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CONSTRUCTION TOOL MANAGEMENT

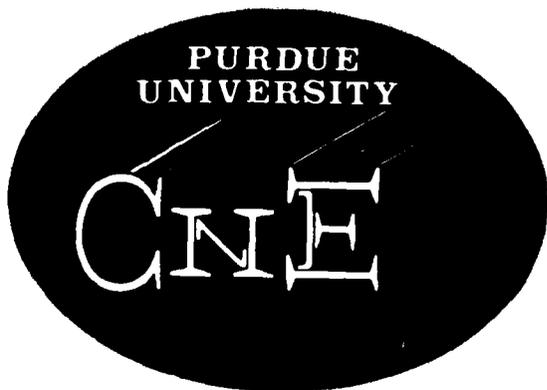
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Cannon L. Morse

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Division of Construction  
Engineering and Management  
School of Civil Engineering  
Purdue University  
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CONSTRUCTION TOOL MANAGEMENT

A Special Research Problem  
Presented to

The Faculty of the Construction  
Engineering and Management Program  
Purdue University

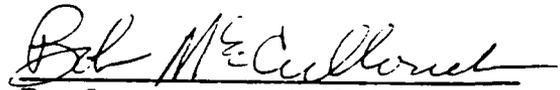
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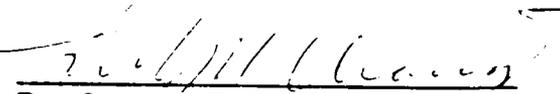
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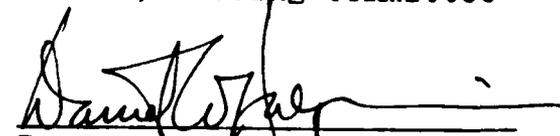
In Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science in Civil Engineering

July 1990

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## ABSTRACT

Contractors utilize tools and equipment daily on construction projects. Managing large pieces of equipment such as cranes and graders is essential to assure the successful completion of the project. Hand tools and minor equipment can play an equally important role during the project's construction phase.

This paper examines the current procedures of hand tool and minor equipment management being implemented by contractors. Additionally, a guide for a tool management system will be developed for use by a large contractor with numerous projects across the United States. Techniques such as tool procurement, storage, issue, inventory, disposal, and distribution will be presented and analyzed.

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## TABLE OF CONTENTS

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<u>Chapter</u>	<u>Page</u>
I. Background.....	1
II. Project Description.....	3
2.1 Statement of the Problem.....	3
2.2 Objectives.....	3
2.3 Methodology.....	4
III. Surveys.....	5
3.1 Initial Letter Survey.....	5
3.2 Telephone Survey.....	5
IV. Survey Results.....	9
4.1 Construction Company Survey.....	9
4.2 Purchasing Procedures.....	9
4.3 Tool and Equipment Leasing.....	10
4.4 Project Costs.....	10
4.5 Tool Storage and Issue Policy.....	11
4.6 Tool Loss.....	13
4.7 Tool Disposal and Replacement Procedures..	14
4.8 Tool Distribution.....	16
4.9 Tool Depreciation.....	16
4.10 Tool Tracking Systems.....	17
4.11 Innovative Tool Management.....	18
4.12 Summary.....	19
V. Recommendations.....	20
5.1 Procurement Plan.....	20
5.2 Project Costs.....	22
5.3 Storage and Issue Methods.....	23
5.4 Minimize Loss.....	24
5.5 Tool Disposal and Replacement.....	26
5.6 Distribution of Tools and Minor Equipment.	28
5.7 Depreciation.....	30
5.8 Tool Tracking Systems.....	30
5.9 Summary.....	32
VI. Conclusions.....	33
VII. References.....	35

Appendix

A. Letter Sent to Contractors.....36  
B. List of Contractors Participating in the Survey...39  
C. Survey Questionnaire.....42  
D. List of Contractors Responses.....45

Tables

1. Small Tools Purchasing Procedures..... 9  
2. Percentage of Costs Devoted to Tools.....11  
3. Average Project Size.....12  
4. Tool Loss Rate.....13

## CHAPTER I

### BACKGROUND

Equipment management is a necessary part of construction operations. Selecting the proper equipment to perform a task is a major responsibility for the contractor. Defining the need, procurement analysis, establishing maintenance procedures, historical records, and value analysis are the steps to good equipment management (Grothaus, 1982).

Whether the equipment is large, such as a scraper, or a small power tool, the contractor must assure that it is available when required. Managers must have the right tools and equipment to complete a construction activity. They cannot neglect the fact that construction equipment is used by small crews whose main objective is completing construction on time and on budget. It has been proposed that equipment has but one fundamental purpose: To facilitate the construction process (Vorster and Sears, 1987). The goal of equipment management should be to maximize profits instead of minimizing equipment costs. However, when profits are not an issue, such as a government agency like the Navy, minimizing costs is a reality and must be considered.

When construction equipment is discussed, large pieces such as bulldozers and cranes often come to mind. However,

hand tools and small equipment are just as important to the construction process as any large piece of equipment. A contractor must establish procedures for hand tools and minor equipment.

Construction tool management techniques should address topics including procurement methods, tool storage, issue and inventory, tool loss control and distribution between projects. Tracking of tools and equipment utilizing computers is an essential component for many of today's contractors. Innovative areas such as bar coding tool issue procedures have been accomplished (Bell and McCullouch, 1988).

Books, journals and articles are plentiful on the topic of construction equipment management. However, research has been minimal on management methods for hand tools and minor equipment. Construction companies must be skilled in this area in order to remain competitive. A tool that is required for a job, but not available, can delay a project and render a crew inactive. Contractors must manage tools such as drills, saws, water pumps and generators in an effective manner.

## CHAPTER II

### PROJECT DESCRIPTION

#### 2.1 Statement of the Problem

This study focuses on the methods that construction contractors utilize to manage hand tools and minor equipment valued at under \$1500. Several key points of tool management will be studied in detail. These include: procedures for procurement or lease, warehousing and storage methods, issuing tools on construction projects, inventory procedures, tool disposal and replacement policies and how tools are distributed and redistributed to construction projects.

Large contractors having projects at numerous locations throughout the United States must be able to economically manage large equipment, such as cranes and scrapers, and small equipment, such as impact hammers and power saws. Construction firms need to skillfully plan and execute their policies in order to have a successful tool management program.

#### 2.2 Objectives

The objective of this study is twofold. One is to analyze the current methods of tool and minor equipment management that are being employed by construction contractors. The second objective is to develop guidelines

for an efficient system of tool management that may be used by a large contractor with many projects scattered throughout the United States. The results of the first objective will be used to develop the second objective.

To achieve these objectives, construction contractors were contacted to discuss their current practices of tool and minor equipment management. Several topics pertaining to their management policy were covered during the conversations.

Firms that have successful tool and equipment management policies will form the foundation for the recommended system for a large contractor with many projects located across the country.

### 2.3 Methodology

This study is an independent research project in partial fulfillment of the requirement for a Master of Science in Civil Engineering at Purdue University. It was completed through a written and telephone survey of construction contractors to ascertain their tool and minor equipment policies. A review of books and journal articles, while limited, was conducted to determine procedures that facilitate effective tool and minor equipment management procedures.

## CHAPTER III

### SURVEYS

#### 3.1 Initial Letter Survey

A letter outlining tool and minor equipment management was sent to 37 contractors on February 1, 1990. These contractors were selected on the basis of the volume of work they performed and the fact that most have construction projects scattered across various portions of the United States. A point of contact and their telephone number was solicited from each firm. The letter is shown in Appendix A.

Twenty-one of the thirty-seven firms responded to the letter. This response produced a 57% return. A list of the firms who responded is provided in Appendix B.

#### 3.2 Telephone Survey

A telephone survey was conducted from the 21 firms that responded to the initial letter survey. This survey employed a questionnaire which was developed to cover the many facets of construction tool and minor equipment management. Each of the point of contacts were asked the same questions. Each question will be stated and discussed below.

The first question is "What are your purchasing procedures for small tools (i.e. hand operated and small

equipment)?". This question provides insight on the type of procedures and suppliers that contractors utilize.

Question 2 asks "Do you lease hand tools or minor equipment? If so, what type of tools and equipment are leased? How has this been cost effective?". Even though the tools and minor equipment pertaining to this study are relatively inexpensive, leasing is a reality in the construction environment.

Question 3 is "What percentage of project costs are devoted to tools and minor equipment?". Various types of construction (building, commercial, government, industrial, etc.) will result in different cost percentages being used for tool and minor equipment.

Questions 4 and 5 concern tool storage and issue procedures on a construction project. Question 4 is "Are tool storage/warehousing policies used on each project? What is the project size? What type of inventory methods are being utilized?". Question 5 asks "How are tools issued at the project site? How is accountability built into the issue process?".

Question 6 concerns the loss rate of tools. Losing tools by either misplacement, theft or other reasons is a common problem on construction projects. The question asks "What is the percentage of tool loss rate? What type of tools are most susceptible?".

The next three questions pertain to tool/minor equipment disposal and replacement strategy that contractors employ. Question 7 asks "How do you determine when tools are to be disposed?". Question 8 is "How is tool disposal performed: sell, auction, given away, etc.?". Question 9 asks "What type of tool replacement strategy do you employ?".

It is important that contractors distribute tools and minor equipment to other projects whenever the project is completed or when there is no longer a need for their use. Question 10 asks "How are tools distributed to other to other projects and what is the policy for doing so?".

Taxes are a concern for all businesses, and construction companies are no exception. Whether or not tools are depreciated, or considered a project expense, is a factor that must be addressed. Question 11 is "How are tools depreciated for tax purposes?".

Since most contractors utilize computers in one form or another, techniques used to track tools and minor equipment have become faster and more accurate. Question 12 pertains to this and asks "Are any of the following methods being utilized: A. Tool Numbering System; B. Tool Database System; or C. Bar Coding?".

In today's competitive atmosphere innovation can be the difference between winning and losing a construction project. Question 13 deals with this aspect and asks "What

type of innovative tool management methods or procedures are being accomplished by your firm? Why?".

The survey questionnaire is shown in Appendix C.

**CHAPTER IV**  
**SURVEY RESULTS**

**4.1 Construction Company Survey**

The 21 construction companies who responded to the initial letter survey formed the basis for further research. Accordingly, a telephone survey of the firms was conducted to analyze current methods of tool and minor equipment management.

**4.2 Purchasing Procedures**

Table 1 was developed utilizing the data received from question number one. Table 1 shows the small tools purchasing procedures employed by the construction firms.

**Table 1. Small Tools Purchasing Procedures (Number of Firms)**

Categories (1)	Firms (2)
Construction Suppliers	11
Industrial Suppliers	6
Low Bid	1

Sixty-one percent of the firms utilized construction suppliers, 33% used industrial suppliers and 5% solicited bids for their small tools.

#### 4.3 Tool and Equipment Leasing

The next question asks if hand tools or minor equipment are leased. Sixty-seven percent either do not or rarely lease hand tools, whereas 33% occasionally lease tools or minor equipment. The types of tools that were leased include: rotary hammers, pneumatic tools, water pumps, generators, compressors, and cement finishing machines.

Leasing has been cost effective for firms due to the following reasons:

1. For short durations or one-time usage it is cost effective.
2. Tools are leased with an option to buy. If the tool or equipment proves useful it will be purchased. This eliminates dollars being spent on equipment that may not satisfy a contractor's needs.

#### 4.4 Project Costs

Question three asks what percentage of project costs are devoted to tools and minor equipment. Several contractors use a percentage based on project labor costs. Table 2 provides the results.

**Table 2. Percentage of Costs Devoted to Tools (Number of Firms)**

Categories (1)	0-5% (2)	5-10% (3)	>10% (4)	Unknown (5)
Project Costs	1	1	1	
Labor Costs	5	2		
Other				7

One firm did not express tools as a percentage of project costs. This firm allocates tools based on crew size and the type of construction activity being performed.

#### 4.5 Tool Storage and Issue Policy

The next question contains three parts pertaining to the type of storage/warehousing procedures being used on construction projects, the size of projects and the type of tool inventory methods being utilized. The most common method of storing tools, being used by 72% of the firms, are storage trailers and tool sheds. The firms using them feel it is an effective way to store tools and gives them the flexibility to easily relocate them whenever necessary. Many of these firms also employ gang boxes as additional means to store tools.

Seventeen percent of the firms use only gang boxes to store tools. One contractor provides tool storage in a warehouse because they are primarily engaged in tunneling

projects and warehouses are usually constructed for the project.

Table 3 shows the range in average project sizes of the various firms.

**Table 3. Average Project Size (Number of Firms)**

Categories (1)	Firms (2)
Under \$1 million	1
\$1-5 million	4
\$5-15 million	8
\$15-25 million	2
Over \$25 million	2

Currently, various inventory methods are being utilized by construction firms. Project superintendents are responsible for inventorying tools for 44% of the contractors who were surveyed. The project manager is tasked with establishing inventory procedures for 39% of the firms. Eleven percent of the contractors hold the foremen responsible for tool inventories. One firm is utilizing bar coding for inventorying tools. This has proven successful for the company. Most inventories are performed on a monthly basis, however, some project managers can establish their own inventory schedules.

Question five concerns tool issue and accountability procedures. Tools are issued on a daily basis for all

firms. Tools are issued to the foremen by 44% of the contractors. The superintendents are issued the tools by 28% of the firms. Seventeen percent of the companies let their project managers establish their own tool issue procedures. Other workers, such as laborers, are issued tools in the case of 11% of the firms.

For the most part, the individual who is issued a tool is accountable for that particular tool. Project superintendents and foremen are each accountable for the tools by 33% of the firms. Companies hold the project manager accountable 28% of the time. Other personnel are accountable for the tools by 5% of the firms.

#### 4.6 Tool Loss

Question six asks what is the tool loss percentage and which tools are most susceptible. Table 4 shows the tool loss rate provided by the survey.

**Table 4. Tool Loss Rate (Number of Firms)**

Loss Rate % (1)	Firms (2)
<2%	3
2-5%	3
5-15%	3
>15%	2
Unknown	7

This is a serious problem acknowledged by most of the firms. Tool loss can contribute to increased costs, project delays and crew inactivity. Most tool loss was attributed to theft rather than losing tools on the project. Several firms thought tool loss was the most serious problem in construction tool management.

The type of tools most susceptible to loss included: electric saws and drills, pumps, generators, levels and small unusual tools. The majority of these tools are relatively small power tools.

#### **4.7 Tool Disposal and Replacement Procedures**

The next three questions concern tool disposal and the type of tool replacement strategy employed. The companies utilize a variety of disposal methods and several have developed replacement strategies for their tools.

The most common approach for determining when tools are to be disposed is when the repair costs exceed a certain percentage of the replacement value. This is employed by 61% of the firms. The most common factor used is when repair costs exceed 50% of the replacement value. Thirty-three percent of the firms dispose tools when they are worn out. One firm tasks their superintendents to determine when tools are to be disposed.

Question eight pertains to how tool disposal is performed. The most popular method of disposal, used by 56%

of the firms, is to simply throw away the tool. Another 28% either auction the tools or sell them for scrap. Eleven percent of the firms did not have procedures for tool disposal. Some of the companies will additionally trade in old tools and receive credit when new tools are purchased. Only one firm, however, uses this method as a major source of tool disposal.

The next question asks the type of tool replacement strategy that is employed. While several procedures were being employed, 44% of the contractors surveyed did not have a strategy. The following are examples of those currently in use.

1. Strategy is based on a need for a tool. If a need is foreseen, then it is purchased in large volumes to reduce the costs.
2. Strategy is based on work experience. The firm knows the kind of tools that are routinely used so they are procured ahead of time.
3. A high/low strategy. When a quantity of tools reaches a specified "low", new tools are purchased to bring the quantity to the "high" level.
4. A strategy whereby the project manager determines the type of tool replacement policy to employ.

#### 4.8 Tool Distribution

Question ten pertains to an important area of tool management: how are tools distributed to other projects and what is the policy for doing so? The most common reply in the survey was that the tools are sent back to the firm's main warehouse. Fifty percent of the companies surveyed employed this method. Once at the warehouse the tools are inventoried, repaired or replaced, then sent out to a new project. The main reason behind this is to provide the personnel responsible for tool management a means to inventory and update the tool records. Moreover, firms do not want to send tools, which are worn out or in need of repairs, to a new project.

Some firms, 39% of those surveyed, allow tools to be distributed between projects. The shipping methods utilized include truck, bus and United Parcel Service (UPS). It must be cost effective before tools are shipped, hence usually large numbers of tools are shipped at a time. The project managers are responsible for updating the inventories to allow the main office to update their records.

Eleven percent of the firms do not allow tools to be distributed to other projects.

#### 4.9 Tool Depreciation

Question eleven addresses whether tools are depreciated for tax purposes or not. Fifty percent of the firms

consider hand tools and minor equipment a project expense and therefore do not depreciate them.

Only one firm actually depreciated all tools. Tools are depreciated over 2 or 3 years using the straight line method.

Twenty-two percent of the companies used a combination of project expense and depreciation. If the tools were under a specified dollar amount (usually \$500) they were considered a project expense. All other tools were depreciated using straight line depreciation over the tool's useful life.

Another twenty-two percent of the firms point of contacts did not know whether hand tools and minor equipment were depreciated or considered a project expense. A possible reason for this could be that depreciation may be a responsibility of the contractor's financial department. Accordingly, the tool managers are not informed.

#### 4.10 Tool Tracking Systems

Question twelve pertains to the type of systems that are being utilized to accurately track tools and minor equipment. The majority of the companies use tool numbering systems (89%), and computer database systems (78%) to track tools. Tool numbering has been around for many years, however, contractors are increasingly using computers to track costs, locations, quantity and maintenance records of

their tools. Computers allow contractors to perform these attributes in an efficient manner.

One firm is employing bar coding techniques for tool management. Bar coding provides them with quicker inventories and more accurate tracking methods for their tools. This appears to be the route of future tool management for construction companies.

#### 4.11 Innovative Tool Management

Innovative tool management is addressed by question thirteen of the survey. Being innovative in managing tools can place a contractor in a better competitive position. Seventy-two percent of the firms, however, feel that they are not being innovative. Rather they believe that their tool management procedures are similar to the rest of the construction industry.

On the other hand, 28% of the contractors feel that they are innovative. Their reasons are as follows:

1. Using bar coding to track tools is cost effective.
2. Eliminate failure in tool management and adhere to what works for a firm.
3. Tracking tools on computers has resulted in a low tool loss rate and helps track costs more effectively.
4. Centrally purchasing tools reduces costs compared to each project purchasing their own tools.

#### 4.12 Summary

The survey results point out the many methods of tool management being performed by today's contractors. The responses to the survey are provided in Appendix D.

## CHAPTER V

### RECOMMENDATIONS

One objective of this study is to provide guidelines for a system of tool management that could be employed by a large contractor with numerous projects throughout the United States. This will involve utilizing methods that have been successful for the contractors that were surveyed, as well as implementing other ideas that may prove effective. Throughout this chapter the term "tool manager" will be used. This is the individual who is chiefly responsible for a firm's tool management policy.

#### 5.1 Procurement Plan

Hand tools and minor equipment may be purchased through construction suppliers, industrial suppliers, soliciting bids, or from the local hardware store. Due to the wide variety of tools and equipment, procedures should be implemented to incorporate a wide variety of sources to procure them. Rarely will one source, such as an industrial supplier, be able to provide all the tools that are required by a contractor. Accordingly, all available avenues should be explored to procure tools and equipment.

When projects are located within the operational area (200 miles) of tool manager, assuming the tool manager is

located at the main corporate office, the following procedures can be implemented:

1. Tool and equipment valued under \$200 should be purchased and supplied by the tool manager. If the tool manager cannot supply the equipment then the project should utilize the best available sources.
2. The tool manager should have the opportunity to provide the project tools and equipment valued over \$200. The tool manager may determine that leasing, lease with an option to buy, or shipping tools from another project may be the most cost effective methods of providing the tools.

If projects are outside the operational area of the tool manager, the following procedures may be used:

1. The tool manager should review with project personnel any request for tools whose value exceeds \$750. The tool manager may decide that leasing, lease with an option to buy, or direct purchase is the best method to obtain tools.
2. If projects require a large amount of tools, the tool manager should be notified. The tool manager may want to send a truck load of tools from the main warehouse. If this cannot be accomplished, then the project should obtain the tools from the best available sources.

Leasing may be a practical solution for some projects if tools are required for short durations. This study concerns itself with the management of tools and minor equipment having a value less than \$1500. This is a relatively small cost and care must be taken when leasing is being considered. Leasing items for only a few days can be expensive; the cost can easily exceed the value of the tool. Leasing with an option to buy has been used successfully by some of the firms surveyed. Contractors should evaluate all the options if leasing is being considered. For leasing to be successful, it must be cost effective.

## 5.2 Project Costs

Construction companies must constantly keep aware of project costs. While the dollar value of a specific tool may be low, a project may well have a quantity of tools whose value is worth thousands of dollars. Whether tool costs are expressed as a percent of project or labor costs is immaterial, tool managers should be aware of the costs as it relates to a project's total cost.

Cost control is of prime concern to the project manager and tools may be easily overlooked. Accurate historical records should be kept in order to determine future tool costs for construction projects. The tool manager should have accurate tool inventories to determine the costs of tools on a project. Project managers must keep this in mind

so tool costs can be monitored. A firm will then know the percentage of project costs being allocated for tools and minor equipment.

### 5.3 Storage and Issue Methods

Several procedures may be employed to store tools, such as gang boxes, tool trailers and sheds. For large projects a central tool room may be established that is manned by one or more individuals. Most projects will have a combination such as trailers and gang boxes to store tools. The method selected should provide secure storage for all the tools on a project. Otherwise tools may not be protected and can be subjected to losses.

Inventory should be performed on tools and minor equipment on a regular basis. Most of the contractors surveyed perform this on a monthly basis. This can be performed by members of the project manager's staff, project superintendents or the foremen. Computer print outs issued by the firm's tool manager can facilitate the inventorying process. Discrepancies discovered during the inventory can be identified and corrective action taken. Once the inventory is completed, the tool manager should receive the results so that the records can be updated. Frequent inventorying will provide information such as:

1. Tools that are missing.
2. Tools which need to be repaired or replaced.

3. Identify tools that are either heavily or under utilized.

On large projects this might be the responsibility of one person. That individual should keep updated records in order that accurate cost information is available to the project manager and the company's tool manager.

If practical, tools should be issued on a daily basis. This may be difficult when tools are stored in gang boxes being used by several employees during the day. However, someone needs to be responsible for the tools. This individual may be a superintendent or a foreman. Contractors need to establish specific written procedures for tool issue. The project employees should know how tools are issued, who is accountable for the tools, and when the tool is to be returned.

When issue procedures are properly followed, lower tool loss and an improved sense of responsibility results. Personnel held accountable for the tools are more likely to take better care of them. Lower tool loss and repair costs lead to lower project costs. This has been recognized by the contractors surveyed who are employing these methods.

#### **5.4 Minimize Loss**

Excessive tool and minor equipment loss is a concern for all contractors. While tools are lost on projects due

to being covered up with concrete or soil, or simply misplaced, theft is the main cause of tool loss. In 1989 nearly one billion dollars worth of construction equipment, large and small, was reported stolen. Each year 25-30% of all equipment thefts are unreported. In previous years, 65% of stolen equipment is unretrieved (Judy, 1990). While this includes large equipment, such as dozers, as well as small tools, the results are staggering.

While tool theft cannot be entirely eliminated, procedures such as inventorying, proper tool issue and accountability practices can reduce tool theft. One inherent feature of construction projects, is that tools are easy to steal. Items, such as drills and saws, can easily be removed from a project site. Many projects do not have any means of security after working hours. This provides an attractive accessible site for people. Contractors can take the steps below as a means to deter tool theft (Judy, 1990).

1. Prominently mark tools and equipment with numbers, company logo, or other unique markings.
2. Do not leave tool trailer keys lying around. Key control is essential.
3. Keep a listing of serial numbers and proof of purchases.
4. Establish local police contact.
5. Inspect the project site before work starts to determine any and all risks the site poses.

6. Store equipment to limit after-hours access.
7. On large projects, hire a trained guard force or employ guard dogs.

The above techniques, when properly implemented, should help to reduce tool loss resulting from theft.

### 5.5 Tool Disposal and Replacement

Tools should be disposed obviously when they are worn out. The tool manager should outline procedures to determine when and how tools are disposed. One method is to dispose of tools when repair costs exceed a certain percent of the replacement cost. The main emphasis for this is economy. Tools should not be disposed when repair costs are a fraction of their value. However, if a project's location is not conducive to a repair source, then disposal may be the only alternative.

There is a variety of methods on how tools are to be disposed. One is to simply throw the tool away, and may be practical for many projects. The following methods may be used for tool disposal:

1. Auction off or solicit bids for the worn out tools.  
If a firm receives 5-10% of the original value, it is still more than by throwing away the tools.
2. Sell tools for scrap metal.

3. Suppliers may accept old tools for a trade in on new tools. However, companies should be aware of suppliers inflating prices of new tools, so the credit received from the old tools is minimal or zero.

The tool manager should coordinate all tool disposal procedures. In some cases the projects may be responsible for tool disposal. When this occurs, the tool manager should be notified of all disposals so that the firm's tool records can be updated.

A tool replacement strategy should be a part of the tool management system. Several of the contractors surveyed are utilizing strategies to replace their tools. These include:

1. Strategy based on a need for a tool. If a need is foreseen, then tools are purchased in large volumes to reduce the costs.
2. Strategy based on work experience. The firm knows the kind of tools that are frequently utilized so they are procured ahead of time.
3. A high/low strategy. When a quantity of tools reaches a specified "low", new tools are purchased to bring the quantity to the "high" level.

The above methods can be incorporated into a tool replacement strategy by the tool manager.

### **5.6 Distribution of Tools and Minor Equipment**

When a project no longer has a need for tools and minor equipment, provided they are in good condition, they must be distributed to another project or the central warehouse. Disposal procedures have been previously discussed. This section describes procedures for the distribution of tools.

When the tool manager decides to distribute tools it must be accomplished in a cost effective manner. The following procedures can be utilized:

1. Tools are transferred from one project to another. The tools must be in good condition prior to shipment so the receiving project does not have to make extensive repairs. The tool manager must have the cooperation of both project managers for this to be an effective procedure. If possible, tools should be sent in one bulk shipment to be cost effective. Accurate inventories must also be conducted and records updated.
2. Tools are sent from a project to the central warehouse. Once at the warehouse, the tools are inventoried, repaired or replaced, then sent out to another project. This provides an accurate inventory and records can easily be updated.

When the above steps are implemented, additional measures can be employed. The project sending the tools, to either another project or the central warehouse, will be credited 50% of the original purchase price of the tools. The project will be credited this percentage only if the tools are in good condition. An incentive can be given to the project manager to achieve this result. Otherwise the sending project will be billed for repairs made to the tools. The new project will be billed for the value of the tools upon receipt. The tool manager should establish this value, which may be 50-100% of the purchase price. The reason for marking up the price is to recover costs for operating the central warehouse. These costs are for the warehouse, its operating and maintenance costs, personnel costs, shipping costs and any other administrative costs.

Tools may be shipped by company trucks, commercial carrier, bus or UPS. Shipping costs are expensive and is cost effective if large volumes are shipped. For some projects it may be better to dispose of the tools and equipment in lieu of shipping them. The tool manager should coordinate all the feasible distribution methods. Most importantly, it has to be performed in an efficient manner. The project managers must eliminate the chance of sending either worn out tools or those in need of major repairs to another project.

## 5.7 Depreciation

Tools and minor equipment can either be depreciated or considered a project expense for tax purposes. Some of the firms surveyed considered tools whose value is under a certain dollar amount a project expense. Other tools were capitalized and depreciated over the tool's useful life. The project and the type of tools utilized will determine which method to employ.

The decision to depreciate tools will probably be the responsibility of the firm's financial or operations department. The tool manager should keep accurate records, whatever method is pursued.

## 5.8 Tool Tracking Systems

Tools and minor equipment should be tracked by numbering systems, computers or bar coding systems. Inventories can be easily and quickly performed, if a contractor uses a computer tracking system. The computer database can contain tool information such as purchase costs, quantities and maintenance records. The tool manager should be able to produce tool records for projects on a regular basis and computers can facilitate this process.

Tools should be numbered to aid in the inventorying process as well as theft prevention. Since a project may have a number of similar tools, numbering precludes

inventory problems. Numbers can also easily identify tools that are shipped from one project to another.

Bar coding is a relative new technique for the construction industry. Tools and equipment can be bar coded along with the storage bins. When tools are checked out the bar code label is scanned. This provides information such as who the tool was issued to, when it was issued, and when it is due back. When the tool is returned, the bar code on them can be scanned to determine the storage location. Reports such as inventories, issue and maintenance records can be provided from the bar coding database (Rieger, 1989).

Recently a few construction firms have begun to utilize bar coding as a means to track and control tools and equipment. Fluor Daniel is using bar coding to track the cost and location of tools and supplies. The initial installation was the Virginia Power nuclear plant at Surry, VA, a \$20 million construction site with 320 employees (Gilbert, 1990). When tools are checked out, the employees bar coded ID badge is scanned along with the bar coded tool. This method provided inventory reports, tool reorder reports when tool quantities became low, and supplier information. Fluor Daniel reports that bar coding has simplified and streamlined the tool control process.

Aluminum bar coded labels were used on the tools. Problems were encountered as the labels would not stay affixed to some of the tools. A solvent-activated glue was

used to remedy the situation. Several of the labels were lost or damaged badly enough that they could not be read by the scanner. Fluor Daniel is currently investigating the use of another type of label.

When bar coding is utilized on construction projects, employees must be properly trained on how to use the system. The equipment and training is an expense that the contractor must bear. This may be economically feasible only for large construction projects. However, the future of tool management will probably include bar coding applications.

#### **5.9 Summary**

This chapter has recommended several techniques for contractors to establish an effective tool management system. While the procedures may not benefit all contractors, many can be incorporated at the main office and project site. Contractors should continue to be innovative by developing techniques to improve their tool management methods.

Firms should have a written tool management policy that is routinely updated. Upper management, project managers and tool managers should follow the policy in order to control the costs associated with small tools and minor equipment.

## CHAPTER VI

### CONCLUSIONS

Hand tools and minor equipment are utilized on all construction projects. Proper management of these resources will help prevent project delays and increased costs. A contractor's tool management policy is an important element in controlling project costs.

This report has provided insight on the various methods that construction companies employ to manage hand tools and minor equipment. A wide spectrum of tool management has been observed. Firms have a variety of procedures for the acquisition, storage, issue, inventory, disposal, distribution and tracking of tools. The contractors are aware and concerned about tool loss and are seeking ways, such as conducting regular inventories, to remedy the situation. Several contractors have also implemented replacement strategies for tools.

Innovative tool management procedures can be the spark that ignites changes throughout the construction industry. Some of the firms were utilizing bar coding and computer tool tracking techniques. This can result in a contractor being more competitive in the marketplace.

Another objective of this study was to provide guidelines for a tool management system that could be implemented by a large contractor with projects across the

United States. Methods that have worked well for the surveyed firms, as well as other ideas, were incorporated into the proposed system. These guidelines can form the elements of a successful tool management system for today's contractors.

## CHAPTER VII

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APPENDIX A

LETTER SENT TO CONTRACTORS

# PURDUE UNIVERSITY



DIVISION OF CONSTRUCTION  
ENGINEERING AND  
MANAGEMENT

February 1, 1990

Mr. Frank N. Spears  
Vice President  
HCB Contractors  
3495 Piedmont Road, N.E.  
Ten Piedmont Center  
Suite 510  
Atlanta, GA 30305

Dear Mr. Spears:

The Division of Construction Engineering and Management at Purdue University is currently conducting research concerning Construction Tools Management. Of particular interest are hand operated tools and small, or minor, equipment (e.g. small generator).

Our objective is to discover how firms, such as yours, manage tools on construction projects and either dispose or redistribute them to other projects in an efficient manner.

Several key points in this study include the following:

- Procedures for procurement or lease
- Tool budget amounts
- Warehousing and storage of tools
- Issuing and reissuing the tools
- Inventory and accountability methods
- Tool disposal procedures
- Tool replacement strategy
- Distribution/redistribution program

This is by no means inclusive as new and innovative methods, such as bar coding and employing a tool database system, may be utilized. We realize that providing the proper tools for various projects require skillful planning and execution.

We are hopeful that you can provide us a point of contact who is very familiar with your tool management program. It would be helpful if we could obtain the name and telephone number where they can be reached. Enclosed you will find a form to fill out with this information and in order to expedite our research please return by February 15. I will contact this individual to discuss specifics of your company's tool management policy. Thanks for your cooperation and help in our research effort.

Sincerely,

Cannon L. Morse  
Research Assistant

CIVIL ENGINEERING BUILDING, ROOM 1223 • WEST LAFAYETTE, IN 47907 • (317) 494-2240

NAME: \_\_\_\_\_  
COMPANY: \_\_\_\_\_  
POSITION: \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_

Please return to the following address:

Bob McCullouch, Ph.D., P.E.  
Purdue University  
Division of Construction Engineering and Management  
Civil Engineering Building, Room 1235  
West Lafayette, IN 47907

APPENDIX B

LIST OF CONTRACTORS PARTICIPATING IN THE SURVEY

Barton-Malow Company  
Southfield, MI

BCB Company  
Atlanta, GA

BE & K Construction Company  
Birmingham, AL

Bowen Engineering Corporation  
Indianapolis, IN

Centric/Jones Construction  
Lakewood, CO

Dunn Construction Company  
Jackson, MS

Geupel DeMars, Inc.  
Indianapolis, IN

Gibson-Lewis, Inc.  
Mishawaka, IN

Gilbane Building Company  
Chicago, IL

Graycor, Inc.  
Chicago, IL

Grow Tunneling Corporation  
New York, NY

Grunau Company, Inc.  
Milwaukee, WI

HCB Contractors  
Atlanta, GA

Helmkamp Construction Company  
Wood River, IL

Kasler Corporation  
San Bernardino, CA

Frank Messer & Sons Construction Company  
Cincinnati, OH

W. B. Olson, Inc.  
Northbrook, IL

Pattillo Construction Company  
Tucker, GA

Turner Construction Company  
Cincinnati, OH

Wal-Mart Contract. Group, Inc.  
Tampa, FL

Walsh Construction Company  
Chicago, IL

Winter Construction Company  
Atlanta, GA

APPENDIX C

SURVEY QUESTIONNAIRE

## CONSTRUCTION TOOLS MANAGEMENT QUESTIONNAIRE

1. What are your purchasing procedures for small tools (i.e. hand operated and small equipment)?
2. Do you lease hand tools or minor equipment? If so, what type of tools and equipment are leased? How has this been cost effective.
3. What percentage of project costs are devoted to tools and minor equipment?
4. Are tools storage/warehousing policies used on each project? What is the project size? What type of inventory methods are being utilized?
5. How are tools issued at the project site? How is accountability built into the issue process?
6. What is the percentage of tool loss rate? What type of tools are most susceptible?
7. How do you determine when tools are to be disposed?
8. How is tool disposal performed: Sell, auction, given away, etc?
9. What type of tool replacement strategy do you employ?
10. How are tools distributed to other projects and what is the policy for doing so?
11. How are tools depreciated for tax purposes?
12. Are any of the following methods being utilized:
  - A. Tool Numbering System
  - B. Tool Database System
  - C. Bar Coding

13. What type of innovative tool management methods or procedures are being accomplished by your firm? Why?

APPENDIX D

LIST OF CONTRACTORS RESPONSES

## BARTON-MALOW COMPANY

1. Purchasing procedures are regulated to utilizing industrial suppliers for their tools.
2. Tools are leased occasionally. The types include rotary hammers and pneumatic tools. For short durations or one-time usage this is cost effective since there are no ownership expenses.
3. Tool costs are approximately 3% of project labor costs.
4. Gang boxes are most often used to store tools. Superintendents are responsible for inventorying tools on a monthly basis. Project sizes range from 2-40 million dollars.
5. The superintendents establish procedures for issuing tools at each project site. The superintendents assume total accountability for all tools.
6. Tool loss rate is approximately 5%. Most susceptible tools include saws, drills, hydraulic jacks and any unusual tool.
7. Tools are disposed when the repair costs of the tool exceeds 50% of the replacement value.
8. Currently there are no set procedures for tool disposal.
9. The tool replacement strategy being employed is on a need basis.
10. Before tools are distributed to other projects they are sent to the warehouse in Michigan. The tools are then inventoried, repaired or replaced, and sent out to a new project.
11. Tools are considered a project expense and are not depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. They are not being innovative but feel that they are managing tools in a similar manner as the rest of the industry.

## BCB COMPANY

1. Purchasing procedures are regulated to utilizing industrial suppliers for their tools.
2. Tools are leased occasionally for items such as small water pumps or generators. For short durations or one-time use this is cost effective.
3. Tool costs are approximately 0.5% of project labor costs.
4. Tool trailers are used for all projects. Average project size is 15 million dollars. Project managers establish tool inventory procedures.
5. Each project is responsible for issuing tools. Project managers and superintendents are responsible for tool accountability.
6. Tool loss rate is unknown but believed to be very small.
7. Tools are disposed when they are worn out.
8. Since the tools are a low dollar item they are thrown away when they are no longer useful.
9. Currently there is not a tool replacement strategy being employed.
10. Each project is responsible for it's own tools. Tools are not distributed to other projects.
11. Tools are considered a job expense and are not depreciated.
12. Tools are tracked on each project's computer database. Tool numbering and bar coding are not being employed.
13. No innovative tool management procedures are being employed.

## BE & K CONSTRUCTION COMPANY

1. Bids are submitted to BE & K for tools that are required for their projects. Generally the low bidder is selected to provide the tools.
2. Hand tools and minor equipment are not leased.
3. Approximately 5% of project costs are allocated for tools.
4. Trailers are used for most projects. On large projects a central tool room is utilized. Project sizes range from 25-500 million dollars. Inventory is checked by bar coding the tools.
5. Tools are issued to the foremen on a daily basis. They are accountable for the tools that they check out. If a tool is lost the value of the tool is deducted from their pay.
6. This is a problem: the tool loss rate is 15%. No particular tool is more susceptible than another.
7. Tools are disposed when they are worn out.
8. When tools are disposed they try to obtain 40-50% of their value by selling them.
9. Currently there is not a tool replacement strategy being employed.
10. Before tools are distributed to other projects they are sent to the warehouse in Birmingham. The tools are then inventoried, repaired or replaced, and sent out to a new project.
11. Tools with a new value under \$750 are considered an expense and are not depreciated. Other tools are depreciated using straight line depreciation.
12. Tool numbering, tracking by computer database and bar coding are being employed.
13. They are being innovative by utilizing bar coding to track their tools. It is being used on their projects and at the warehouse in Birmingham. It is proving to be cost effective for BE & K.

## CENTRIC-JONES CONSTRUCTION

1. Tools are purchased from wholesale construction suppliers by the Lakewood, CO office. Project superintendents may also purchase tools when the need arises.
2. Tools are leased occasionally at the Project Manager's discretion.
3. Tool costs vary depending on the type of work. For building construction it is low, however, for dam projects it may be up to 5% of the labor costs.
4. Tools are stored in tool sheds for most projects. Project sizes range from 1-20 million dollars. Foremen are responsible for the tool inventories.
5. Tools are issued to the foremen who are also accountable for them.
6. Tool loss rate percentage is unknown. This is a problem that is difficult to control on projects such as bridges and dams. The most susceptible tools include pumps, saws and generators.
7. Tools are disposed when they have performed their useful life. Tools are also disposed when the repair costs exceeds 40% of the replacement value.
8. Tools are disposed by auctions to obtain the best price.
9. Currently there is not a tool replacement strategy being employed.
10. Vans are staged at the home office to pick up tools at a project and deliver them to a new project. Shipping tools by United Parcel Service (UPS) has been used, but this method is rare.
11. Tools are depreciated over 2 or 3 years using straight line depreciation.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. No innovative tool management procedures are being employed.

## DUNN CONSTRUCTION COMPANY

1. Tools costing over \$100 are procured by the central office. Various construction suppliers are utilized.
2. Tools are occasionally leased. Most leases are with an option to buy.
3. Tool costs are approximately 5% of project labor costs.
4. Storage trailers are used and are assigned to the superintendents. Project sizes range from 5-35 million dollars with the average being 15 million. Inventories are conducted on a monthly basis using a computer print out.
5. Tools are issued by the superintendents. On a large job a central tool room is used with a worker assigned to issue tools on a daily basis. The superintendent is accountable for all the tools on a project.
6. Tool loss rate is approximately 15%. Most susceptible are small tools such as saws and drills.
7. There is no established system for determining when tools are to be disposed. The superintendents decide when tools are to be disposed. Some tools last for 5-6 years. Others need to be replaced for each project.
8. When tools are disposed the useable parts are salvaged and the rest is sold for junk.
9. Currently there is not a tool replacement strategy being employed.
10. Tools are distributed to other projects by UPS or bus when it is cost effective to do so.
11. Tools are considered expendable items and are not depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. They are being innovative by trying to eliminate failure in their tool management procedures and stick to what works for them.

GEUPEL DEMARS, INC.

1. Tools are procured utilizing 4-5 main suppliers. These are construction supply businesses.
2. Tools are rarely leased.
3. Tool costs are approximately 2% of project labor costs.
4. Trailers are used for most projects. Tools are inventoried monthly by the superintendents. Project sizes range from 3-75 million dollars.
5. The tools are issued to the project foremen. The superintendents are accountable for the tools.
6. Tool loss rate is less than 1%. The most susceptible items are saws.
7. Tools are disposed when the repair costs of the tool exceeds 50% of the replacement value.
8. Tools under \$200 are usually thrown away. Higher value tools are sometimes traded in for new ones.
9. The tool replacement strategy employed is that small electrical tools are procured for one particular job. Whereas items such as generators are purchased with the plan that they will be utilized on several projects.
10. Tools are distributed to other projects by warehouse trucks or the superintendents transport them. Usually before they reach a new project site the tools are taken to the Indianapolis warehouse for inventory and any necessary repairs.
11. Tools with a value under \$250 are considered an expense and are not depreciated. Other tools are depreciated using straight line depreciation.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. They are being innovative by tracking their tools using a computer database and a tool numbering system. This has resulted in an extremely low tool loss rate. This allows them to know where their tools are at all times.

GIBSON-LEWIS, INC.

1. Tools are procured through distributors and construction suppliers. They look for suppliers that can provide good customer service.
2. Tools, such as cement finishing machines and compressors, are leased. For short durations this is cost effective.
3. Tool costs are approximately 2% of project costs.
4. Gang boxes and trucks are used to store tools. Trailers are rarely employed. Project sizes range from 1000-500,000 dollars. Foremen inventory the tools.
5. The foremen issue and keep track of the tools. The foremen are accountable for all the tools
6. Tool loss rate is estimated at 10-15%. Most susceptible tools are saws, small hand tools and 4 foot levels.
7. Tools are disposed of when the repair costs of the tool exceeds 50% of the replacement value.
8. The useable parts are salvaged from the worn out tools. The remaining parts of the tools are thrown away.
9. The tool replacement strategy depends on a need basis. If a need for a tool is foreseen then it is purchased on a volume basis since this reduces tool costs.
10. Before tools are distributed to other projects they are sent to the main warehouse in Indiana. After the tools are inventoried and repaired they are sent out to a new project.
11. The point of contact for Gibson-Lewis did not know if the tools were depreciated.
12. Tools are numbered and painted a color that identifies them as the property of Gibson-Lewis. Computer database and bar coding procedures are not being employed.
13. No innovative tool management procedures are being employed.

## GILBANE BUILDING COMPANY

1. Tools are purchased through distributors and construction suppliers.
2. Hand tools and minor equipment are not leased.
3. The percentage of project costs devoted to tools was unknown.
4. Trailers are used for most projects. Project sizes range from 5-50 million dollars. Project Managers establish tool inventorying methods.
5. Project Managers establish issuing procedures and are accountable for the tools.
6. Tool loss rate does occur but the percentage is unknown.
7. Tools are disposed when the repair costs of the tool exceeds 50% of the replacement value.
8. Useable parts of worn out tools are saved for repair parts. The remaining parts are thrown away. If possible the tools are traded in for new tools.
9. The tool replacement strategy being employed by Gilbane is that they keep in stock items that will be needed based on experience.
10. Transfer memo is sent from a project to the warehouse when tools are distributed to a new project. It is a complete inventory of all the tools that are sent to the new project.
11. Tools are considered expendable items and are not depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. No innovative tool management procedures are being employed.

GRAYCOR, INC.

1. Tools are purchased from construction suppliers by the central warehouse. Tools are bought with the plan that they will be used within the next 6-12 months.
2. Tools are rarely leased.
3. Tool costs are approximately 2% of project labor costs.
4. Central tool cribs are used for most projects. Project sizes range from 50,000-65 million dollars with the average being 3 million. Superintendents establish tool inventory procedures, however the firm conducts an audit on an annual basis.
5. Tools are issued to the superintendents who are personally accountable for the tools. This has proved successful for Graycor.
6. Tools loss rate is approximately 5%. Most susceptible are saws, drills and portable welders.
7. Tools are disposed when the repair costs of the tool exceeds 50% of the replacement value.
8. Tools are thrown away when they are worn out.
9. The tool replacement strategy being used is a high/low system. When a quantity of tools in the central warehouse reaches a specified "low" new tools are purchased to bring the quantity to the "high" level.
10. Tools are distributed to other projects by either the superintendents transporting them or they are sent to the central warehouse. Once at the warehouse they are inventoried, repaired or replaced then sent to a new project.
11. The point of contact for Graycor did not know if the tools were depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. No innovative tool management procedures are being employed.

## GROW TUNNELING CORPORATION

1. Tools are purchased through large industrial type suppliers such as Ingersall Rand and Black & Decker.
2. Tools are rarely leased.
3. The percentage of project costs devoted to tools was unknown.
4. Tools are stored in warehouses on tunnel projects. The average project size is 45 million dollars. Inventories are performed on a monthly basis by the superintendents.
5. Tools are issued to the foremen on a daily basis. Since the tools are procured primarily for one project, they are accountable to the project only.
6. Tool loss rate is too high but the percentage was unknown. Most susceptible are impact wrenches, torches and small handtools which tend to disappear.
7. Tools used on tunneling projects are worn out when the project is completed. They are then disposed.
8. Useable parts of worn out tools are saved for repair parts. The remaining parts are thrown away.
9. The tool replacement strategy in place is based on their experience in the tunneling business. The same type of tools are required for each project. Tool requirements are therefore known and planned for ahead of time.
10. Tools are not distributed to other projects very often. When tools are sent to other projects they are first sent to the main warehouse in New York. They are inventoried, repaired or replaced, and sent to the new project.
11. The point of contact for Grow did not know if the tools were depreciated.
12. Tool numbering, computer database sytem or bar coding is not currently being employed. Grow is in the process of developing a computer database system to facilitate the tracking of tools.
13. No innovative tool management procedures are being employed.

## HCB CONTRACTORS

1. Tools are purchased through construction suppliers.
2. Tools are rarely leased.
3. The percentage of project costs devoted to tools was unknown.
4. Tool sheds and trailers are used for storage. The average project size is 25 million dollars. The Project Managers establish procedures for inventorying tools.
5. Tools are issued to the workers on a daily basis. The Project Managers are accountable for the tools on their jobs.
6. Tool loss rate is high: as much as 50% on some jobs. Most susceptible tools are saws and drills.
7. Tools are disposed when the repair costs of the tool exceeds 50% of the replacement costs.
8. Tools are disposed by shipping them to the central warehouses. They are then either sold for junk or thrown away.
9. Each project establishes a tool replacement strategy. This varies from project to project.
10. Tools are not distributed from project to project.
11. Tools are considered a project expense and are not depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. No innovative tool management procedures are being employed.

## HELMKAMP CONSTRUCTION COMPANY

1. Tools are procured utilizing 3-4 major construction suppliers.
2. Tools are leased occasionally. For short durations or one-time usage this is cost effective since there are no ownership expenses.
3. The percentage of project costs devoted to tools is approximately 10%.
4. Trailers are used for most projects. The Project Manager is responsible for establishing inventory procedures.
5. The Project Managers are responsible for tool issue and accountability.
6. The tool loss rate was unknown. Most susceptible tools are saws and grinders.
7. Tools are disposed when the repair costs of the tool exceeds 50% of the replacement value.
8. Tools are either thrown away when they are worn out or traded in for new tools. Auctions are not an effective disposal procedure.
9. Currently there is not a tool replacement strategy being employed.
10. Project Managers distribute tools from job to job. The main warehouse receives forms from the Project Manager when this is performed. Their computer database is then updated to reflect the location of the tools.
11. The point of contact for Helmkamp did not know if the tools were depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. They are not being innovative but feel they try to manage tools in a simple rather than complicated manner.

## KASLER CORPORATION

1. Tools are centrally purchased utilizing construction wholesale houses. Projects call in their tool needs and the central warehouse procures them.
2. Hand tools and minor equipment are not leased.
3. Tool costs vary depending on the type of work. For tunneling the costs are 8% ; for bridges the costs are 10%; and for dams the costs are 1%. All costs are a percent of project labor costs.
4. For large projects a warehouse is utilized for tool storage. For smaller projects gang boxes are employed. Projects vary in sizes up to 80 million dollars. Inventory methods are established by the projects.
5. Tools are issued to the foremen. On large jobs the foremen sign out for the tools. Foremen are accountable for the tools.
6. Tool loss rate was unknown but believed to be low. Most susceptible tools are hammers and shovels.
7. Tools are disposed when they are worn out.
8. Currently there is no set procedures for tool disposal.
9. There is not a tool replacement strategy being employed. It varies from project to project.
10. Project Managers are responsible for distributing tools to different projects.
11. Tools are considered a project expense and are not depreciated.
12. Tools are numbered. Computer database and bar coding procedures are not being employed.
13. No innovative tool management procedures are being employed.

FRANK MESSER & SONS CONSTRUCTION COMPANY

1. Tools are purchased from industrial and construction suppliers.
2. Hand tools and minor equipment are rarely leased.
3. Project costs are not related to tools costs. Tools are allocated to construction activities and crew sizes.
4. Tool sheds are most often utilized. The average project sizes ranges from 100,000-50 million dollars, with the average being approximately 6 million. Tools are inventoried on a monthly basis by the superintendents.
5. Tools are issued to the laborers on a daily basis. They are accountable for the tools.
6. Tool loss rate is not a problem for Messer.
7. Tools are disposed when they are worn out.
8. Tools are disposed by throwing them away.
9. Tool replacement strategy is accomplished by obtaining recommendations for tools from experienced foremen on the projects. They recommend the type and specific brand names of new tools to be procured.
10. Before tools are distributed to other projects they are sent to the warehouse in Cincinnati. The tools are inventoried, repaired or replaced, and sent out to a new project.
11. Tools are considered a project expense and are not depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. No innovative tool management procedures are being employed.

W. B. OLSON, INC.

1. Tools are procured from construction wholesale houses.
2. Hand tools and minor equipment are not leased.
3. The percentage of project costs devoted to tools was unknown.
4. Trailers are used to store tools on projects. Project sizes range from 1-10 million dollars. Superintendents are responsible for inventorying tools.
5. Tools are issued to the superintendents, foremen and the craftsmen who sign for the tools. This procedure makes them totally accountable for the tools that are issued.
6. Tools loss rate is approximately 5%. Having the personnel sign for the tools has reduced the tool loss rate. The most susceptible are saws.
7. Tools are disposed when it is no longer economically feasible to repair them. An experienced individual makes this decision for Olson.
8. Tools are disposed by throwing them away.
9. Currently there is not a tool replacement strategy being employed.
10. Tools are distributed to other projects by truck. The driver updates the tool inventory from project to project when this occurs so that Olson knows the location of the tools.
11. Tools are considered a project expense and are not depreciated.
12. A tool numbering system is being utilized. Computer database and bar coding procedures are not being employed.
13. No innovative tool management procedures are being employed.

## TURNER CONSTRUCTION COMPANY

1. Tools are procured from all sources, such as industrial suppliers, construction wholesalers and hardware stores.
2. Hand tools and minor equipment are rarely leased.
3. The percentage of project costs devoted to tools was unknown.
4. Trailers, gang boxes and tool sheds are used for tool storage. Project sizes range from 200,000-50 million dollars. The Cincinnati office sends out a "tool" superintendent to inventory tools on a monthly basis.
5. Tools are issued to the foremen who sign tool transfer sheets. They are accountable for the tools.
6. Tool loss rate was unknown but believed to be low. Most susceptible items were two-way radios used for communications on the projects.
7. Tools are disposed when they are worn out.
8. Tool disposal is performed by trading in the old tools for new tools. At times they are given away to trade schools.
9. The tool replacement strategy being employed is based on future workload if it can be accurately determined.
10. Before tools are distributed to other projects they are sent to the warehouse in Cincinnati. The tools are then inventoried, repaired or replaced, and sent out to a new project.
11. Tools with a value under \$500 are considered an expense and are not depreciated. Other tools are depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. They are not being innovative but feel that they are managing tools in a similar manner as the rest of the industry.

## WALSH CONSTRUCTION COMPANY

1. Tools are procured by their Central Purchasing Department from major industrial suppliers.
2. Hand tools and minor equipment are not leased.
3. The percentage of project costs devoted to tools was unknown.
4. Gang boxes are used for tool storage. The average project size is approximately 10 million dollars.
5. Tools are issued to the foremen. They are accountable for the tools.
6. Tool loss rate is approximately 30%. No particular tool is more susceptible than another.
7. Tools are disposed when the repair costs of the tool exceed 60% of the replacement value.
8. Useable parts of the worn out tools are salvaged for repair parts. The remaining parts are auctioned.
9. Currently there is not a tool replacement strategy being employed.
10. Tools are distributed to other projects by truck or UPS when it is cost effective to do so.
11. Tools are considered a project expense and are not depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding is not being employed.
13. They are being innovative by centrally purchasing the tools rather than having the project managers buy them.

## WINTER CONSTRUCTION COMPANY

1. Tools are purchased from construction supply houses. They receive input from the superintendents for brand names of tools that are superior performers.
2. Hand tools and minor equipment are rarely leased.
3. The percentage of project costs devoted to tools was unknown.
4. Tools are stored in trailers and gang boxes. Project sizes range from 7-50 million dollars. Tool inventory is performed on a quarterly basis by the superintendents.
5. Tools are issued to the superintendents on a daily basis. The superintendents are accountable for the tools.
6. Tool loss rate is less than 2%. Most susceptible tools are saws, drills and levels.
7. Tools are disposed when the repair costs of the tool exceed 50% of the replacement value. The tools are sent to the Atlanta warehouse for repairs.
8. Tools are disposed by throwing them away.
9. The current tool replacement strategy being employed is on a need basis. Winter is looking into the possibility of planning their future needs to facilitate bulk purchases at lower costs.
10. Before tools are distributed to other projects they are sent to the warehouse. The tools are then inventoried, repaired or replaced, and sent out to a new project.
11. Tools with a value under \$500 are considered an expense and are not depreciated. Other tools, or those with a useful life of at least one year, are depreciated.
12. Tools are numbered and are tracked on a computer database. Bar coding has been explored and its use in the future is likely.
13. They feel that they are being innovative by using computers for tracking tools and their associated costs.