

## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-33	Production management	Stainless exhaust pipe manufacturing	
	2nd category	Industry	Sector / Product
	5S	Automotive parts mfg. (after-market)	Exhaust pipe manufacturing

### Subject

Reduction of time to search jigs and tools by providing a storage space  
(improvement of workability through 5S activities)

■ **Diagnosis:**

Many welding jigs are hooked on hangers without assortment or marking and it takes time to find a right one. Tools are kept disorderly in tool boxes and it is hard to tell which is in use or available.

■ **Guidance:**

- 1) To assign a serial number to each jig, mark the name and the number on the jig, and hook it on a designated position of the hanger; and
- 2) To indicate tool shapes in each box.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

The recommendations have not been implemented as the company plans to relocate the factory and is busy with new jobs.

■ **Other relevant points (issues to be solved and problems remained):**

Although the management understands what they should do, but they do not seem to feel the need for improvement strongly because they do not have management staff and are busy with daily operation. It is important to visit them frequently and provide information and guidance repeatedly.

## 1 Case A

### **Description of Problems**

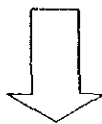
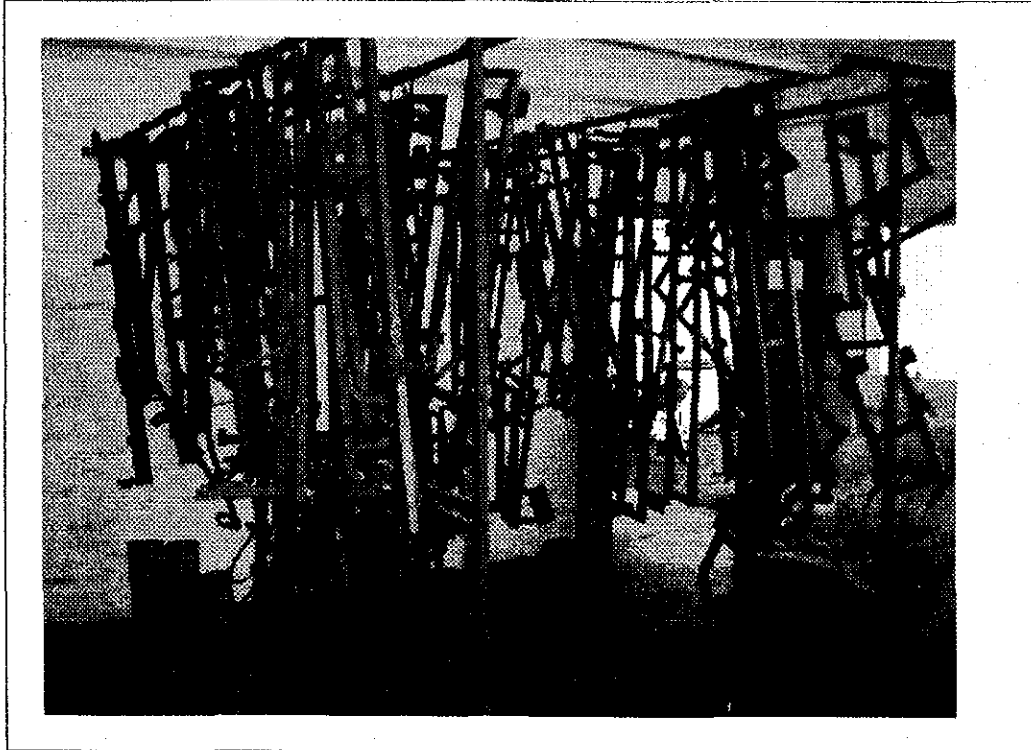
- 1) Many kinds of jig for tail pipe assembling work are hung on the store stand. It is difficult to find the necessary jig due to them being not labeled properly.
- 2) The work place has reduced in the pipe cutting shop because there are too many obsolete products.
- 3) Many hand tools are hung on the hanger in a toolbox, which is situated on the wall of the welding shop. It is however difficult to know what tools are in use due to inadequate labeling.

### **Diagnosis and Recommendation**

- 1) Jigs should be clearly labeled, showing their name and control number. Their storing address and control number should also be shown on the storing stand. It makes the accessibility of jigs easy and increases productivity (See Photograph 1).
- 2) Products should be arranged and obsolete products disposed off.
- 3) The shape of each tool should be drawn on the hanging board, which would indicate which tools are in use as well as the proper position of the tools (See Photograph 2).

**Photograph 1 The assembling jigs for tail pipe  
and the store stand**

**The Present state**

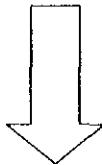
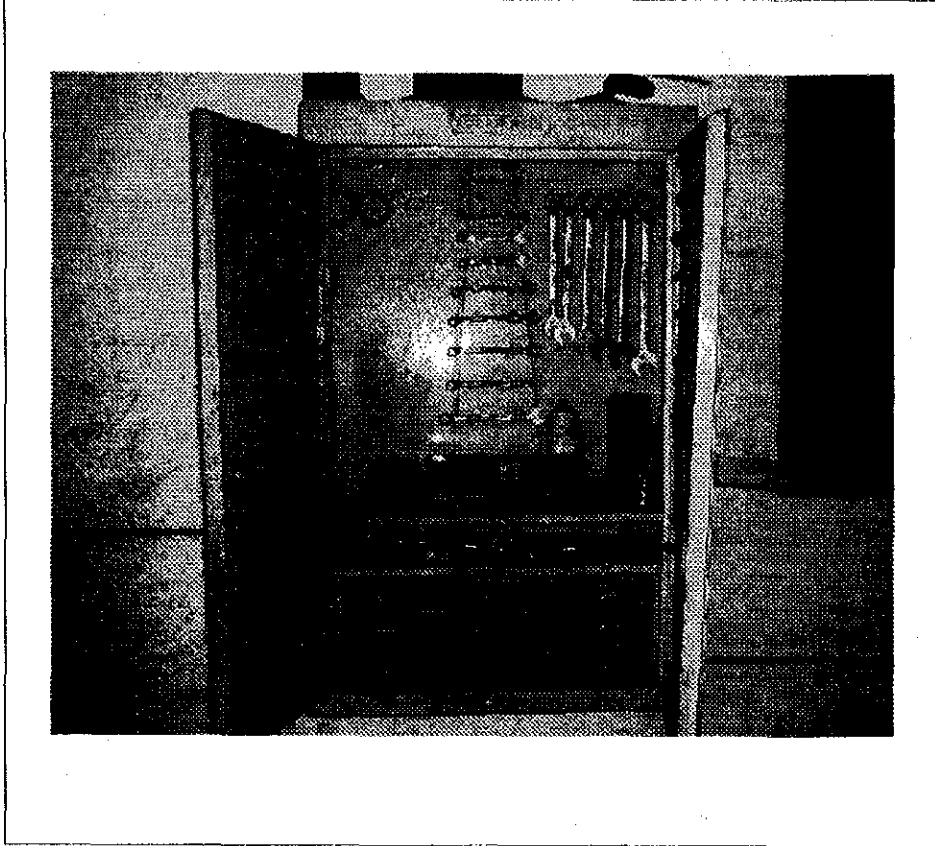


**Recommendation**

Jigs should be clearly labeled, showing their name and control number. Their storing address and control number should also be shown on the storing stand. It makes the accessibility of jigs easy and increases productivity.

**Photograph 2 The hand toolbox in the welding shop**

**The Present state**



**Recommendation**

The shape of each tool should be drawn on the hanging board, which would indicate which tools are in use as well as the proper position of the tools.

## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-34	Production management	Stainless exhaust pipe manufacturing	
	2nd category	Industry	Sector / Product
	Process control	Automotive parts mfg. (after-market)	Exhaust pipe manufacturing

Subject
Collection and recording of daily production data by process

■ **Diagnosis:**

No daily production data are collected for each process and absence of such data prohibits identification of problems in a particular process.

■ **Guidance:**

To collect daily production data in each process and analyze them to see if any problem occurs.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

The recommendations have not been implemented as the company plans to relocate the factory and is busy with new jobs.

■ **Other relevant points (issues to be solved and problems remained):**

Although the management understands what they should do, but they do not seem to feel the need for improvement strongly because they do not have management staff and are busy with daily operation. It is important to visit them frequently and provide information and guidance repeatedly.

## **1 Case A**

### **Description of Problems**

The daily production quantities of components are not known at every workshop process.

### **Diagnosis and Recommendation**

The data of actual production quantities should be collected and analyzed to know the conditions of production. The problems of the workshop will be clear by analyzing of production data, and countermeasures to the problems will be taken easier.

## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-35	Production management	Automotive steering knuckle processing	
	2nd category	Industry	Sector / Product
	5S	Metalworking	Machining

### Subject

5S activities in the materials and products storage yards

**■ Diagnosis:**

Storage yards for materials and finished products, a final inspection station, and other facilities are provided within the warehouse. Jig and old tools and apparatuses are also stacked. Due to the limited space, pallets storing materials are stacked in five stages, which can collapse to cause an accident.

**■ Guidance:**

Rearrangement of the warehouse floor is recommended as follows:

- 1) To separate the materials and products storage yards clearly from the work space including the inspection station;
- 2) To assort and dispose old tools and equipment, and relocate jigs to the machine shop; and
- 3) To restrict the stacking of pallets up to four stages.

**■ Response of the enterprise (as confirmed during the follow-up activity):**

The materials and products storage yards have been relocated to another building and the entire floor is used as workspace. Old equipment and tools have been disposed.

**■ Other relevant points (issues to be solved and problems remained):**

The company makes rearrangement of the entire factory and plans to expand it by acquiring an adjacent land. Upon completion of the rearrangement project, areas of improvement achieved through 5S activities and remaining problems should be checked.

## 1 Case A

### Description of Problems

The reasons for the stock floor being crowded resulting in inefficiency are that receiving materials for work, shipping of products, painting and final inspection and storing of Machining jigs, old equipment and materials are carried out in this area. The baskets with the castings are stacked 5 high this is not only dangerous but also makes it difficult to lift the baskets up and down.

### Diagnosis and Recommendation

(See Sketch & Photographs)

The set up of the stock floor needs to be rearranged in order to get the most efficient usage by placing all needed articles into the right position.

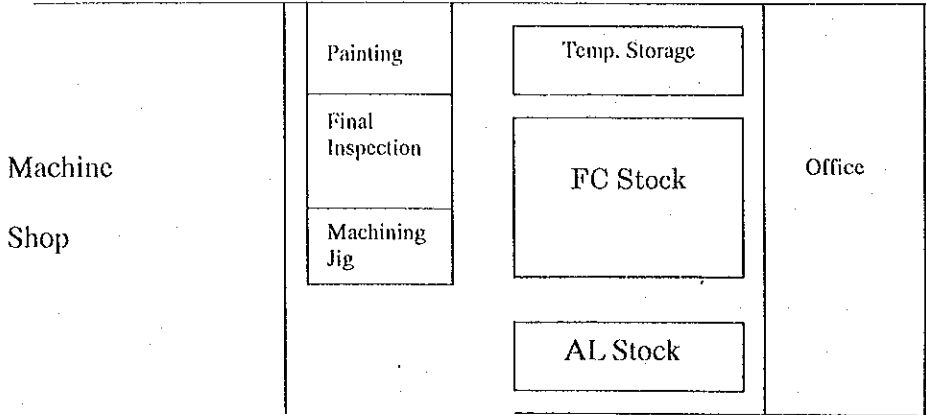
- 1) The stock place for materials and products has to be separated from the painting space and the final inspection place.
- 2) All existing articles have to be sorted and only the articles needed on the stock floor should be kept and placed into the right position. See positioning below.

- Castings and materials: Stock floor
- Completed products: Stock floor
- Old equipment and unused material: Dispose
- Machining Jigs: Machine shop

- 3) The baskets should be stacked 4 high in order to be safe.



**Sketch: The Present Layout of Stock Floor**



**Photographs: The View of Stock Store Inside**



## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	<b>1st category</b>	<b>Division / Process</b>	
MW-36	Production management	Automotive steering knuckle processing	
	<b>2nd category</b>	<b>Industry</b>	<b>Sector / Product</b>
	Transportation management	Metalworking	Machining

<b>Subject</b>
Improvement of workflow between processes

■ **Diagnosis:**

Four machines are arranged without consideration of process flow, resulting in disorderly workflow.

■ **Guidance:**

To rearrange the machines in order of processes and create a linear and efficient layout.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

The company carried out a rearrangement project that would include the change in machine layout according to the order of processes.

■ **Other relevant points (issues to be solved and problems remained):**

After completion of the layout change, the results should be checked together with the status of 5S activities.

## 1 Case A

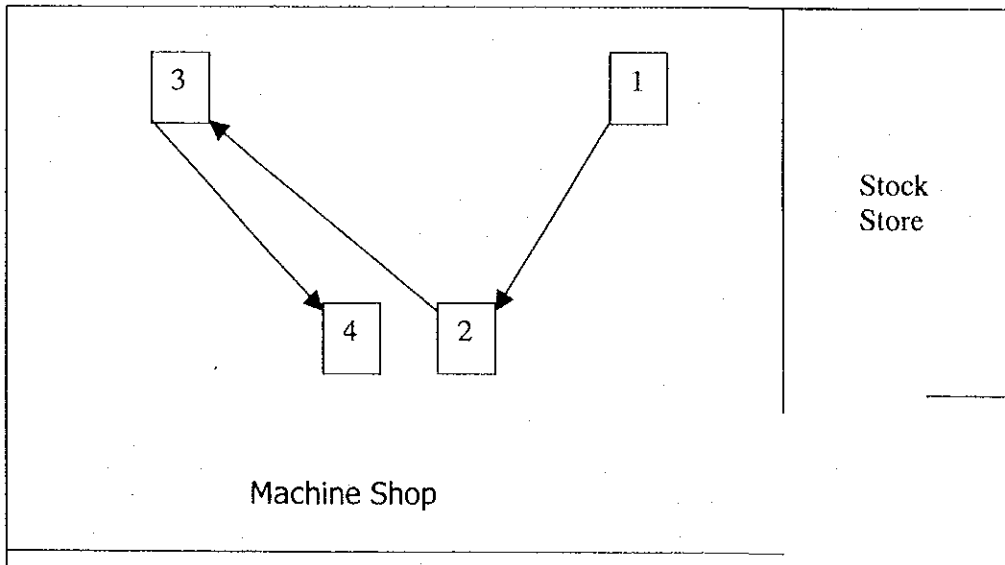
### **Description of Problems**

Observing the work flow of the steering knuckle the following was noted. Four machines located in distant areas on the factory floor are used to produce this main product.

### **Diagnosis and Recommendation**

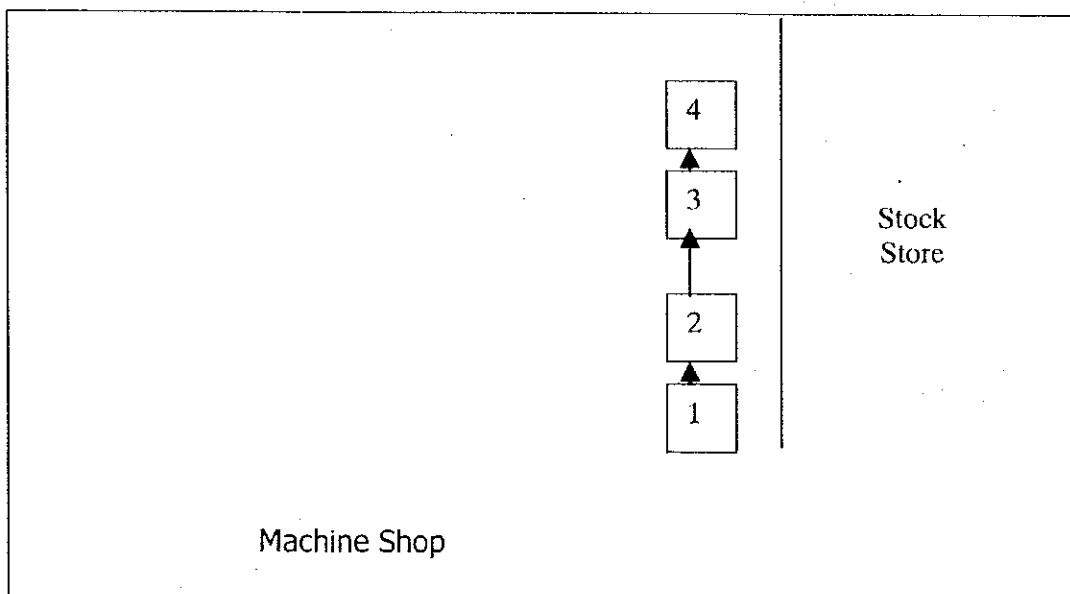
The layout for this procedure needs to become a straight line workflow in order to lessen transport distance of the work between processes (See Sketch).

### Sketch: The Present Flow of Steering Knuckle in the Machine Shop



### Recommendation

The layout for this procedure needs to become a straight line workflow in order to lessen transport distance of the work between processes.



## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-37	Production management	Automotive steering knuckle processing	
	2nd category	Industry	Sector / Product
	Transportation management	Metalworking	Machining

### Subject

Improvement of transportation of in-process work pieces between processes

■ **Diagnosis:**

Work pieces, upon completion of each process, are placed on a large pallet, from which they are transferred manually to another vacant pallet (on a cart) for the subsequent process. It takes long time and is inefficient.

■ **Guidance:**

The following improvement was proposed:

- 1) To keep a small basket placed on a carriage near the machine, put completed work pieces in the basket, and move the carriage to the subsequent process as soon as the basket becomes full; or
- 2) To use a small basket with wheels for the same purpose.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

The above recommendation was not implemented because the company intended to change machine layout and consider pallet modification after the layout change has been completed.

■ **Other relevant points (issues to be solved and problems remained):**

It is possible to eliminate the pallet if work arrangement is modified with the planned layout change, such as use of a slider. Periodical visit and guidance are required to encourage the recommended improvement.

## 1 Case A

### Description of Problems

Steel baskets are used for storage and transportation of the products in the machine shop, it is impossible for a worker to lift the filled basket by hand because it is too large and too heavy (Size: 1,500 mm L x 900 mm W x 600 mm H).

The worker is currently moving the product from a filled basket to an empty basket on a cart and transporting or carrying 2 items at a time to the next process. Both methods are time consuming and unproductive.

### Diagnosis and Recommendation

#### 1) For Immediate Action

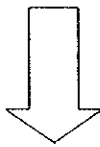
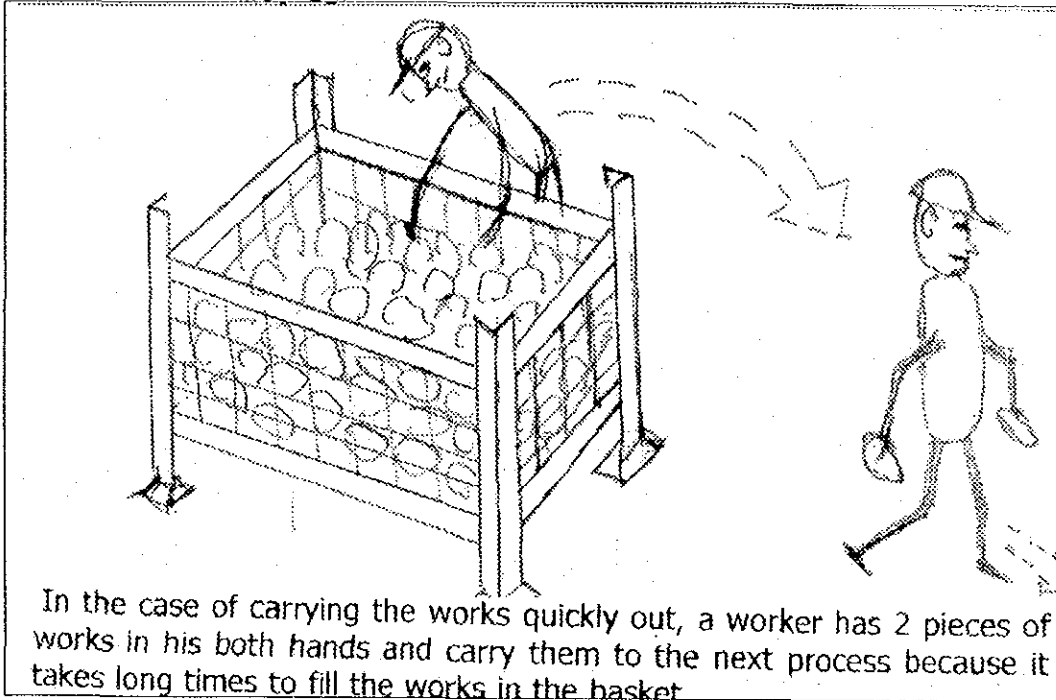
Smaller baskets and trolleys are needed to carry the products to the next process. Although this will increase the frequency of carriage it will improve the inefficiency of current methods used (See Sketch 1).

#### 2) For Future Consideration

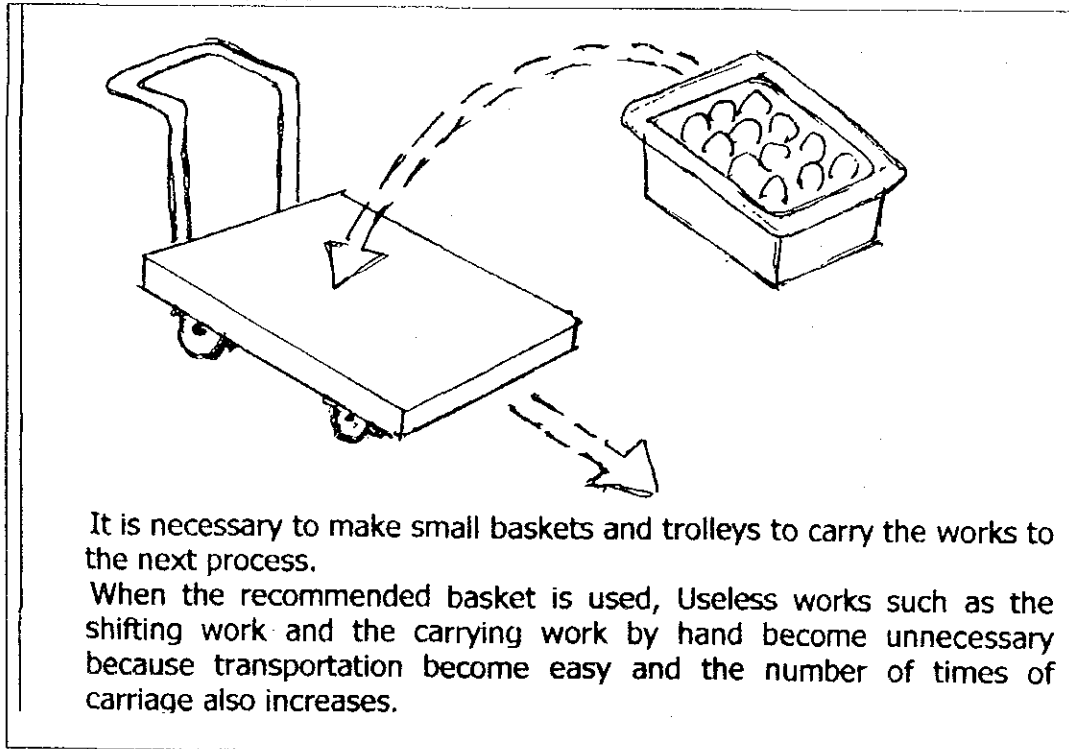
A steel basket of approximate size: 750mm L x 450mm W x 500mm H, with 4 wheels needs to be built (See Sketch 2).

## Sketch 1 The Improvement of Carrying Method of Works

### The Present Carrying Method

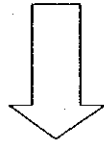
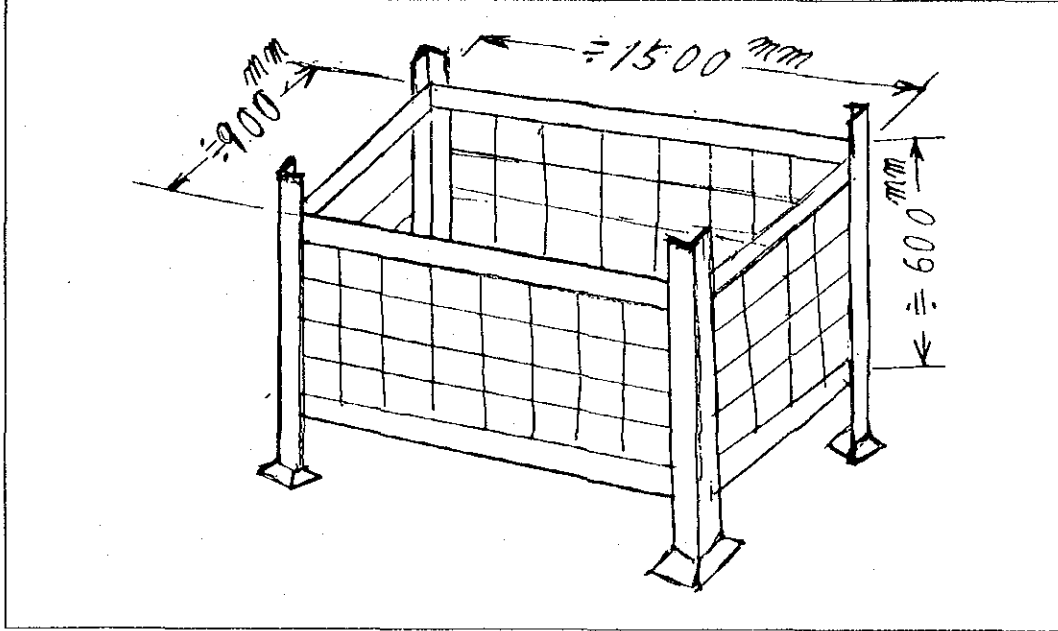


### The Recommendation

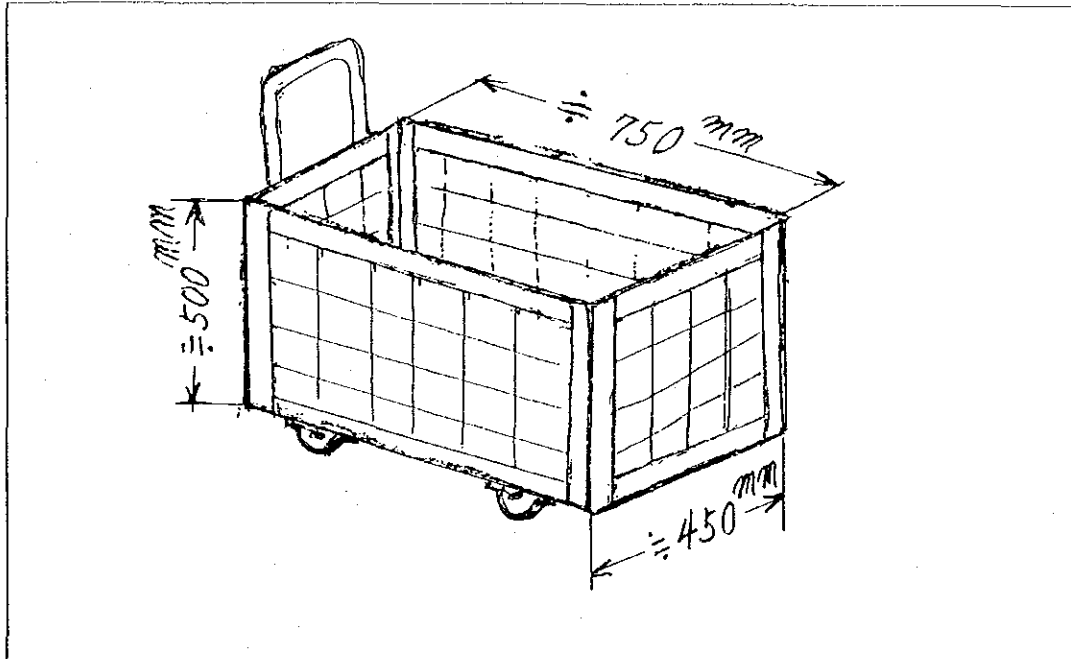


## Sketch 2 The Improvement of Steel Basket

### The Existing Steel Basket



### The Recommended Steel Basket





## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-38	Production management	Automotive steering knuckle processing	
	2nd category	Industry	Sector / Product
	5S	Metalworking	Machining

Subject
5S activities on the shop floor

■ **Diagnosis:**

The shop floor is littered with cuttings and oil, and a paint indicating a service path is partly lost. Poor housekeeping suggests the lack of systematic 5S activities.

■ **Guidance:**

It was advised to implement 5S activities as explained in the seminar and to resurface the floor (uneven and damaged due to wear and tear) with paint.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

The above recommendation was not implemented because the company intended to change machine layout and resurface and paint the floor as part of the project, followed by promotion of 5S activities around the machine.

■ **Other relevant points (issues to be solved and problems remained):**

It was revealed that the management was willing to promote 5S activities as taught in the seminar and explained during the follow-up survey, but they did not understand the concept of 5S practice completely. Periodical visit and guidance are required to encourage full deployment of 5S activities.

## **1 Case A**

### **Description of Problems**

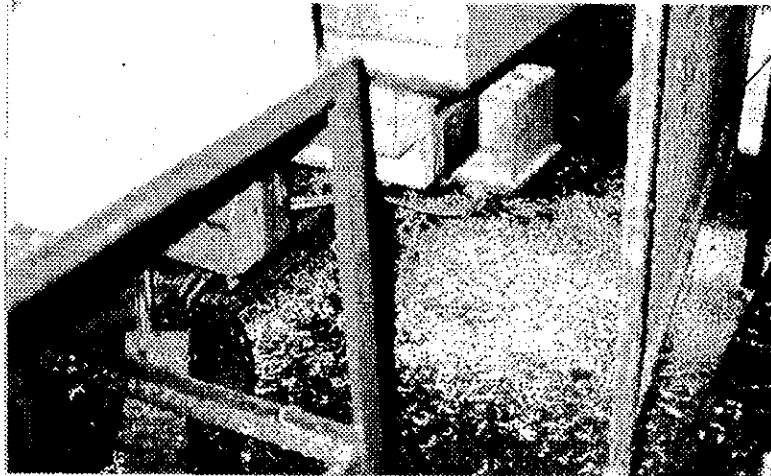
5S principals are not applied. Shop floor is partial demarcated and too many articles are placed in different areas.

### **Diagnosis and Recommendation**

5S activity needs to be implemented as introduced at the seminar. The shop floor needs to be repaired and cleaned (See Photographs).

## Photographs The state of 5S

### The Present state of 5S



### Recommendation

5S activity needs to be implemented.  
This can be done by referring to the document of 5S activity introduced at the seminar.

## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-39	Production management	Production management	
	2nd category	Industry	Sector / Product
	Process control	Metalworking	Machining, Press, Welding

<b>Subject</b>
Production planning and scheduling

■ **Diagnosis:**

The management makes a production plan according to customer orders but fails to document it. As a result, information is not shared with the production department. Although the factory manager is consulted when production volume and schedule is notified, he is not able to use daily production data for systematic production management because no production plan is available in the form of production targets. A production plan and schedule should be established.

■ **Guidance:**

Field guidance was made to teach weekly and daily planning as well as the method for preparation, which are suitable for the current flow of work.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

■ **Other relevant points (issues to be solved and problems remained):**

The corporate manager is virtually responsible for production management and has no time to introduce planning practice, although he is willing to do so. Clearly, he requires management staff to assist him, which takes long time. In the meantime, he should use a consultant who provide guidance on a continuous basis by proposing specific actions and providing follow-up advice. Then, in the long run, it is imperative to establish a mechanism to train and promote employees to management staff in a systematic manner.

## **1 Case A**

### **Description of Problems**

There are neither production plans nor schedules put in writing.

### **Diagnosis and Recommendation**

Weekly and daily production planning and scheduling should be made.

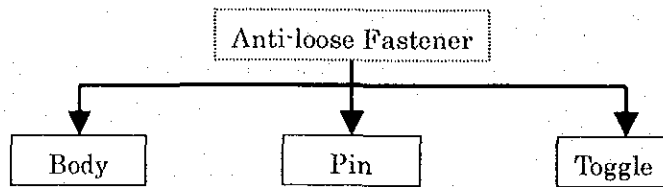
- 1) Steps for production planning and scheduling
  - Start the weekly and daily production scheduling from your important products (3 – 5 items). You can modify the schedule forms, and expand the scheduling into other products.
  - Compare the schedule plans with actual production results and analyze reasons for differences. This will improve the management of the production progress.
- 2) Example of Anti-loose Fastener (Refer Attachment A).

## How to make the Production Schedule?

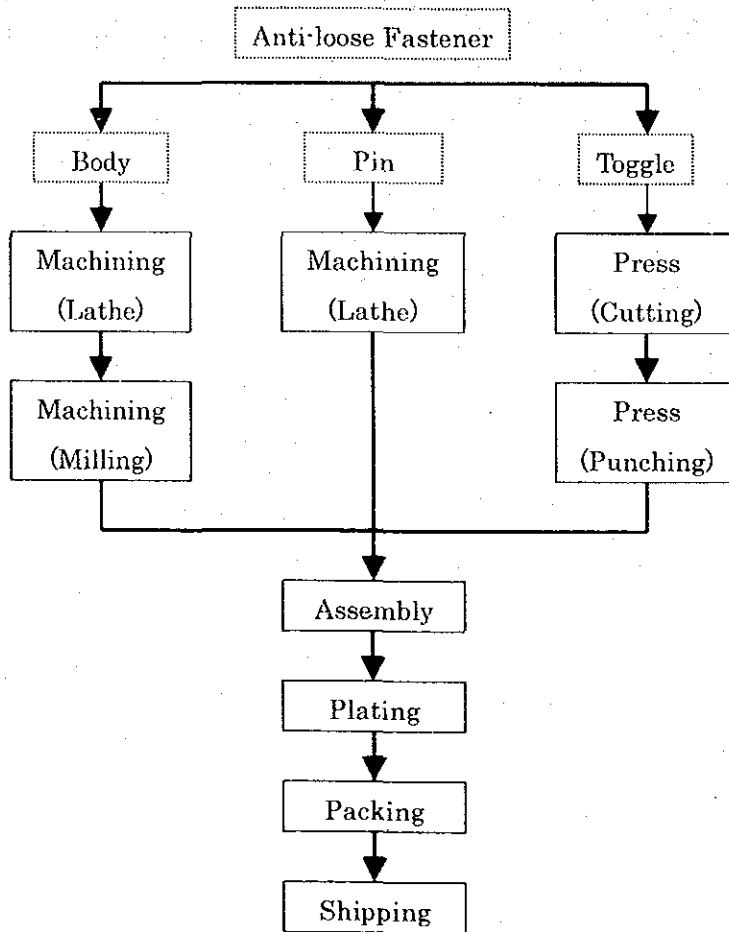
(Example: in the case of Anti-loose Fastener)

1. Break down the product of received order to component parts.

Example: Anti-loose Fastener



2. Design the manufacturing processes on the basis of the component parts.

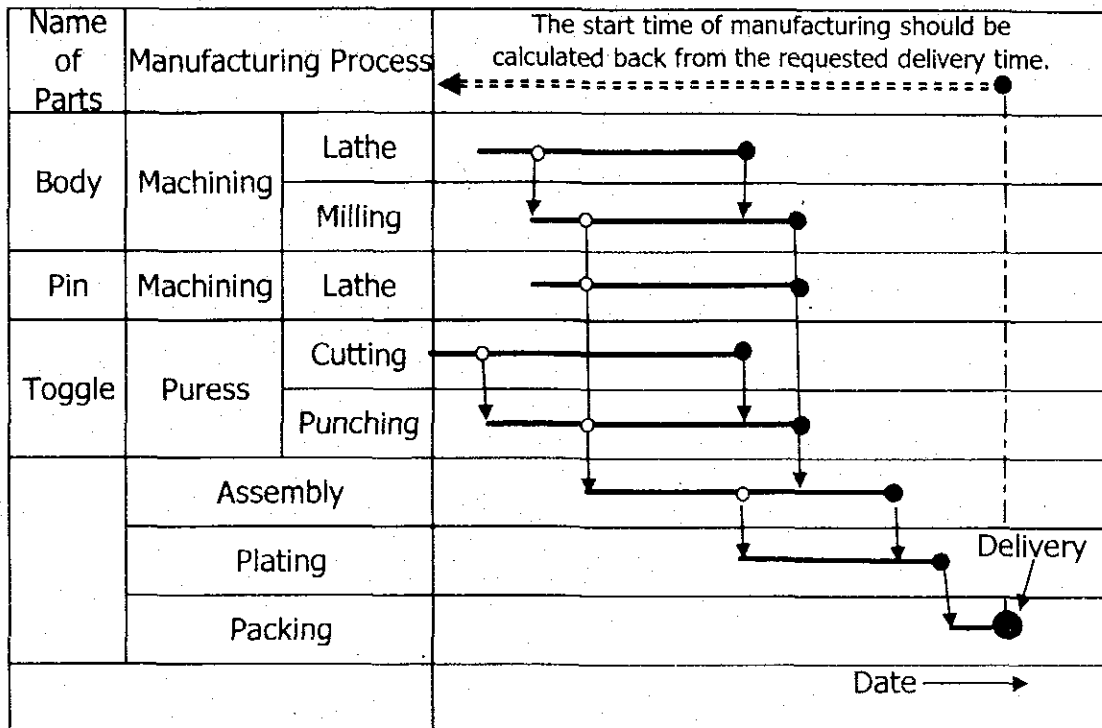


3. Make a rough production schedule on a time chart with the consideration of each manufacturing process and capacity.

The start time of manufacturing should be calculated back from the requested Delivery time (shipping date).

Example: Anti-loose Fastener

**Production Time Chart of Anti-loose Fastener**



4. Make a weekly production schedule on the basis of the production time chart. The manufacturing days of each parts should be shown with a bar in the weekly production schedule sheet. [Bar chart] **(See Attachment A-1)**
5. Make a daily production schedule on the basis of the weekly production schedule. The working schedule should be shown in the column of Planned with bar. [Bar chart] **(See Attachment A-2)**
6. Fill in the existent operation cards on the basis of daily production schedule.

7. Hand over the operation cards to operators through the foreman.
8. Gather the operation cards with the recorded actual production results from the foreman.
9. Check whether the jobs were done as scheduled, compare the results with the plans. If any differences arise, the reason of failure should be inquired by the foreman and the operator.
10. Add the left jobs in the first place of following day.

Remarks;

1. The control system in this recommendation should be applied on the main products (3 – 5 Items) at the beginning, and then transferred to other products.
2. Bottleneck process (weak process), bottleneck machine and important machines should be concentrically controlled.





Manufacturing Process:

Daily Production Schedule

Working Date		Scheduled by				Scheduled on:		Week-ending:													
Order Number	Customer	Product	Parts	Used Machine	Qty	Working Time															
						7	8	9	10	11	12	13	14	15	16	17	18				
101	A	Anti-loose Fastner	Body	Lathe	Planned	5,000															
					Actual																
				Milling	Planned	5,000															
					Actual																
				Lathe	Planned	10,000															
					Actual																
102	B	Plate Back Hook	Plate	Milling	Planned	3,400															
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## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	<b>1st category</b>	<b>Division / Process</b>	
MW-40	Production management	Production management	
	<b>2nd category</b>	<b>Industry</b>	<b>Sector / Product</b>
	Quality control	Metalworking	Machining, Press, Welding

### Subject

Development of the quality management system

■ **Diagnosis:**

*Throughout the production process, work pieces are sampled for dimensional check. Also, product dimensions are measured upon the customer's request and are reported. However, the measured data are not used for quality management because no quality management system is established.*

■ **Guidance:**

The study team proposed four QC tools for use at the shop. In particular, quality control using the percentage defective was emphasized as an effective measures for quality maintenance.

■ **Response of the enterprise (as confirmed during the follow-up activity):**

■ **Other relevant points (issues to be solved and problems remained):**

The corporate manager is virtually responsible for production management and has no time to introduce planning practice, although he is willing to do so. Clearly, he requires management staff to assist him, which takes long time. In the meantime, he should use a consultant who provide guidance on a continuous basis by proposing specific actions and providing follow-up advice. Then, in the long run, it is imperative to establish a mechanism to train and promote employees to management staff in a systematic manner.

## 1 Case A

### **Description of Problems**

The quality control system is not established.

### **Diagnosis and Recommendation**

- The operation cards should be modified to count defect numbers.
- QC tools should be used to monitor and control quality (Refer Attachment A).

### Recommendations for the future

- To improve quality and productivity, the defect rate chart is a useful tool. Start using it from important processes (3-5 items), and then expand the usage to other processes.
- To keep the critical processes in a stable condition, the control chart is a useful tool. Use  $\bar{x}$  mean – R range chart to keep the critical dimension in control.
- The quality charts and daily schedule should be put on a board in the shop. To visualize the production activities to everybody is very important not only for the management of the shop floor but also to have the transparency among employees.

## **QC Tools for Quality Control and Quality Management System**

### **1. Control Chart** --- Dimensional control by inspection data

To utilize the inspection data for the production management, make the control charts on the critical dimensions, and watch the tendency. If the value goes out of the control limit, you must take some action. The chart is made for each production process, and it is located besides the machine of the process. I recommend you to use "X bar-R Chart" for control of machined dimensions. **(Refer Attachment A-1)**

### **2. Defect Rate Chart** --- Follow-up of the in-house quality defects

To improve the quality continuously, follow up the in-house defect rate, and take action to improve it when the defect rate is more than the target rate value. You can see the result of the work by using the defect rate chart. The chart is made for each machine, and it is located besides the machine. Defect rate is calculated by defect number/ production quantity. Defect number is summation of scraps, reworks, and additional works. Additional works mean off-standard works like bur cutting. **(Refer Attachment A-2)**

### **3. Customer Rejection and Action Report** --- Follow-up of the customer rejections

To improve the customer satisfaction, quick response to the customer rejections is important. Make the reports of the customer complain and follow up your actions. Your actions and results are recorded. So you can use this record to prevent the recurrence of customer complains. **(Refer Attachment A-3)**

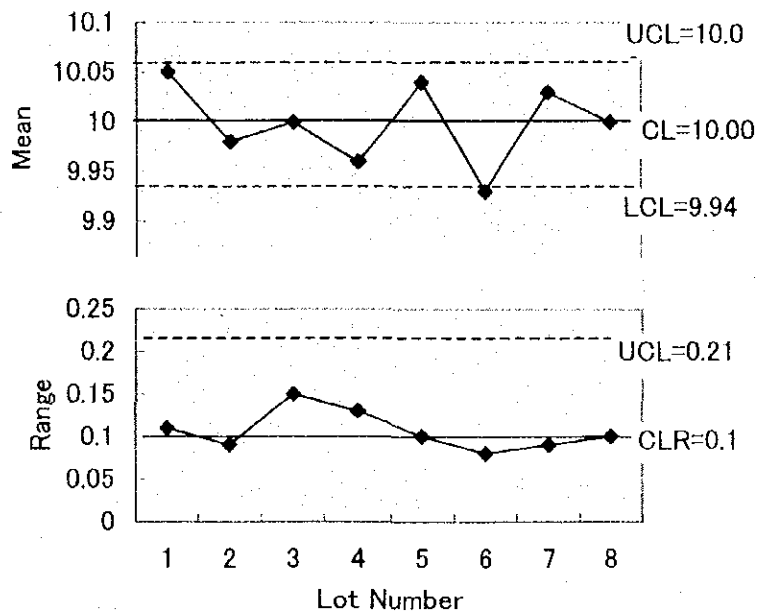
### **4. Quality Control Flow Chart** --- Adoption of quality into production process

When you are planning new machine process of a new component, use the QC flow chart to make up the quality into the production process.

## Control Chart

Component: (Average of mean)=10 (Average of range)=0.10	Customer: UCL=10.06 LCL=9.94	Machine: LCL=9.94
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Date	Lot No.	1	2	3	4	5	Mean	Range
	1						10.05	0.11
	2						9.98	0.09
	3						10	0.15
	4						9.96	0.13
	5						10.04	0.1
	6						9.93	0.08
	7						10.03	0.09
	8						10	0.1

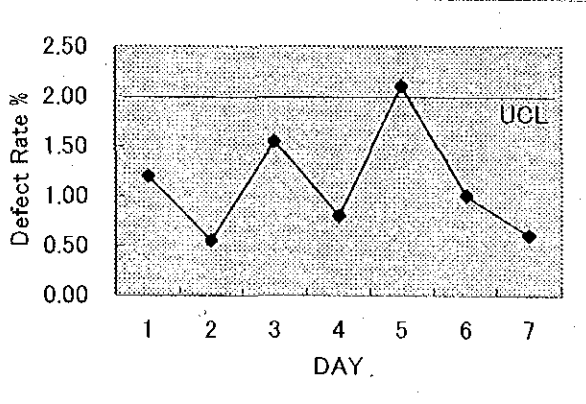


CL=Average value of mean of each lot  
 UCL & LCL of mean=Calculated from a formula  
 CLR=Average value of range of each lot  
 UCL of range=Calculated from a formula

### Daily In-house Defect Rate Report

Machine:	Month:	Year:	Reported by
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Customer	Component	Order No.	Operation No.	Date	Quantity (A)	Defect Number (B)	Defect Rate (B/A)	Coment
				1			1.20	
				2			0.55	
				3			1.55	
				4			0.80	
				5			2.10	
				6			1.00	
				7			0.60	
				8				
				9				
				10				
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				31				



Daily defect number of in-house production is summation of scraps, reworks, and additional works. Additional works are works which are required off-standard works like burr cuttings.

## Customer Rejection and Action Report

Component:	Quantity:	Date:
Customer:	Operation No.:	Made by:

### Details of Non-conformance

<p>What was wrong:</p>  <p>By whom and how was it find:</p>  <p>Request from Customer:</p>
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### Cause Analysis

<p>Could you recover Rejected Parts:</p>  <p>Results of Inspection:</p>  <p>Estimated Cause:</p>
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### Actions taken and Results

Actions	Results



## Case Study Summary of Enterprise Diagnosis and Guidance

<b>Case No.</b>	1st category	Division / Process	
MW-41	Production management	Stainless exhaust pipe manufacturing	
	2nd category	Industry	Sector / Product
	Productivity	Automotive parts mfg. (after-market)	Exhaust pipe manufacturing

### Subject

Improvement of workability in the pipe cutting process

**■ Diagnosis:**

Pipes are measured by a scale attached to a guide before being clamped. As every pipe must be measured, it takes considerable time when a large number of pipes are cut.

**■ Guidance:**

It was advised to install a pipe stopper that serves a guide for cutting.

**■ Response of the enterprise (as confirmed during the follow-up activity):**

The recommendation has not been implemented as the company plans to relocate the factory and is busy with new jobs.

**■ Other relevant points (issues to be solved and problems remained):**

Although the management understands what they should do, but they do not seem to feel the need for safety improvement strongly because they do not have management staff and are busy with daily operation. It is important to visit them frequently and provide information and guidance repeatedly.

## **1 Case A**

### **Description of Problems**

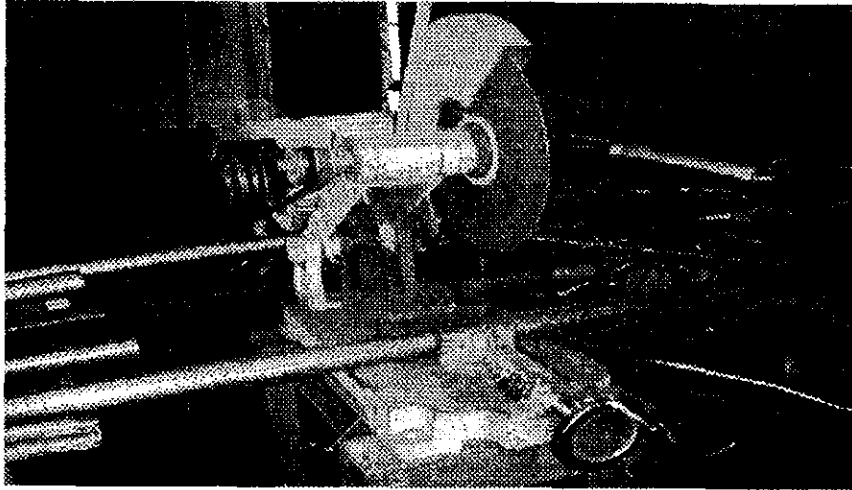
Pipes are cut to length using a cutting grinder with an adjustable scale installed on a guide. This process is not only unproductive but also liable to inaccuracy.

### **Diagnosis and Recommendation**

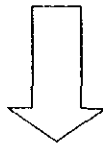
A sliding stopper should be installed on the guide. Using the stopper also stabilizes the pipe when cutting (See Photograph)

## Photograph: The cutting work of pipes

### The present state



1. Although a scale is installed on the guide, operator is required to adjust the length of pipe each time because there is no stopper for length adjustment.
2. The cutting grinder is dangerous due to the safety cover being too small.



### Recommendation

1. A sliding stopper should be installed on the guide.
2. The safety cover should be expanded.