light vehicle replacement resulted in savings of 25% per annum.

The IPWEA *Plant and Vehicle Management Manual* will provide a long-needed reference to best practice for novice and experienced practitioners alike. Its continuing development will be an added bonus.

Peter Taylor
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Former Chief Executive Officer, Engineers Australia
(Past National President, IPWEA)

From the Institute

The IPWEA is pleased to deliver a major update to this important document to the local government and public works industry.

In producing the original Manual in 2003, it was the aim of the Institute to raise the profile of plant and vehicle management as an essential part of business in public works. Since that time, we have seen over:

- 650 Manuals sold and two updates,
- 2000 people trained or attending professional development workshops and
- 290 enrolments for the popular Fleet Management Certificate

Each professional development workshop attracts new faces and record attendances were achieved at the 2011 workshops, which is a clear indication of the growing success of the IPWEA's Systems Plus Plant and Vehicle Management Program.

While the management principles have remained constant, there have been changes in many other areas of plant and vehicle management over the past eight years and this third update has involved a significant rewrite in recognition of the change.

Thanks must particularly go to the main authors, Grant Andrews from Uniqco International Vehicle Management and Ross Moody, IPWEA National Executive Officer (also the Editor), for their efforts in compiling this third edition of the Manual.

Thanks also go to the National Systems Plus Panel for their input and peer review and to those individuals and organisations who have contributed in some way.

The Institute sees the Manual as a 'live' document that will continue to develop over time and suggestions for improvement are welcome any time.

Any comment or contributions should be e-mailed to national@ipwea.org.au, or addressed to:
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I congratulate and thank all those who have contributed to this significant project.

Paul Di Iulio
National President
Institute of Public Works Engineering Australia

About this Manual

Introduction

The IPWEA *Plant and Vehicle Management Manual* provides public works professionals and civil contractors with far more than a general guide to plant and vehicle management—it provides vital information to assist in establishing an efficient and cost effective fleet management program.

Fleet assets represent a significant investment for local government and public works agencies. One of the aims of the Institute has been to raise the profile of this essential part of the business and to increase awareness of its importance among senior management.

Plant and vehicle management has long been the most neglected area of asset management, often overlooked for assets such as roads and buildings. Now, asset management and related business functions hold equal importance. Many leading business operations rely on a well-equipped and properly maintained fleet in order to provide a cost-competitive and efficient service.

The role of the fleet manager is now also that of asset and investment manager. The fleet manager must be concerned with returning the best value on the capital investment, not just financially but operationally and socially, as environmental considerations are also of importance.

Today, effective fleet management goes well beyond simply fixing vehicles when they break down! Issues such as right-sizing the fleet, replacing equipment, knowing when to hire, when to lease or when to purchase demand more attention than they have in the past. Fleet management is now far more complex and has to cover such areas as establishing programs to preserve the value of equipment investments; minimising the incidence of unscheduled repairs; and collecting, analysing, and reporting necessary data so that intelligent asset management decisions can be made.

Another important aspect of fleet management is the recognition that the primary service provided to customers is mobility. Organisational mobility is essential for providing public services by moving people, materials and tools to remote job sites. A Fleet Manager's customers' costs are not limited to direct expenses for such items as repairs and fuel, but also include the substantial indirect cost of lost employee productivity when plant and vehicles are out of service due to maintenance or breakdown.

Good plant and vehicle management demands that managers not only understand the mechanics of owning and operating a fleet, but are also able to communicate effectively with management, accountants and the broader public.

Best practice management is a balancing act: high utilisation of plant and vehicles, minimum downtime, and astute buying decisions.

This Manual forms the cornerstone of the IPWEA program Plant and Vehicle Management 'Systems Plus', which incorporates:

- this Manual
- training
- professional development workshops
- newsletters
- online Tools
- the Fleet Management Certificate.

What's in the Manual

The Manual starts off with a ***Quick Guide*** and the ***Top Key Performance Indicators*** for effective plant and vehicle management.

The Manual is divided into modules, encompassing all the significant aspects of plant and vehicle management in a public works environment.

Step By Step Approach

Most modules are introduced with a flow chart that provides a step-bystep approach for quick reference.

Numerous case studies are provided, detailing real examples provided by plant and vehicle managers in public works.

Acknowledgements

This Manual has been developed jointly by the Institute of Public Works Engineering Australia (IPWEA) and Uniqco International Vehicle Management.

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IPWEA and Uniqco wish to acknowledge the contributions made by organisations and individuals in delivering the third edition of this Manual to the public works industry.

Organisations and individuals providing content used in the Manual

Organisations

ALS Global
Daimler Trucks Australia/Pacific Pty Ltd
Fleet Safety Solutions
Thales Telematics Australia
Western Australian Local Government Association
Uniqco International Vehicle Management
Peter G Rufford, Director of PEECE Pty Ltd.
Matthew Turner, Plant Safety Assessor
Colin Supple and Associates Pty Ltd
Byron Shire Council
Sutherland Shire Council
Moreton Bay Regional Council
Rockhampton Regional Council
City of Stirling
New South Wales Roads and Maritime Services
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Quick Guide to Plant and Vehicle Management

An Overview

Why is it necessary to proactively manage the mechanical plant and vehicle fleet?

Apart from ensuring value for money is achieved from procurement and operational performance, actively managing the plant and vehicle fleet is essential to delivering efficient works and services.

- Managing the mechanical plant and vehicle fleet, like any other resource, requires accurate, reliable, timely, relevant and quantifiable information. Such data are required to set charge-out rates, undertake needs analysis and buy/hire assessments, develop maintenance programs, and set service and works programs and budgets. Next to employment costs, the plant and vehicle fleet rates a close second in determining total service and works costs.
- Procurement and management can be based on outdated policies that no longer reflect market conditions, and are restricted by capital and maintenance budgets that bear no relevance to operational needs or conditions. Replacement schedules can be inadequately resourced and replacement reserves can be seen as easy targets and a source for balancing otherwise unachievable budgets, or for delivering on previous commitments; or promises for works and services. Plant and vehicle management is a dynamic environment in which to work, so is subject to constant change. It is important not to lock into policies that may become redundant the day after they are introduced. Changing technology, differing markets and better management regimes make for a very dynamic mix. Plant and vehicle changeover policies that are flexible can take advantage of positive turns in the market for second-hand items by bringing forward the timing of changeovers or changing the fleet mix.

Case Study

After the 2008 global financial crisis, some organisations continued with a 40,000 km 24-month changeover policy for cars. Optimum replacement points have varied, and continue to vary, up to 5 years or 150,000 km. By being locked into a fixed change point, organisation cannot respond to market fluctuations and change vehicles at the lowest cost point.

Case Study

The motivation for a Melbourne metropolitan council to develop a business-case approach for fleet management arose after the council significantly reduced the plant replacement capital budget requested by the fleet operations department. The initial request was perceived to be well in excess of the level of funding the Council was prepared to allocate without more supporting information. The age and useful-life argument was deemed insufficient.

In response, fleet management, with some external assistance, proposed to undertake a best-value analysis for assessing each item of plant/vehicle/equipment and the options for renewal or purchase. A business case would be prepared that considered the financial benefits of the purchase and would be subject to prioritisation as an investment like other items of capital expenditure. In addition, information would be provided on the history of the item, for example cost and reliability. The business case would also consider options to replace/purchase, such as lease, hire and process change.

Financial analysis included use of Net Present Value (NPV) and Internal Rate of Return (IRR) for assessing the viability and ranking of options. A priority matrix was developed with criteria and weighting based on operational effectiveness and financial, staff and community benefits. The total score allowed a ranking of projects and a cut-off line to be drawn if funding was less than that required.

Policy and decision makers may see the plant and vehicle fleet as 'status symbols' for the relevant manager. This perception can be changed through detailed analysis of plant and fleet needs and operations together with a total life cycle 'value for money' approach to assessing plant and fleet requirements.

- Understanding the operational business unit's constraints and requirements is an essential part of good fleet management.
- Applying systematic analysis to the procurement, management and maintenance of the plant and vehicle fleet will provide a foundation to maximise the return on investment. This will be very difficult to achieve without an effective fleet management system.
- Plant and vehicle fleet items are capital goods. They need to be treated and accounted for in a similar way to fixed capital assets, such as land and buildings. In procuring capital goods, investment of capital from borrowings, reserves or the plant and vehicle operating returns (profits) is required.
- Investments in capital goods form part of the business strategies of a business aimed at maintaining, extending and improving the delivery of works and services.
- Investments in plant and fleet vehicles are aimed at increasing the performance and output potential of the operating business unit. Higher levels of efficiency are delivered through increased productivity and optimising service delivery.
- Utilisation is the key to the procurement and management of the plant and vehicle fleet. Low utilisation raises questions of ownership versus hire. There may also be issues relating to operational management, such as coordination of use between work sites and operational units.
- Promoting and rewarding innovation in the workplace can result in new ways of doing things with improvements in quality, productivity and cost savings. The fleet manager should take the time to observe and understand the business in which the fleet end-user is engaged.

Case Study

A regional city in central west NSW established a dedicated fleet management section in 1994. Prior to this, council was like most others of the time, where the engineer's or administrator's secondary task was to purchase and dispose of plant and equipment. The city recognised the old arrangement as being a relatively *ad hoc* process that failed to take advantage of the considerable saving that could be made by effectively managing a substantial asset – in this case a capital investment of approximately $15 million.

Prior to 1994, reporting mechanisms were poor. In many cases the council had little or no idea of the cost of operating and maintaining individual fleet items on a routine basis, and exception reports were time-consuming and difficult to extract. With a stand-alone fleet management section, the city was able to progress the management of the fleet from an operational function to a branch that could provide a strategic direction and a value-added service when providing plant and equipment to the organisation.

Case Studies

Some examples of innovations are:

- Traditional turf topdressing with sand using a fertiliser-spreading contractor. Most fertiliser-spreading contractors can adjust the delivery of their machines to suit topdressing. The high flotation required for agricultural jobs helps minimise damage on fine turf given the correct conditions.
- Side filling behind kerbs using a fertiliser-spreading contractor. By simply fitting a cross-feed conveyer to the back of a spreader bin in place of the spinners, contractors are able to feed soil over the kerb with minimal disruption to traffic.
- The use of a multi-handler in a yard application where there was a need for a forklift and a skid steer loader but utilisation could not support ownership of both. The advantage of this concept is that it allows greater utilisation of a forklift and loader in one machine. However the multi-handler may not be as effective as either of the specialist items.
- Demountable fire pumps and water tanks on

tipper trucks. By using demountable tanks on tippers, a tree-watering facility can be provided that will increase the utilisation of trucks while reducing the capital outlay to provide the service.

- Posthole borer on a crane truck. By having a posthole borer attachment for a crane truck, the borer attachment can be used when there is the requirement to erect poles, plant trees, etc.

Quick steps to managing the fleet

Step 1 – Measuring utilisation

How is utilisation defined?

Utilisation is usually measured by hours worked or distance travelled in a nominated timeframe, which for comparison or benchmarking purposes is taken as a calendar year.

Why is measuring utilisation important?

Without knowing the utilisation, an accurate assessment of the following management issues cannot be made:

- Is the item needed on a permanent or intermittent basis and should the item be owned or hired as required?
- What are the servicing requirements per annum?
- How much fuel and oil will be required per annum?
- What staff resources are required for servicing and repairs?
- What will the tyre wear be per annum?
- When can major maintenance be programmed?

Utilisation information provides the foundation for best-practice plant and vehicle management.

Step 2 – Address low utilisation

Where low utilisation is identified, a business case study may need to be made to ensure that the low utilisation is either acceptable due to the nature of the business or lack of hire options.

The business case for retaining ownership of an item with low utilisation must address the following questions:

- Is the item essential to the business operation of the end-user client?
- Is there a contractor available to provide a quality service at a competitive cost?
- Is the item to be dry hired? If so, at what cost? Are our operators sufficiently skilled to provide the service at a competitive price?

Step 3 – Establish internal hire rates from whole-of-life costs

To develop internal hire rates, it is necessary to first establish the average annual whole-of-life costs. The elements of whole-of-life costs include purchase price, resale value, opportunity costs (cost of capital), fuel, repairs, maintenance, insurance, oil, registration, and administration costs.

When establishing annual whole-of-life costs, budget items are allocated directly to either fixed or variable expenditure over a 12-month period. The sum is then either charged out as an annual rate or recovered via timesheet hours or engine hours or kilometres travelled.

A standard FEL replaced with a multihandler for general application in a works depot.

Case Study

A NSW central west council's fleet management section placed a high priority on the need to be cost competitive with external providers. Their business performance was measured by comparing internal and external hire rates for like items. As part of the reporting responsibilities, the fleet manager was required to provide an annual report to the council, which shows a direct comparison between internal and external hire rates.

Internal hire rates were regularly benchmarked and were found to be consistently lower (between 20% and 40%) than external rates for the same equipment.

As a result, fleet management outsourced a number of maintenance tasks, including tyre management and fabrication work. Specialised plant items were hired when required, as opposed to being owned, and the decision to hire or own became based on documented usage patterns and utilisation percentages.

Fleet management adopted the approach that if any item failed to obtain 65% utilisation, then a detail costing report would be required to maintain ownership. A pivotal role within fleet management was a centralised hire coordinator responsible for all external hire of plant and equipment. This was to ensure that all plant and equipment would meet the required safety standards, insurance and legislative requirements. It also allowed fleet management to provide the organisation with accurate usage rates and detailed reporting mechanisms.

Step 4 – Establish 10-year replacement program

The next step is to create a 10-year capital purchase forecast. A 10-year plan is recommended as most equipment will have up to a maximum of 10-year optimum replacement life. By budgeting in advance for a capital replacement program, fleet managers are making sure their financial counterparts are fully aware of their long-term capital needs. The planned replacement program can be funded using the depreciation and cost of capital components accounted for in whole-of-life costing.

Plant and vehicle replacement reserves are recommended in order to ensure plant is replaced in a timely manner without the risk of deferring replacement because of lack of funding.

Deferring replacements compounds costs by increasing maintenance costs, and reduces operational efficiency of services through downtime due to mechanical failure.

Step 5 – Monitor downtime and maintenance costs

Downtime is the hidden cost of fleet management. In many cases, downtime costs are substantial and fleet managers, just as much as owner/operators, need to be aware of how machine downtime can affect business unit productivity.

Downtime costs have two major components:

1. Hire of a replacement machine. This also incorporates the cost of holding additional machines in order to compensate for the mechanical downtime on other machines. Dry hire of an externally supplied machine may involve on-site and off-site charges and these to need to be incorporated into the hire charges.

2. Fixed costs related to the loss of an operational machine on a specific task. The fixed costs of a machine are the costs incurred as a result of ownership. These include licence, insurance and finance costs and depreciation. In addition to the fixed costs related to the plant, it is necessary to establish a cost related to the operator's downtime, subject to whether or not the operator is allocated another chargeable job while his machine is down.

However, there may also be costs associated with lost productivity of associated plant and labour, and these costs are often ignored in calculating the true cost of downtime.

Maintenance can be substantial and a good record of maintenance undertaken allows informed decisions for continual improvement of the fleet.

An awareness of the cause of failures enables the operational manager to have a proactive approach to staff training and correct equipment application. This, in turn, may result in reduced operational costs and increased equipment availability.

With established reasonable records on downtime and maintenance, fleet managers can use their information to effectively manage the cause and reduce the effect.

In order to reduce downtime, the fleet manager should consider:

- After-hours servicing.
- Ensure scheduled maintenance occurs no less often than the manufacturer's recommendations.
- Improving the training of plant operators.

Case Study

A typical example follows showing the cost of downtime for an organisation with a grader. The grader failed at 8.30am one day and the driver and supervisor spent most of two days recovering and replacing it with a dry hire unit. In turn, this held up the maintenance crew for some time at a cost of $1120. The cost of external dry hire of a grader for 26 days while the transmission was overhauled cost $9843. The finance and depreciation cost on the unit over the 26 days cost $1649. A total cost of $12,612 was incurred before paying for the repairs.

In addition, there was a further cost of $2826 caused by the downtime of the three trucks, roller, water cart and eight staff working on the grader operation. Therefore the total downtime cost was $15,438. This must be added to the repair cost of $28,400 to show the full cost impact of the failure.

Step 6 – Liaise with end-users in preparing specifications

Users of the plant and vehicle fleet have a substantial role to play in reducing the potential costs of the fleet. By incorporating input from end-users into specifications, the fleet manager will increase the likelihood that the most appropriate item is selected to undertake the task required of it.

All too often, when the fleet manager delivers the new item, end-users spend a substantial amount of time and money tailoring the vehicle to their needs. If these items are included when the vehicle is purchased, the modifications and tailoring are undertaken during production, thereby reducing the cost.

Case Study

An example of an incorrect operational specification is a situation where, traditionally, a skid steer loader was used to remove kerbing. The continual impact upon the end of the kerb to remove the concrete caused repeated drive chain failures. Subsequent replacement of the skid steer with a small excavator made the job more efficient and cost effective.

A second example involved a station wagon vehicle that was due to be replaced for a survey crew. After discussion with the crew, a crew cab vehicle with a tailored tradesman's van body was selected in preference to a station wagon. The crew were provided with a vehicle that could securely and safely store the theodolite, staffs, stakes and drawings.

At the same time, this allowed the manager to simply swap the body to the next crew cab at every changeover, reducing downtime and costs substantially.

Step 7 – Purchase and disposal

Purchase of plant and equipment in the public sector is an involved process that needs to be open and accountable at all times.

Step 8 – Consider regulatory requirements

Operating plant and fleet attracts inherent liabilities for an organisation directly related to various regulatory requirements. It is the responsibility of the fleet manager to not only be aware of regulatory requirements but to be proactive in ensuring compliance with the various Acts, Regulations and Codes of Practice in their jurisdiction.

Case Study – Adopting best practice principles

"The Principles in Practice"

A Queensland council commissioned a review of fleet services that resulted in a number of recommendations, including the need to appoint an experienced fleet manager who was given the brief to implement change in the following areas.

Fleet Management Software

Deficiency

There was an urgent need for the implementation of fleet management software to assist with the management and maintenance of council's fleet of vehicles, plant and equipment.

Improvements

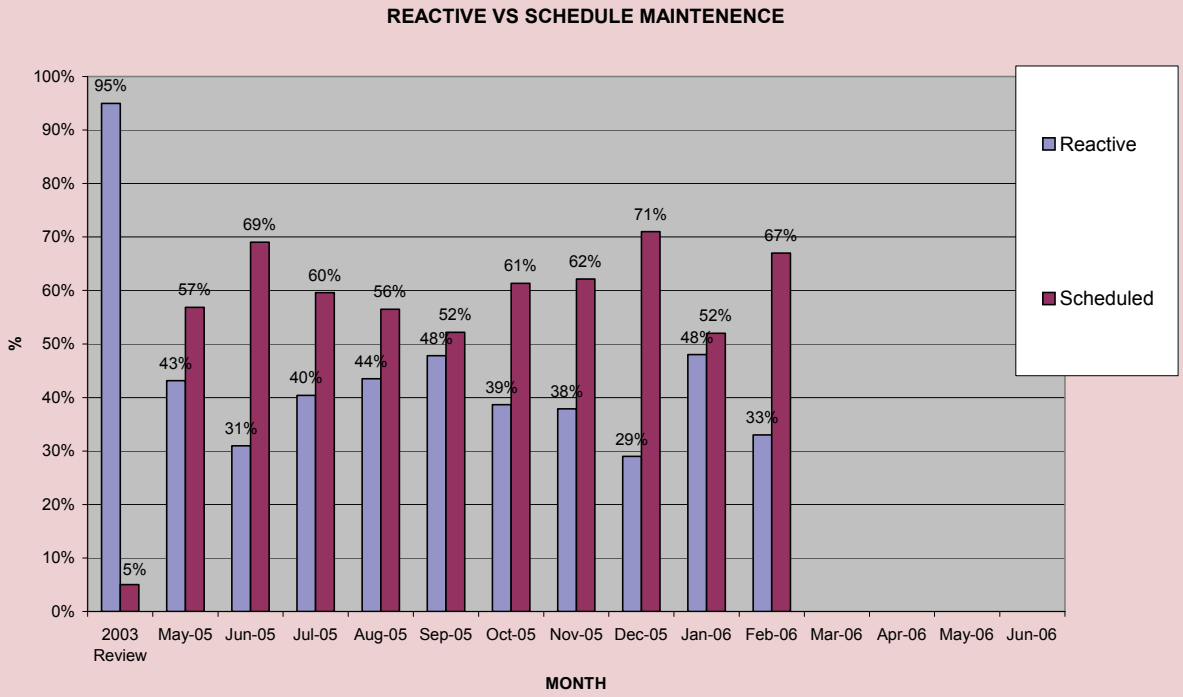
- Implementation of computerised maintenance and scheduling system for all vehicles, plant and equipment

Workshop Operations

Deficiency

Staff were giving their best efforts but were aware of the problems and wanted to learn and improve the business.

- 95% of workshop maintenance was reactive
- Limited preventive maintenance completed
- Maintenance staff had received limited training
- Limited processes in place for workshop operations
- Incomplete costing of repairs
- No job sheets
- Poor reporting of previous work carried out
- Staff had a blame culture
- Poor customer service was provided.



After the introduction of planned service schedules, reactive maintenance decreased to less than the target benchmark of 50%.

Improvements

- Increased frequency and quality of preventive maintenance
- Introduction of job sheets and costing of repairs
- New office accommodation for supervisory and administration staff
- Review of all suppliers
- Processes for defect reporting and fault rectification
- Training of operators/drivers in daily maintenance requirements
- Implementation of failure investigation reporting for all reactive maintenance
- Reduced outsourcing and insteadtrained internal staff, which reduced costs and improved skills
- Improved communication with customers
- Change of culture to 'building customer relationships' from one of 'blame'

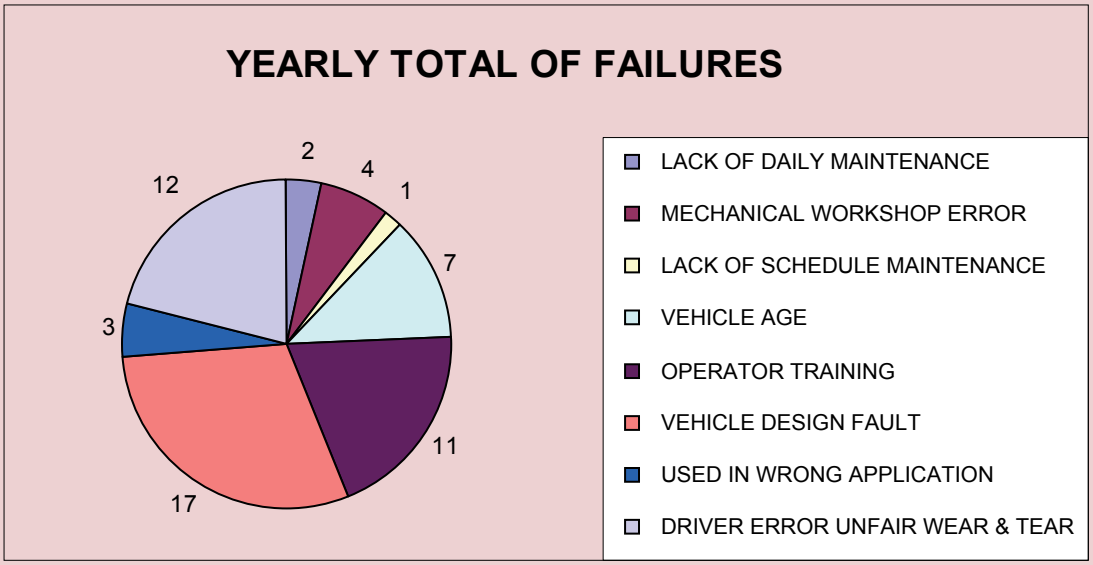
Fleet Management

Deficiency

- Chart of accounts was hard for staff to follow
- There was no whole-of-life costing for any assets
- The acquisition and disposal method was antiquated and ineffective
- Poor consultation with the users when purchasing new equipment resulted in a high level of downtime and expensive repairs
- Charge-out system relied on user work sheets to recover costs, resulting in under-recovery of most plant and over-recovery of frequently used plant
- The asset data base was incomplete
- Plant was being over-depreciated
- Fleet was being under-utilised
- Replacement of fleet was *ad hoc*
- No useable data were collected for the management of the fleet
- Fleet was often used in wrong applications, causing failure and downtime.

Improvements

- Liaison with finance department to streamline the chart of accounts
- Annual rates for all vehicles, plant and equipment
- Software to collect and analyse whole-of-life costing, failure trends and optimum replacement periods
- Regular meetings with customers to listen to current issues and future needs



Recording of reasons for failures provides valuable management information.

- An accurate fleet database
- A five-year capital replacement program based on optimum changeover for each type of plant
- A process for acquisition and disposal of plant and equipment, ensuring full consultation with customers, including supervisors, drivers, health and safety officer, and fleet maintenance staff
- A strengthened specification and tender evaluation process
- Disposal of underutilised plant it if the 'business case' couldn't justify ownership

Small Plant and Equipment

Deficiency

- Meetings with all sections of operational staff revealed a consistent dissatisfaction with small plant and equipment (chainsaws, weedeaters, etc.)
- Failure and breakdowns of small plant was impacting on staff's ability to respond to the region's needs
- Inventory inspection revealed:
  - more than three times the number of small plant the Council previously inventoried
  - 90% of small plant was rated as being in poor condition. Most had passed its useful life, with some over 12 years old
  - no controls on who could purchase equipment
  - major repairs were being conducted on equipment that was worthless
  - no preventive maintenance carried out – no training provided for users
  - mixed makes and models purchased
  - condition of equipment was so poor that user departments had to stock three times the number of items required, simply to cover 'downtime' of the equipment
  - A 'blame culture' existed between fleet and the end-users

Improvements

- Disposal of all items in poor condition
- Purchase of new equipment in consultation with customers
- Limit purchases of small equipment to only two brands
- Implement 'actual needs' analyses with users (kit for each truck)
- Implement scheduled maintenance system
- A replacement program
- Customers' input in the purchase decision to ensure equipment meets their needs
- A small-equipment hire service managed and run by fleet management
- Increased number of tradesmen repairing small equipment, from two to five
- Reduction in the number of items owned from 670 to 440, with downward trend continuing

Change Summary

The fleet section now has:

- A customer-orientated culture
- Measurement of utilisation
- Optimum replacement of plant, vehicles and equipment
- Calculation of whole-of-life costs
- Measurement of downtime and associated costs
- Recording and monitoring of downtime
- Maintenance failure reporting
- Monitoring of reactive versus scheduled maintenance
- Improved parts and materials controls
- Specialist servicing using private service providers
- Fewer mechanics

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