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CONTRACTOR EQUIPMENT MAINTENANCE: PROBLEMS AND OPPORTUNITIES

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Abstract

Maintaining acceptable machine availability and repair costs is a challenge for contractor operations where sophisticated repair support systems may not exist. This study defines the present state-of-the-art in contractor equipment maintenance through on-site interviews with a sample of contractors in eastern Canada. Differences from traditional company maintenance operations were noted and recommendations to improve maintenance strategies have been made.

1. Introduction

On woodlands operations, owner-operators or contractors can be attractive alternatives to operating and repairing company-owned equipment. However, several FERIC member companies saw their contractors struggling with mechanical reliability problems which often required high-priced, expert help not usually available in the contractor's crew. As the economic health of their contractors has to be of major importance to the forestry companies, FERIC initiated a project to investigate approaches or strategies which could be developed to cope with the problem of mechanical availability experienced by the modern owner/operator/repairer... the jobber.

The main objective of this project was to define factors which influence the efficiency of equipment maintenance on contractor operations and propose strategies or recommendations to encourage better equipment maintenance policies on the whole size range of small, medium and large contractor operations. The results have been written primarily to provide information to company woodlands managers but, as some of the recommendations may involve corporate policy decisions, company vice-presidents, equipment dealers and the owner-operators themselves should also be interested.

As an initial step, a series of visits and interviews (53) was organized to develop a profile of the maintenance organization and experience of woodlands contractors. The identification and prioritization of their maintenance problems was derived in part from a questionnaire type survey filled out during the interviews and in part, from observations and impressions gained during the visits. An important objective was to find out what successful jobbers did and identify the weaknesses in other operations which had cash-flow and availability problems.

The focus of the study was on eastern Canadian operations involved in harvesting and extraction, including roadside processing, but excluding the load, haul and road construction phases. The sample of contractors interviewed was deliberately selected to cover the full

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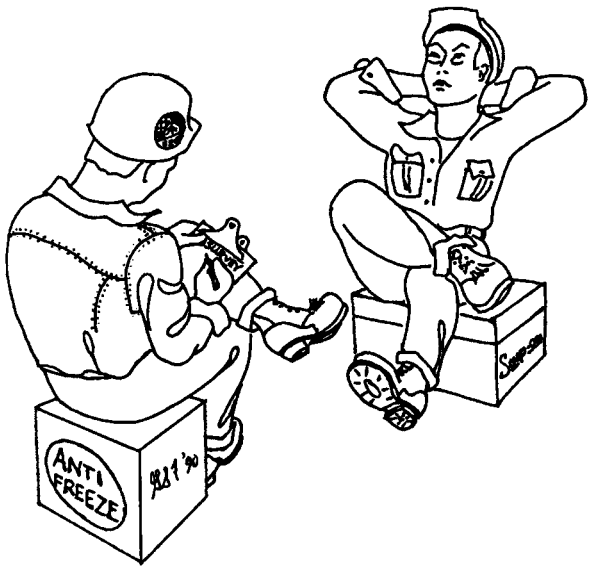
spectrum including large-sized (similar to company) operations, general contractors who sub-contract out every phase, small stump-to-roadside contractors and individual machine owner-operators.

2. Logging Contractor Profile

The operating style and business philosophy of the large contractors should not be compared to that of smaller contractors. Thus, it quickly became apparent that the first problem to overcome would be to define the various classifications of entrepreneurship. It was found that the number of combinations of contractors, equipment, employees and family relations was limited only by the imagination of the people involved. Contractors may be totally independent and responsible for their own banking, payroll, stumpage and workmen's compensation. However, depending on location, tradition, union and company policy, they may instead come under various "umbrellas" whereby they almost become bonus foremen.



"WELL, IT ALL DEPENDS..."

For this study, contractor size class was based generally on annual production volume. An analysis of the data showed that there were three distinct contractor size strata within the population (large, medium and small). It should be noted that this relative classification could vary if other criteria were considered. For example, a highly-mechanized operation may be classed as "large" according to annual volume production or replacement value of equipment, but "small" or "medium" when only the number of production employees is considered.

Large Contractors

Large contractors, representing 11% of those surveyed, typically employ 50 or more production workers and have a contract size of 225 000 m^3 or more annually. The replacement cost of their production equipment varies between $2 000 000 and $8 000 000. These entrepreneurs rarely have all new equipment at any given time, therefore the depreciated or present value of their equipment ranges between $750 000 and $2 000 000. They are often unionized, and if their operation is not within commuting distance of the labour source, they may be required to provide a live-in camp complete with cookery.

Medium Sized Contractors

Three-quarters of the jobbers sampled belong to this category, producing between 25 000 and 100 000 m^3 annually, with the most common scale of operation being 50 000 to 75 000 m^3.

Depending upon their level of mechanization, they may employ from 15 to 45 production workers. If the harvesting equipment were replaced new, it would cost between $1 000 000 and $2 500 000. The depreciated value of this equipment is between $250 000 and $750 000. A jobber in this group will usually have one or more mechanics besides himself on the payroll. Often those employees qualified to do mechanical repair work will also do other utility tasks such as install culverts, operate a bulldozer, etc.

Small Contractors

There are different kinds of small contractors. The owner-operator may process a large annual volume through only part of the total stump-to-roadside system, as in the case of a one-machine delimbing or slashing operation. Other small contractors may operate from the standing tree to primary landing with conventional skidders or with a harvester and a forwarder. The new replacement value of their equipment is usually less than $1 000 000.

3. Ownership and Operating Philosophies

There is a vast difference between the way owning cost is perceived by a private entrepreneur and the way it is

perceived by a large corporation. The word "depreciation" is meaningless to many logging contractors. To the contractor, owning cost means the monthly payment to the finance company, and it is simple cash outflow, just like wages or diesel fuel.

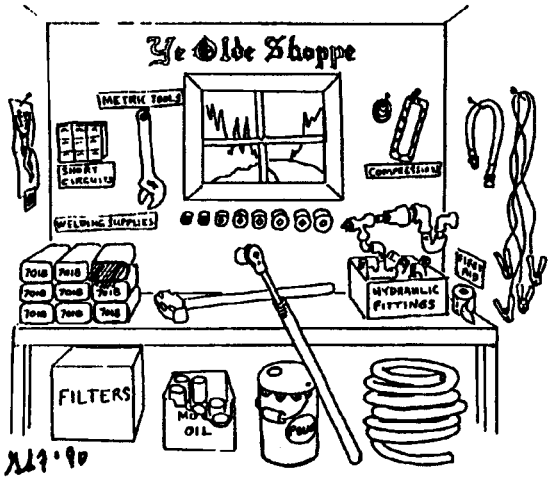
Two operating philosophies were apparent concerning equipment ownership and maintenance. Some jobbers prefer to keep their equipment new, work it hard on long, double shifts, taking full advantage of dealer assistance and warranty policies, and trading-in after three years. They feel more comfortable paying high owning costs to enjoy high availability and maximum production capacity. Alternately, other contractors feel that the best method is to purchase used machines, develop a comfortable working pace for their equipment and learn to maintain for long equipment life. This may have a negative impact on availability and possibly on operating cost. Often these operators keep a larger number of machines, so spare units are available in the event of breakdown. This however encourages cannibalization, a costly and inefficient parts replacement policy. The choice of an operating philosophy depends among others on personal style, availability of capital and the size of the contract.

Regardless of size of operation, the major service was invariably taken more seriously than the daily or shift service, and either a hired mechanic, or the owner looked after this task. In the smaller operations where there were no designated mechanics, one of the most mechanically-inclined operators did the major service on the various pieces of equipment. Implementation of the major service schedule varied from very strict to whenever the machine was easily accessible.

4. Factors that Affect Equipment Maintenance Efficiency

During this exploratory study, a wide cross-section of people was met and a large variety of situations was encountered. Thus, recommendations for improvement in efficiency of maintenance management will necessarily be general in nature. While a comprehensive list of problems has been generated, the solutions are more difficult to define.

High levels of downtime for servicing and repairs on sophisticated machines are costly. The reduction of downtime-related costs is as important as reducing cost by achieving high productivity during production time. The increase of productive machine hours (PMH) per shift will usually result in a decreased average cost per m^3.



As money is spent on mechanical support (field garages, service vehicles, equipment and repair parts, training mechanics and operators, and improving components that fail), machine availability increases. Following the law of diminishing returns, improvement is fast at first, then it slows down to a point where much more must be spent on support services and facilities to achieve a small improvement in availability. The goal is to find the optimum level of investment in facilities (garages, generator sets, power tools, etc.) that remains cost-effective for a specific operation.

4.1 Security of Contract

The duration of logging contracts awarded by the forest companies to their contractors has traditionally been for one year, although it is generally understood that the contract will be renewed the following year. While longer-term relationships are implied, sudden changes in demand for wood fibre may result in sudden increases or drastic cuts in contract volume.

Financial backing is difficult to obtain without a long-term commitment. The purchase of expensive, specialized equipment may be required for the most economical cost per unit of production. Yet, it is difficult to run sophisticated equipment without the construction or the acquisition of support facilities such as garages, special tools and diagnostic and testing equipment. Furthermore, specialized mechanics are not easy to hire on a short-term basis.

Efficient maintenance practices call for sound business health. A jobber whose cash flow is disrupted by a prolonged shutdown may suffer severe financial problems. Spare parts purchases are last in priority after payroll (including the tax responsibilities of payroll), then fuel, then operating supplies and emergency repairs, then 30 day accounts to avoid "C.O.D."

purchases, and then machine payments to defer repossession of equipment.

The forest companies are encouraged to examine the impact of their policies regarding the duration of contracts on the ability of the contractors to produce at a cost favourable to the company and at a profit margin acceptable to the contractor. *In general, a one-year contract does not favour adequate management of logging equipment maintenance.*

4.2 Labour Aspects

A key factor to improved efficiency is to attract and keep good, conscientious operators by providing them the best living and working conditions. Where distances and the labour resource so permit, a contractor may be able to avoid the high capital and operating cost of a live-in camp by running a commuter operation. If this is not possible, it may be a cost advantage to the jobber on non-unionized operations, where conditions and tradition permit, to run an on-site trailer camp. In many cases, these camps are tidy, and very handy for the independent owner-operators to live close to their work. They may even have their families with them.

Geographical areas differ in their availability of skilled workers, operators and mechanics. Thus, contractors have to react to the labour resource and act accordingly. When labour supply is high, the owner can be selective. When labour supply is low, owners must direct more of their efforts at recruiting, training and keeping those workers.

On large, unionized company operations, machine operators are usually discouraged from participating in mechanical repair. On contractor operations, this practice seems to change. Even on large, rigidly-unionized contractor operations, machine operators somehow become involved in assisting the mechanic while their machine is down. On two-thirds of the operations visited, minor repairs were performed in large part by the operators. This was especially true on smaller operations. In some cases, these repairs were crucial since the piece-work operator's wage simply stopped until his machine was back to work. At most of the remaining surveyed operations, the operators did 10 to 25% of the minor repairs, which consisted mainly of on-the-job hose changing. However, there are always exceptions; the owner of one tightly-run operation, which employed a full-time dedicated mechanic, claimed that his operators never touched a wrench.

All contractors interviewed claimed to have a daily service and major service schedule of some kind. In some instances, the operator was paid extra for performing the daily service, but generally this work was carried out by the operator during his regular shift.

Training courses can facilitate repairs by the operators. For example, courses on hydraulics and electrical systems for mechanics would be an asset. Regional technical schools should be encouraged to develop such training programs for contractors.

4.3 Financial Control of Repair Cost

Contractors have to weigh the cost and difficulty of obtaining production and cost information on their machines against how much benefit this information brings to them. There are marked differences in attitudes toward cost control and these usually relate to the size of operation.

In a company operation or on a large contractor operation, the annual volume can justify the cost of an employee dedicated to keep track of parts and labour by individual machine, job or employee number. Medium-sized contractors, on the other hand, have to spread their overhead labour costs over many functions. For example, the mechanic may also drive the lowbed, install culverts, push trucks with the bulldozer, and serve as a spare operator. In the case of the small operator, these tasks all have to be done by the owners themselves, or their partner, or a family member.

Sometimes, the gross total month-end production figures and cash flow cost information is all that appears to matter. An annual financial report which is required by the bank to justify a line of credit has little value as a guide for day-to-day operating decisions.

"MY KIDS SAY IT'S AS EASY AS 1-2-3"

A small effort toward record-keeping can represent a very real pay-back in equipment operating cost. A notebook kept for each machine with entries made when new or rebuilt components are installed, or when major repairs are done, can be used to follow-up on warranty claims for example. These file records also serve to identify the machines which are the source of problems, as well as those which are profit-makers. A simpler, though not as effective system, would be to keep a logbook in the service truck and make short notes of all repairs to all machines for component life tracking and future reference. However, reports on daily production, downtime, reason-for-repair, etc., are valuable only if there is a follow-up.

Business management courses have historically been well received by contractors. These may be sponsored by the host company, and taught by consultant Registered Accountants during evening sessions or weekend workshops. Provincial government subsidies are sometimes available for such programs.

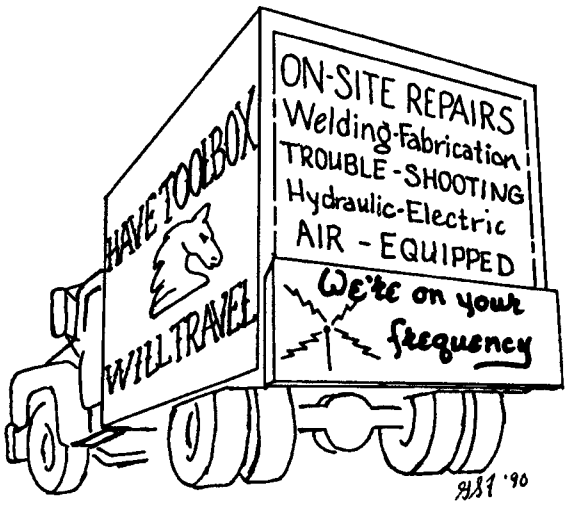
4.4 Diagnostic Skills and Tools

The implementation of strategies to reduce equipment cost and downtime is often hindered by a lack of proper tools. Large contractors may be able to justify hydraulic test benches and electronic analyzers to verify in-house repaired components before re-installation, or to diagnose black boxes. They also may be able to afford specially-trained tradesmen to rebuild components and old equipment in spare time toward cutting costs or generating revenue through resale. The same remarks apply to dedicated tiremen, parts expediters, etc.

Medium-sized contractors, however, do not harvest sufficient volume to cover the overhead of such useful but expensive tools and techniques. Thus, for other-than-normal service and emergency component exchange, they must call the dealer's serviceman or transport the machine to a repair shop.

Small contractors usually own a welding machine, a good tool box, and some hydraulic hose and fittings. Unless they are competent mechanics first and contractors second, they will have to rely on experts to diagnose problems and advise on what parts to order.

It may take two hours or two days to get a dealer's service representative to a contractor's worksite. If the warranty period is passed, this becomes a major out-of-pocket cost. Lost revenue from downtime can never be regained. The cellular phone network is expanding and it is now possible to install a phone in one or more of the production machines. The dealer's service representative could then be called directly from the machine for assistance in diagnosis and parts ordering.



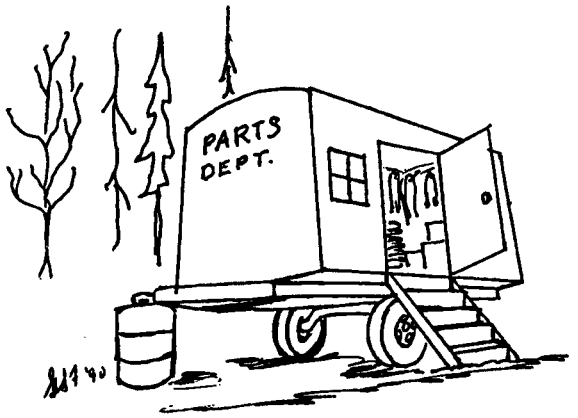
"WOULDN'T IT BE HANDY IF SOMEONE..."

Diagnostic skills and tools must be made available to contractors when and where they are needed. Several contractors expressed a need for a mobile, heavy-equipment repair specialist in their area. Such an entrepreneur would carry various equipment brand parts, supplying a service needed after the warranty period is over. He would have testing and trouble-shooting tools which no one single operator can justify.

Sophisticated harvesting machines demand a few vital diagnostic devices, such as hydraulic pressure gauges which cover the range of pressures from 3.5 to 35 MPa (500 to 5000 psi). Modern harvesters also require access to a multi-meter and test light for electrical circuits. Such tools are not expensive, however they require trouble-shooting skills to know how to use them. *Shop and machine reference manuals are available, and it is imperative that the successful contractor be very familiar with these.*

4.5 Parts Inventory & Management

Over 50% of the contractors surveyed claimed to have less than $25 000 in repair parts inventory. Cost control of these inventory parts ranged from fully-staffed, computerized information systems on the largest operations to a parts box in the back of a pickup on some of the smaller operations. Over 80% claimed they had a policy on parts issue/control. On deeper probing however, only 13%, mainly in the larger group, actually had one individual who was responsible for this task. However, the machine owners, who often order and pay for the parts themselves, do have a general idea of their actual repair cost.



Contractors of all sizes tend to run with as small a staff as possible, so they often do not know the frequency of turnover of most repair parts. Many contractors' parts vans run informally on a self-serve basis. This makes for difficult parts cost control by machine number, and encourages ordering parts after the failures. In some special situations, the operating site may be located where parts can be delivered overnight by scheduled bus. This works well only if the local supplier carries a good inventory of spare parts. Some manufacturers identify the fast-moving parts which should be stocked at the logging site. This is not always the case, and it is unrealistic for a busy contractor to consider an optimum parts inventory study.

Spare parts must be available readily and promptly when and where needed. One way dealers can help improve the situation is to carry an adequate inventory of parts in their warehouse. The equipment dealers' approach to dealing with the jobber has to be different from the traditional approach to large company-owned fleets. *The sales representative and service manager have to meet the contractor and understand his needs.* This requires more work for the sales representatives and a clear understanding of how the contractor thinks. A well-stocked, well-managed and easily accessible inventory of parts at the dealer's warehouse will go a long way to alleviating the frustration of contractors who cannot afford to keep their machines out of production for prolonged periods.

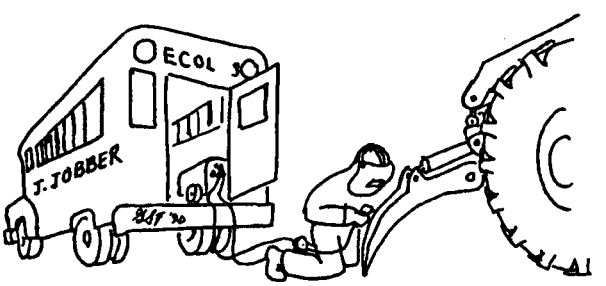
4.6 Garage Facilities & Maintenance Equipment

There were a variety of maintenance facilities in use with some contractors having more than one type. The larger contractors often had a well-equipped main garage staffed with five or more mechanical tradesmen, a staffed parts department with in excess of $100 000 value of spare parts, and one or more field shops with dedicated service trucks. Such operations resembled those with large company-owned fleets of equipment.

Medium-sized contractors usually had an unstaffed main shop building, often remote from the operation, for seasonal overhaul work while others had priority access to a main garage and mechanical staff, operated by a third party, usually the host company. An operation of this size cannot support a sophisticated parts department, but invariably there is a spare parts inventory kept on site. A retired school bus is commonly used as an office/parts department. There is often no enclosed field shop.

The successful small contractor generally knows how to weld and repair. They may not employ a mechanic dedicated solely to repair work, but they will often employ operators who possess some mechanical skills. The jobber's pickup often served as a mobile service truck, even though he might have a garage remote from the operation.

In addition, there were other facilities and services commonly found on contractor operations. Three out of four jobbers either owned a lowbed or had quick, priority access to one. Only one contractor interviewed did not have a welding machine. Many of the jobbers interviewed (62%) owned and used hydraulic hose presses. This included many of the smaller-sized operations.



It is difficult to establish what a contractor should have in the way of garages and repair facilities. *Ideally, it should be the minimum amount which will keep the equipment operational.* The investment in support facilities depends greatly on the distance from the worksite to the nearest for-hire service garage.

There are many alternatives for storage of tools and parts. The relocatable garage on timber skids or steel I-beams is handy because smaller equipment like skid-

ders and pickup trucks may be serviced inside. These buildings can be moved, although this is not an easy task.

Retired 5th-wheel highway vans converted to parts storage depots are popular. All sizes and shapes of such vans may be found on contractor operations. These are easy to relocate, and serve as good parts and tool storage, lunch room and office facilities. They do not offer any enclosed, protective space for equipment repairing, however.

The one-ton or two-ton service truck can be driven to roadside sites for on-the-job repair tasks. It is especially useful for major service jobs because filters, oil and a few repair parts may be carried in stock.

A wood-frame structure with polyethylene plastic covering is a low-cost alternative to provide a sheltered area for maintenance work on smaller machines or parts of larger machines. While the temperature may not be warmer than on the outside, protection from wind and rain facilitates repair work. When possible, owner-operators may negotiate a deal with the host company, or with an independent third party, for the use of a bay in a main garage as required for major repairs or for seasonal overhaul work.

The contract size and time frame must be adequate to cover the owning cost of machinery and facilities. In those cases where cutting is done by large-volume contractors, there must be a time provision to write off the large capital investment in camps, garages, maintenance support facilities and expensive harvesting equipment.

4.7 Summary of Key Recommendations

- The forest companies are urged to extend the duration of logging contracts awarded and the tenure of the cutting areas allocated. Contractors can then proceed to acquire the mechanical repair support facilities and systems allowing them to operate more efficiently.
- Contractors should provide the best living conditions possible for their operators to reduce personnel turnover.
- Companies can help the contractors improve their business management skills by providing business and computer training courses. Hydraulic and electrical system courses for mechanics would also be an advantage.
- The larger contractors can improve their operating efficiency and equipment availability by acquiring a portable garage, by hiring a parts clerk/garage accountant, and by putting cost control and parts inventory onto a computerized tracking system.
- The machine maintenance efficiency of medium-sized contractors will improve by arranging access to a garage for major repair work, by providing a locked (controlled) parts van on the worksite, and by acquiring basic diagnostic and troubleshooting instruments.
- Small contractors have to become resourceful in many ways to improve the reliability of their equipment. For example, a suitable garage can be built using a wood framework covered with industrial plastic. A log book of repair parts used for production machines is a start in the right direction.

Miscellaneous advice by successful jobbers for improving the availability of equipment was collected during the on-site interviews. Here are some of the most frequently-heard recommendations:

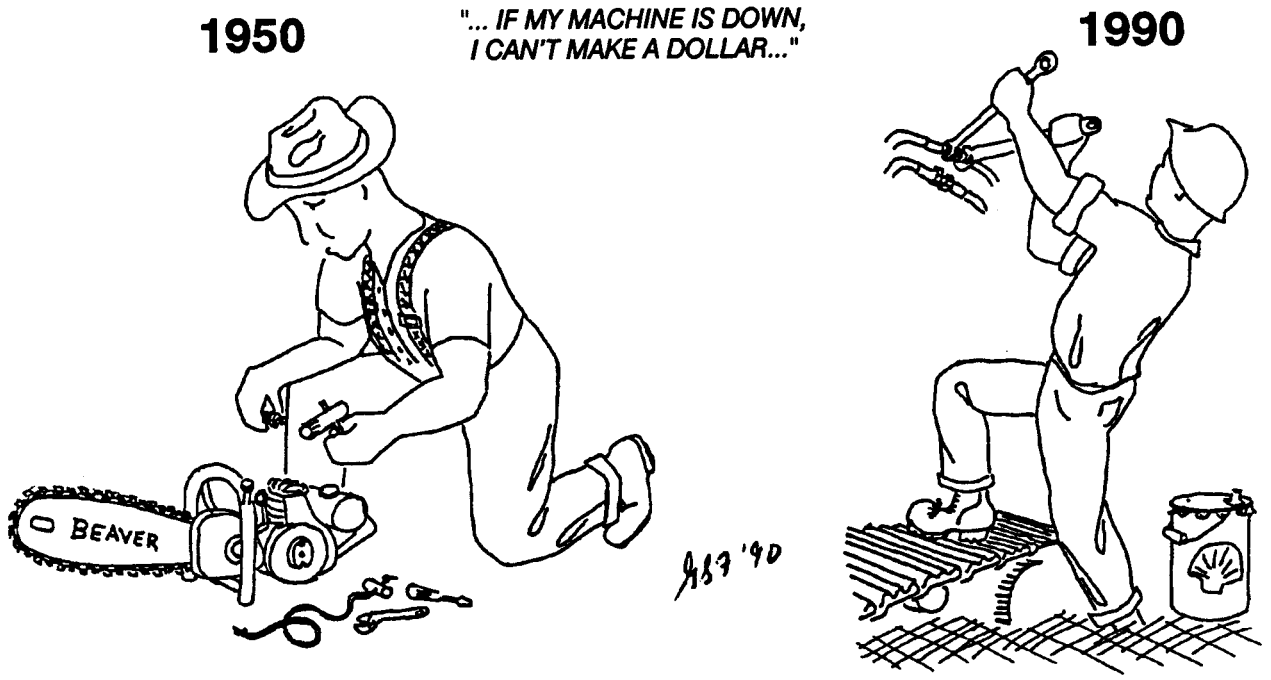
- Preventive maintenance (starting with good cleaning and housekeeping practices) is more productive than corrective modifications or becoming skillful in how to do a recurring big repair job.
- The small repairs or modifications that do not affect the performance of the machine should be done when the machine is scheduled for service.
- Operators should be able to repair the machines that they operate.

5. Conclusion

In this preliminary overview of the contractor equipment maintenance situation, some very good and efficient operators were met, as well as some surprisingly inefficient ones. Certainly, all contractors met were highly motivated. Almost always, there was an obvious good rapport between the contractors and their employees. A good relationship between the company and contractors was apparent in most cases.

A reasonable goal to aim for, in fifteen words or less, is "minimum delivered fibre cost to the mills, at a profit margin attractive to the entrepreneur". It makes good business sense to help the contractors become more efficient. One of the ways to do this is to help them understand their costs, especially in the area of maintenance and repair.

FERIC's goal was to explore the state-of-the-art of equipment maintenance on contractor operations. Once the major problems are identified, they can be prioritized so that a long-range program may be formulated for the forest companies, their contractors and the equipment suppliers, leading to a reduction in overall repair downtime and costs.



"THE MORE THINGS CHANGE..."