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Organizational Factors Affecting Trials of New Logging Machines

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PREFACE

The trial of a new logging machine may seem to be largely a matter of "common sense". Thus, many of the organizational factors identified in this report may appear obvious, and the discussion may even seem condescending. However, ideal machine trials -- like ideal operations -- are easier to envisage than to execute, given the pressures, conflicts, and general problems of the real world. Machine trials often fall short of their intended purposes; the examples cited in this report are fact, not conjecture.

This report is intended as an aid and reminder to help those planning machine trials to recognize and avoid potentially troublesome situations, in which, for whatever reasons, a machine is not evaluated effectively. Granted, realistically some organizational trade-offs from the ideal must be expected but these should be identified and recognized as points which must be given special attention and interpretation. As much as possible, a serious attempt should be made to minimize the effect of external influences on the machine trial.

INTRODUCTION

Trials of new logging machines are usually undertaken and reported as if they followed a simple pattern: A company arranges to test a prototype, or borrow, lease, or buy a promising new machine for a field trial. The trial proceeds, with operators and mechanics gaining experience and improving their performance. The manufacturer or user often makes the usual repairs and modifications common to the break-in or debugging period with a new machine. After several weeks or months, internal (and occasionally published) reports indicate that the new machine has been successful or unsuccessful in various work situations and that its productivity was X cubic meters per hour at a cost of Y dollars per cubic meter. From this experience, the company compares the new machine with conventional practice or other new machines, and decisions are made as to whether the machine should be rejected, modified, or continued in use.

However, the situation at an actual trial is usually much more complex than just stated. Typically, two parties are involved, the manufacturer and the user, each with different interests and goals. Moreover, the manufacturer may function through a distributor while the user may range from a large wood-using company to an individual contractor. In some instances a user group of two or more companies may be formed to share the high costs of machine development.

The purpose of the trial varies in each case and is determined to a large extent by the stage in the machine's development. A prototype requires a different testing approach attitude than a production model. Often a system is under investigation rather than an individual machine. The system can contain one new machine or a number of new machines introduced together or at different times.

Organizational factors further complicate the realization of the true potential of a machine. These are the underlying and unmeasurable factors which involve the way in which a machine trial is planned and conducted.

All trials involve two major assumptions, which are seldom recognized explicitly and which are often not true:

1. Operators, mechanics and supervisors of both company and manufacturer are knowledgeable and competent.
2. All concerned have a high and unbiased desire to let the new machine show what it can do, so it can be judged on its merits.

To state these assumptions is to raise doubts among those who have participated in such trials, and even more among those who have had the opportunity of carefully observing other people's trials.

A review of FERIC experience, based mostly on observations during evaluation studies, shows that trials are much more complex events than are generally recognized and that the conditions of the trial often appear to affect or bias the judgement of those who have initiated the evaluation. The organizational factors discussed are based on 16 PAPRICAN and 12 FERIC studies covering the period from 1970 to date, as well as experience gained from some machine trials without published results.

In established mechanized operations, two basic questions underlie every trial of a new machine:

1. What is the expected "successful" outcome of the trial?
2. Who wants the machine to succeed or fail?

The first question is fairly obvious, and yet it is sometimes overlooked. "Success" may be defined as reducing wood costs in a specified kind of operation (e.g., felling, limbing, and topping) compared with alternative machines and methods; or as contributing to a reduced total system cost, even at the expense of higher costs for the machine itself. For example, a machine may incur higher direct costs than a cheaper competitor but offer an advantage when the full costs of labour are taken into account. Long-distance forwarding may be more costly than short-distance forwarding, until road costs are included. A harvester may be tried not under easy conditions that would minimize its wood costs (clean, long-boled jack pine), but with short, limby spruce, where the object is to replace more expensive or unavailable manual methods.

To a user, success may not be indicated by a quantifiable cost savings. Instead, success may be the possibility of maintaining a productivity and cost level with a smaller labour force or with less-skilled operators and maintenance personnel, with less risk of environmental damage or with better employee safety and job satisfaction.

On the other hand, the manufacturer may measure success simply as the sale of a machine. Or, in early machine development, a machine trial may be considered successful if it demonstrates a viable new concept from the drawing board.

The second question (who has a stake in successful outcomes?) is seldom asked and less frequently answered. The implicit notion is that everyone involved has a strong neutral desire to make a fair, unbiased trial. Our experience fits the pattern

often observed in other industrial situations: It may make a big difference who is promoting the trial, what his objectives are and are perceived to be, and who feels reassured or threatened by the very fact that the trial is taking place. The machine trial may introduce or aggravate conflicts between working groups, either vertically (division or woodlands manager vs. camp people; camp management vs. operators) or horizontally (operators vs. maintenance staff).

Evaluation reports now generally include data on important stand, operating and environmental factors that have been found to affect productivity. Beyond these relatively visible factors lie others, whose existence and effects are well recognized, but which have been overlooked in some logging machine trials. This paper intends to identify and describe some of these factors, based mainly on observations and informal reports during FERIC evaluation studies. While these observations and interpretations conform to those made in other industrial fields, they are presented here not as research results but as points that deserve (a) more attention from the managers of machine trials, whether the user or manufacturer, and (b) additional attention in the planning and conduct of research and industrial evaluations.

ORGANIZATIONAL FACTORS AFFECTING MACHINE TRIALS

This section presents a number of strategies for both the manufacturer and user to consider, first individually and then together, in planning a machine trial. It must be recognized that the purposes and roles of these two groups can differ in the evaluation of the same machine. Specific examples from FERIC's experience (summaries of some actual observations are included in italics) demonstrate how organizational factors have influenced machine trials. While the same factors have not been evident on each evaluation, some form of organizational factor or combination of factors appears to have had an adverse influence on many machine trials. This influence could have been prevented or minimized if the organizational factor's importance had been recognized during the planning stage of the trial.

1. GUIDELINES FOR THE MANUFACTURER IN ORGANIZING MACHINE TRIALS

Good intentions - a desire to show a machine at its best - are necessary but not sufficient to ensure that the new machine will pass its trial successfully. Given a well-designed and -operated machine working under favourable circumstances, a manufacturer is usually able to assemble operators, mechanics and supervisors who can be counted on to make the machine look

good. However, not every manufacturer's demonstration goes this way. We have all seen demonstrations in which inexperienced or untrained operators and servicemen have staged disastrous displays, despite the positive intentions of the manufacturer or distributor. As well, the selection of uncommonly good stand and terrain conditions or improper reporting of time elements will be recognized as such by experienced observers and can also lead to unrealistic expectations by the manufacturer and future buyers. (Staged demonstrations should not be confused with serious machine trials, which are the subject of this report).

1.1. Define the Stage of Machine

The machine stage is a key to determining the purpose of the trial; it determines the responsibilities of the manufacturer and the roles of members of the manufacturer's organization. Agreement on the machine stage between the manufacturer and user leads to a clearer definition of respective roles, thus lessening areas of potential conflict. Further suggestions are given under each machine stage.

(a) The Prototye Machine

Since the purpose of the prototype is to determine whether the concept is viable and to find faults, there should be a minimum of "spectator" interference and only a secondary regard for wood production. Thus, the test site should be separate from regular operations, yet not so far as to create inconvenience for access and service.

The trial must be organized to maintain enthusiasm and momentum. An ample supply of parts and proper tools must be on hand, and arrangements must be made to have facilities readily available for major modifications.

This debugging stage requires regular attention from design engineers. The trial length should be adequate to test the operating characteristics and suitability of new components.

During the trial of a prototype harvester, the lack of parts and tools, and the delays caused by a crew filming the machine seriously hampered the momentum of the trial and the advancement of modifications. The initial operator could not speak the same language as the mechanics and thus they could not describe the small problems which are noticeable only to the operator. As

well, the design engineers rarely visited the field trial. Each of these factors may have had a small effect but their combined impact seriously reduced the effectiveness of the trial.

(b) The Preproduction Machine

With a preproduction model, modification and debugging are still prime considerations. However, there should be more concern about wood production. The machine should be tested under a range of field conditions to determine their effect on its performance and to make corresponding adjustments.

It is important that valid and practical component replacements and modifications be given high priority, as preproduction machines may often be sold if the machine proves a success and few modifications are required. This helps the manufacturer recover some of the R & D costs while the user can usually purchase the machine well below the market price.

(c) The Production Machine

At this stage, the main purpose is to sell the machine. The manufacturer may have to do less planning when a large company tests the machine, but the support functions of the manufacturer still play an important role in the performance of the machine as well as in the future relations and sales. The manufacturer may continue to have a major role in the planning and running of the trial with a small company or contractor.

1.2. Communication

Once the machine trial has been arranged, the manufacturer should communicate the purpose of the trial and plans to all members of its own staff who are involved with the machine. This includes everyone from design engineers to sales people and dealers. Thus, it can determine the responsibilities and approach to the trial within its own organization and determine the needs and support required from the user.

The manufacturer should then communicate these intentions to potential cooperators. During the trial, there will be better cooperation and less conflict if each party (manufacturer, dealer and user) understands the trial purpose(s) and each other's responsibilities.

1.3. Selection of User

The "user" in a prototype trial may not have a full part in its planning and conduct; yet his cooperation and guidance may play an important role in helping to get the machine out of this critical stage. The selection of a user becomes even more important with smaller manufacturers, who are often limited in regard to the financial commitment that they can make for machinery testing.

User selection is still important with preproduction models. Users should be chosen based on expressed enthusiasm, past experience and the support they can offer. Since preproduction machines are often sold, the needs of the user should also be considered, and the appropriate range of stand, terrain, and operating conditions for the test should be kept in mind.

> *A skidder manufacturer arranged a trial for its new machine on the operations of a company whose personnel seemed able and interested. However, both operating people and management were then involved with trials of four other new machines. The new skidder could therefore not receive adequate support, and it was often assigned to unsuitable work areas.*

Contractors have shown that they can provide both good and poor trials for the manufacturer. Some contractors may produce a poor trial because they are too production-conscious. They want no interruptions and are reluctant to accept the expense and downtime for modifications or repairs which may benefit the machine. Their fast intuitive decisions may not be in the best interests of the manufacturer. Conversely, a contractor may become more involved with a new machine, since the outcome of a trial directly affects his livelihood.

> *During the trial of a harvester, the operator noticed a crack in the frame of the harvester head and brought it to the attention of the contractor to be welded. The contractor insisted that the machine be kept in production. In less than 2 days the frame had split in two, ruining the head.*

1.4. Plan for a Wide Scope of Support Functions

Suitably wide support is important during all stages of machine development. In prototype and preproduction models, a good parts supply and facilities for quick modifications are essential to keep up the momentum of the trial and often to test a number of alternatives. The manufacturer may be responsible for tools, mechanics, supervision and repair facilities since the cooperator cannot be expected to supply these in prototype trials or in some preproduction trials.

Once a machine is in the production stage, a number of support functions supplied by the manufacturer can greatly enhance the performance of the machine in a trial and help the user to recognize the true potential of the machine or system at an earlier time.

Modifying the machine to meet an identified need is one form of support that can have an important effect on the outcome of a trial.

A 'non-shearing' felling head received both fair and poor trials because of the actions of two dealers. The new felling head required some mechanical modifications on both operations. In one trial, Dealer A provided poor follow-up and service and as a result the user returned the felling head. Dealer B, at a different location, gave good support by performing the necessary modifications and by sending out personnel to analyse the problems. After modifications, the head worked very successfully.

The manufacturer should be sensitive to problems and suggestions in the field to enhance the machine's development and user satisfaction. Manufacturers sometimes tend to blame the user for a poor trial, whereas the problem may rest in some aspect of machine design.

A harvester manufacturer responded to problems and suggestions in the field and, over several years, developed a widely successful machine. Outside technical expertise also helped during the development of the machine. Another manufacturer considered itself a "machinery expert", and enjoyed initial success by sales based primarily on its name. This manufacturer eventually was much less successful. It was not organized to react when field problems occurred, as logging machines were of minor importance compared with other machinery which it sold.

A training program prior to the delivery of the new machine provides valuable experience which otherwise take weeks into the trial to achieve. This program should include user operators, mechanics and especially supervisors.

A skilled operator supplied by the manufacturer for the initial stages of a trial can demonstrate the potential productivity of the machine to the user, relate unforeseen operating conditions or component performance to the manufacturer, and also aid in training the user operators.

Prior to the trial of a harvester, a manufacturer supplied a training program for operators, mechanics and supervisors. Manufacturer's operators and personnel assisted in solving the mechanical problems in the field, thereby helping the trial to proceed quickly and smoothly. Quick action on modifications and good lines of communication between manufacturer and the company also occurred because of the manufacturer's range of support functions. An effective demonstration and trial led to the purchase of the machine.

Some manufacturers must face the problem of selecting a dealer because they lack their own distribution network. Dealers should be selected for their ability to sell the machine and to provide support services both for the machine trial and after the machines have been sold. As shown in the next example, distributors should also be selected for their interest in promoting the machine.

A manufacturer sold a feller-buncher to a dealer because the location was too far away from the factory for the manufacturer to give direct support. The dealer was large and successful with its main line of equipment. The company testing the machine identified and requested necessary modifications, but the dealer would not comply or communicate the real problems to the manufacturer. The company therefore did not purchase the machine.

A parts supply on consignment is a viable alternative where a dealer is unable or unwilling to purchase parts.

1.5. Plan for Proper Data Collection

Data collection relates back to the purpose of the trial and, thus, to the stage of the machine. The information desired on prototypes may stress component operating characteristics and suitability. Time study data would be collected at the trial with preproduction machines and even more so with production models.

Data taken during any stage of machine development should be accurate, unbiased, and backed up by an event recorder. With good data, the manufacturer can see where the problems are and feel confidence in the machine evaluation. A manufacturer can lose credibility by the use of poor data. The most common sources of distortion are inaccurate definition and reporting of scheduled and effective machine time, which distorts data on availability and utilization.

1.6. Insure Proper Follow Up - Learn for Future Developments

The manufacturer should investigate and understand the reasons for success or failure of a machine. The proper reporting of data will do a great deal in helping to explain and understand the outcome of a trial.

The manufacturer should be in a objective position after a trial to understand the faults of the machine and make good decisions on future modifications.

Stand, terrain and climatic conditions that may not have been expected should be investigated thoroughly to determine their effect on the machine.

It was the general feeling of some foreign manufacturers that the reason for the failure of their machines in Canada was that the users did not know how to operate the machines properly. However, one manufacturer did not realize the actual problems until its own demonstrator crew met with the same results. The machines had not been designed for the unforeseen heavy brush conditions. If the manufacturer had followed up on the trial properly in the first place, it would have realized that the machine was wrongly placed.

2. GUIDELINES FOR THE USER IN ORGANIZING MACHINE TRIALS

2.1. Define Purpose of Trial

The initial step in planning a trial must be to define the purpose of the trial from the user's viewpoint and the criteria used to define successful performance. As stated earlier, "success" can take a number of forms. Therefore, the trial should be carefully organized so that the success is possible and can be clearly identified. The user and manufacturer must then agree on each other's purposes and roles.

A user's regular cutting policies may be restricting in certain cases, especially to the development of a new prototype. The user should thus examine company practices and alter them if justified to suit the machine and purpose of the trial.

The regular cutting policy of leaving poplar standing interfered with a company's development of an off-road delimber because it hampered the machine's mobility on the cutover. Also, the policy of separating spruce and pine at the stump made the system look bad because the test stand had a low percentage of pine, and the bunches were often too small for the skidder.

2.2. Communication

All user personnel involved should know the full purpose of the trial. This includes prior communication between groups both vertically and horizontally and at all organizational levels. Development people must work with maintenance people to arrange for parts supply and to set priorities for service and repair. Roads people should be involved to make sure there is adequate access, with roads and landings built ahead of time so as not to interfere with the trial operation. There may be an exchange of ideas between top management of various divisions in order to plan the trial, choose a proper site or gain from others' experiences. Communication should also involve people from outside the user organization who have had experience with the same machine or manufacturer in previous trials.

Personnel from lower management levels should have an input into the selection of machines and systems and in the planning of the trial. This may reduce the danger that a new machine will be regarded a "just another head office toy", imposed from above.

A number of harvesters were assigned to a subsidiary through the head office. Senior management of the subsidiary did not like the machines but took them only because they could not get anything else. An unfavourable attitude in the field, rather than the machine's modest shortcomings, prevented it from reaching its full potential.

2.3. Check for Manufacturer Support and Commitment

The user should investigate the scope of backup the manufacturer or distributors can supply and their willingness to make modifications. It should also be kept in mind that service from a dealer can be good in one area but poor in another. Supply of parts should always be assured prior to entering into an agreement and especially before buying a machine. Although the planning for a production machine trial is primarily the user's concern, the responsibilities of the manufacturer, especially in parts supply, have an important effect on the progress of the trial.

Poor parts supply has frequently occurred on new machine trials. The unavailability of parts seriously affected the trial of a prototype harvester in which the user had a great interest. Parts support was lacking because the small manufacturer was in financial difficulty.

On another trial, the coast-to-coast distance was simply too great for the manufacturer to provide adequate parts support. The trial was also hampered by the fact that the machine concept was new to the area and the expertise of the manufacturer did not reach the people on the operation.

2.4 Selection of Site, Layout and Time Period

The right selection of stand and terrain conditions is important for the company to assess if a new machine or system is capable of operating effectively on its own limits. Therefore, the conditions should be representative of the areas the machine would work in if proved a success. However, poor choices in regard to stand conditions have often occurred during machine evaluations.

A harvester equipped with a saw felling head was tested in stands of small trees because they were close to the camp, despite the fact that good sized saw-timber suitable for sawlogs was available a little farther from the camp. The machine was being evaluated to see if sawing was a suitable alternative to shearing in reducing sawlog butt damage. Thus, the purpose of the trial was defeated from the start.

Proper layout of a trial must specify skidding and yarding distance, landing size and location, location of cutting areas, and the general location of the trial in relation to other operations.

The trial site should be close to other operations for easy service, modifications and access.

The road spacing should be chosen so that a skidder or forwarder can show its potential over appropriate travel distances.

> *A clambunk skidder was put into an area where a large part of the area only allowed for a short skidding distance. Under these conditions, it was difficult to realize or assess the machine's potential since it was designed for a longer skidding distance. The skidder could have been assessed fairly on paper at the shorter distance with the terminal and travel times accurately separated and measured. However, visually and psychologically, the machine could not compare with a conventional skidder, and most people would rather deal with an actual operational situation than a hypothetical one.*

A production machine should be tested in the conditions which appear most limiting to the machine's design and function as well as in favourable conditions. A year-round evaluation would be preferred. However, there is usually not that much time available before a decision must be made to proceed or return the machine. Therefore, the selection of the season in which a machine trial occurs is important. For example, a machine with potentially poor flotation should be tested in spring or summer when the ground-bearing capacity is low.

Proper Operation and System Planning

Where wood production may be low, the trials of a prototype or preproduction machine should not be counted on for supplying part of the wood quota.

Production machine trials, in contrast, should be planned and run under a production context and as a system.

> *The attitude that it was "just a trial" seriously hampered a yarder trial because it was given low priority over regular operations and thus lacked proper system support, planning and layout.*

Bulldozers were previously committed to road construction in the regular operations so that landings were constructed for the trial only when there was slack in their normal duties. The main fault was that the yarder trial was not planned as a system. Thus the overall system performed poorly, making the machine look poor.

System support is an important step in trial planning and should be considered well in advance of the trial. A machine's performance can be strongly affected by the preceding and succeeding phases of the logging operations.

Constant wood supply to a delimber by feller-bunchers was vital. Conventional delimbing and skidding crews, working under a bonus system next to the new delimber, were also dependent upon the same feller-bunchers. The arrangement worked smoothly except when the feller-bunchers broke down. The wood supply for each system would suffer, causing downtime and dissension between the two working groups.

2.6. Declare a Person in Charge

Proper organization and planning of a trial will be enhanced by the appointment of a person in charge. The organizer should have enough authority to determine priorities and make arrangements. With one person in charge there is more of the chance of beating the "it-was-someone-else's-problem" syndrome.

Someone else should act in an audit capacity by being an objective observer and analyser.

Head office people wanted to test a wheeled feller-buncher equipped with a saw felling head, which would be used later at a different division if the machine proved a success. The camp had originally requested a tracked machine with a shear head to suit the poor flotation and small tree size. An assistant camp foreman, who had little authority, was placed in charge of the trial. Without previous communication of the purpose of the trial, the imposing of the machine into the camp reduced worker motivation and produced a poor camp attitude towards the machine. The operator, supplied by the manufacturer for the initial stages of the trial, often complained about the poor planning. He would periodically get too far ahead of the skidders

and find no cut lines laid out. The trial was inconclusive, partly because the person in charge lacked adequate authority.

2.7. Set Up a Trial Organization

Machine trials are more likely to be successful where a user has a group of people capable of performing machine development and evaluations. The advantage is that all members of the group will have predetermined and clearly defined responsibilities and functions. The trial organization need not be large or permanent, but still can be formally organized for the duration of a trial.

Poor communications between head office, district management, and camp level can retard the good intentions of upper management. Good channels of communication are present in a special trial organization, which leads to faster decisions and better communications between user and manufacturer.

2.8. Recognize How People Are Affected By a Trial

There is always the chance that people feel threatened by the trial. A foreman, who is usually under pressure to keep production up, may feel uneasy during the initial stages of new machine testing. Or a foreman with no direct role in the trial can feel threatened, and in turn affect the trial when systems are competing for a mutual wood supply and service facilities.

Prototypes and some preproduction machines should not conflict with camp operations, especially when a camp is competing for production standings with other camps under some form of incentive payment system.

It should also be recognized that people at various organizational levels may feel that the trial itself will mean a loss or change of jobs.

The "threat" aspects can be relieved by early communication of the purpose of the trial and by proper operational planning. If a given camp experiences lower production because of a trial, the cause should be recognized and noted on circulated camp production and cost reports.

2.9. Create a Trained, Objective and Motivated Working Force

The importance of training all personnel connected with the new machine is obvious. Timely training makes operators, mechanics, and supervisors less uncomfortable during the early days of the trial, and enables them to provide earlier indications of the machine's potential. Training is especially important when a machine or system embodies a totally new concept.

A number of men recruited through Canada Manpower were used as the crew for a trial. Even though they had some woods working experience, the lack of proper training had a disastrous effect on the trial. The knowledge that their employment would only last as long as the trial could not have helped their morale. Although a bonus plan had been set up, poor planning and training led to a poor start and decreased their motivation to the point where the bonus seemed far out of reach. A new crew of regular woods workers was placed on the machine for a second trial. Better planning and a more skilled and motivated work force resulted in a much higher productivity.

All persons involved in the trial should have proper incentive to make the machine work as well as possible. Their usual pay and other benefits must not suffer from the trial.

A highly skilled machine operator was used for the testing of a new saw felling head. Since the old shear type was quite reliable he rarely had to leave the warmth of the cab. However, the new head often jammed and required more careful maintenance, so the operator often had to leave the cab to check the head in deep snow and very cold weather. Thus, the most skilled person lacked motivation to be the best operator. A better alternative may have been to train an operator less used to the comforts of the old machine.

In another machine trial, the operator lacked the incentive to push the machine's performance because he had to work alone at night, and the trial site was far from other operations.

2.10. Proper Record Keeping

Prior to the trial, management must decide what relevant information is required to get a true picture of the performance of a new machine. This involves the

planning of proper forms for the supervisor to fill out. Optimum information should be recorded on mechanical and safety problems, production and costs without becoming too detailed for analysers and managers to make the final decisions. Record keeping is especially important when a new system or group of systems is involved and operators are not used to one or more new machines. Event recorders should be used, where possible, to supplement the daily forms. The forms and recording charts should be filled out and handled by an objective observer.

Cost of trial operations should be carried in a separate account which includes all labour, supplies, parts and machine development charges. Wood produced or work performed in the trial can be credited to the account at a unit price set before the trial begins. However, under this system, someone must check that the costs are properly allocated. If regular operation accounts and trial costs are not handled separately, then the figures at the end of the year do not represent the true costs for either the trials or the regular operations.

3. CONCLUSION

It would be naive to suggest that we know very much about the ways in which organizational factors may affect the trials of new logging machines. It would be worse to infer that we can describe panaceas for all the real problems that exist.

Even at this stage, however, we may urge all who are concerned with machine trials to concern themselves with these organizational factors. Although the final testing arrangements may be a result of a number of tradeoffs, the following checklist may assist both manufacturer and user personnel to improve future practice and make their trials more effective in evaluating the real worth of a new machine or method.

3.1. Checklist for Manufacturers

(1) Define stage of machine and purpose of trial. Plan accordingly, remembering that the main emphasis in prototype trials is on concept, debugging design problems, and modification, and that with preproduction and production models the aim is production.

(2) Communicate purpose to all internal personnel involved in trial.

(3) Determine the responsibilities and roles within own organization.

(4) Select a user based on past experience, personnel, expressed enthusiasm, and operations and sites available.

(5) If required, select distributor based on enthusiasm and ability to provide support.

(6) Communicate trial purpose and manufacturer's trial organization to potential users.

(7) Determine support required from user. Define user's responsibility.

(8) Plan for support services, including parts supply, modifications, training of user personnel, and supervision.

(9) Collect accurate and objective data based on the purpose of the trial.

(10) Be open to problems and opinions of the user. Be flexible as trial conditions may change, but all changes from original plan should be agreed upon and well documented.

(11) Insure proper follow up. Find reasons for failure or success of the machine.

(12) Learn for future trials.

3.2. Checklist for Users

(1) Define purpose of trial in consultation with manufacturer, along with the elements that are used to determine "successful performance".

(2) Communicate purpose to all organizational levels. Consider opinions from lower ranks during planning and machine selection.

(3) Gather background information on machines and past trials if available.

(4) Declare person in charge who is responsible for the successful conduct of the trial and assign him adequate authority to see that the trial objectives are carried out.

(5) Set up a trial organization with predetermined responsibilities for conduct of trial, data collection, analysis and reporting.

(6) Check for support from manufacturer and distributor, including parts supply, willingness and facilities for modifications, training and supervision. Define manufacturer's responsibility (and share of costs).

(7) Plan the system and system support. Depending on the information required, make allowances for changes in company policy.

(8) Plan and arrange priorities between different departments and operations.

(9) Select time of year most suited for the trial depending upon the machine and purpose of trial.

(10) Select site that is representative of the purpose of the trial.

(11) Plan layout of trial including road spacing, location of cutting blocks, size and location of landings, and trial location in relation to other operations.

(12) Recognize how all personnel's interests are affected by trial and resolve potential areas of conflict.

(13) Select and train a motivated work force. All personnel must have a positive attitude to make the machine and system work.

(14) Consider information required and plan for adequate, objective data collection.

(15) Prepare a trial budget and set up a separate trial account.

(16) Make agreement with manufacturer on duration of the trial and provide for early closing or extension possibilities if either of these is warranted.

(17) Protect the supervisor and crew from fear of failure because the machine "does not work out". That, after all, can be a valid result of a machine trial.

(18) Learn for future trials.