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New Technologies Unit
Technology Promotion and Development Division

20362

Leather Product and Shoe Manufacturing *On-the-Job* Training Programme

Overhead Handout

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INTRODUCTION

Early in 1993 the New Technologies Unit, in cooperation with the Leather Programme of UNIDO, carried out a series of footwear manufacturing technology seminars in East Africa. Over a month and a half five African countries of the region were visited, with seminars and factory visits taking place in each. This activity led to a great deal of discussion between participants in the seminars, the New Technologies Unit, the UNIDO expert and the Leather Programme on methods of follow-up. What was needed was an activity which 1) developed in participants a greater understanding advanced management concepts; 2) assisted participants in the implementation of the techniques and technologies at a factory level; 3) allowed for one-on-one contact and interaction with experts; and 4) covered a number of companies at a reasonable cost. The *On-the-Job Training Programme* is the result.

The *On-the-Job Training Programme* covers a variety of techniques and technologies central to the competitive management of a shoe manufacturing company. It begins with an overview of work study techniques, methods which allow managers to increase productivity within the constraints of current resources. It then moves on to outline the variety of layouts possible on the factory floor. The role of management in all its facets is then covered, including the importance of a total quality approach. Control systems for production, quality and costs are also outlined. Finally, the course wraps up with a Consultancy Kit, a series of questions all managers should ask themselves when reviewing the operations of their firm.

The New Technologies Unit, part of the Technology Promotion and Development Division, is the back-stopping unit for the *On-the-Job Training Programme.* It undertakes various promotional activities, with a broader aim than that of technical co-operation. Technological advances in fields such as new materials, manufacturing, marine industrial technology, energy and environment technologies bear far-reaching implications for the business strategies of both developed and developing countries. The Unit's technology promotion encompasses a wide range of activities designed to provide access to and information on new technologies while assisting in the formation of effective business strategies. These include the promotion of international and regional centres, like the International Centre for Science, a Unit-backstopped project, and a variety of studies, networks and publications.

The Leather Unit, of the Organization's Industrial Operations Technology Division, is the group responsible for the project "Regional Africa Hides and Skins, Leather and Leather Products Improvement Scheme". It has played a central role in the planning, development and implementation of the Seminar Series for Leather Product and Shoe Manufacturing in Africa. The Leather Programme's National Experts are responsible for all implementation at the local level, while selection of the expert, locations and inputs on topics have come from the Unit's management. With technical assistance provided by the Leather Unit varying from $6 - 8 million a year, the Leather Programme is one of the largest in UNIDO, with activities taking place across Africa.

Work Study

Method Study and Work Measurement
Aims: 1) increase productivity at no extra cost; and 2) establishing standards of performance

Work Study

Method study is the systematic recording and critical examination of existing methods
Work Measurement is the application of techniques designed to establish the time required, qualified worker and a specified job at a defined performance

Work Study - Goals

Increase in Productivity
Accuracy in establishing standards of performance
Increased material savings
Improved efficiency
More efficient labour costs

Work Study

Production is, generally, the output of a plant
Productivity is the ratio of input to output. Resources of input can be:
Materials
The Services of Men
Plant, Machines and Tools

Productivity of Materials

A skilled cutter is capable of cutting 21 shoes from a skin of leather.
An unskilled cutter is only capable of cutting 20 shoes from a similar skin of leather.
The skilled cutter obtained 5% greater productivity.

Unskilled Cutter	= 20 shoes
Skilled Cutter	= 21 shoes
Difference	= 1 shoe
Difference	= 1/20
	= 5%

Productivity of Machines

If a machine tool has been producing 100 pieces per working day, and through the introduction of better cutting tools the output is increased to 120 pairs, the productivity will have increased by 20%.

Old System	= 100 pieces
New System	= 120 pieces
Difference	= 20
	= 20/100
	= 20%

Productivity of Man

If an operative has been attaching 30 pairs of soles per hour, and improved conditions enable him to produce 40 pairs per hour, the productivity has increased by 33 1/3%

Normal = 30 pairs
Improved = 40 pairs
Difference = 10
= 10/30 = 33 1/3%

An increase in production does not signify an increase in productivity. The following examples demonstrate why this is so.

Example 1

Three men produce 300 pairs of shoes daily.
The team is increased by one man.
Four men produce 400 pairs per day.
300 pairs /3 men = 100 pairs per man.
400 pairs /4 men = 100 pairs per man.
Production has increased by 100 pairs.
Productivity remains same at 100 pairs / man.

Example 2

Three men can insole attach 300 pairs daily.
The method in use is reorganized.
Three men can now produce 360 pairs daily.
Increase of 60 pairs = 60/300 = 1/5 = 20%
Productivity increased by 20% with same resources.
Production has increased by 20%.

Example 3

Five men can forepart last 500 pairs daily.
The team is increased by one man.
Six men increase the production to 540 pairs daily.
500 pairs / 5 men = 100 pairs per day.
540 pairs / 6 men = 90 pairs per day.
Difference = 100 - 90 =10
10 / 100 = 10% decrease in productivity.
Labour Team = 5 men Increased to 6 men
Difference of one man = 1/5 = 20/100 - 20% increase
Daily output of 500 increased to 540
40/500 = 8/100 = 8% increase in production.
Productivity decreased by 10% Labour team increased by 20%
Production increase by 8%.

Example 4

Five workers can stitch 100 leather hand bags per day.
Each worker collects her work from the previous operation.
Reorganization eliminates the need for collection.
Four workers can now stitch 100 handbags per day.
100 bags / 5 workers = 20 per worker.
100 bags / 4 workers = 25 bags per worker.
Difference = 5 - 5/20 = 1/4 = .25%
Production in each instance is 100 bags.
Productivity has increased by 25%.
Production remains the same.

Conclusions

1. An increase in production does not by itself indicate an increase in productivity.
2. If the output in resources goes up in direct proportion to the increase in output, the productivity will stay the same.
3. If the input of resources goes up by a greater percentage than output, higher production will be achieved and productivity will fall.

Conclusions

4. Higher productivity means that more is produced with the same expenditure of resources. i.e. same cost in terms of materials, machine time, or labour.
5. Alternatively that the same amount is produced at least cost in terms of either materials, machine time or labour. This is also an example of an increase in productivity.

The Productivity Factor

It is necessary to make the best possible use of all available resources including Government, Management and Labour
The Government plays an extremely important part. A programme of economic development is required.

The Productivity Factor

An ideal situation would ensure that materials, components, grindery items and chemical were manufactured within the country

The Productivity Factor

The Manufacturers Association should work closely with the Government in these areas
Management are responsible for ensuring the most efficient use of Machinery Equipment, Space, Materials, Production Systems, Manufacturing Processes and Labour

Role of Management

Obtains the facts
Plans Motivates
Directs Controls

In order to produce Shoe and Leather Goods Products

The Productivity Factor

Difficulties with obtaining workforce cooperation
Fears of unemployment
Success of change depends on cooperation at all levels

Productivity Improvement

It is necessary for Management to:

- create a favourable climate
- obtain cooperation of workers
- obtain cooperation of the trade unions
- understand that coercion is no substitute for voluntary action
- encourage people to cooperate
- explain policy

Basic and Excess Work Content

- Basic Work Content - minimum time required to produce one unit of output
- Excess Work Content - increase by 1. defects in the design or specification of the product 2. inefficient methods 3. ineffective time due to shortcomings on the part of management 4. ineffective time within control of the worker

Productivity and Design/Specification

- Benefit from closer relationship between Design, Product Engineering and Manufacturing
- Adequate knowledge of the market
- A large variety of products
- Pattern development programmes

Limits to High Productivity

1. Inadequate knowledge of the market.
2. Lack of pattern development programmes.
3. Excessive variety of products.
4. Excessive number of designs.

Limits to High Productivity

5. Ill fitting patterns
6. Incorrect position of seams, perforations and laps.
7. Lack of standardization or costs structures.
8. Lack of personnel in Pattern development centre.

Value Analysis Team System

- Introduce a system to ensure that all designs are examined in detail prior to bulk production
- Form a value analysis team

Value Analysis Team System

Goals of team are to produce shoes that are within the specified cost, designs that are saleable, problem free and have minimum necessary labour and material Materials specified by the team should be easily obtainable

Low Productivity

- Lack of material savings
- Cutting boards faulty
- Damages at skiving
- Poor lining fit
- No guides at seam closing
- Top stitching without knife attachment

Low Productivity

Top stitching without guides
Components attached prior to stitching
Incorrect fit of stiffeners
Insufficient time dwell (causing weak bonds)
Incorrect fit of plates at lasting
Excessive roughing (damages)
Heel attach (excessive pressure) Broken heels

Management Ineffective Time

- Marketing Policy
- Lack of Standardization
- Designing Changes
- Planning
- Lack of materials
- Plant Breakdowns

Management Ineffective Time

Plant in Poor Condition
Inferior Working Conditions
Lack of Training
Untrained Supervision
Style of Management
Lack of Communications
Unfair Labor Practices

Ineffective Time within the Control of the Workers

Attitudes
Careless Workmanship
Time keeping
Idleness
Lack of Commitment

Method Study

- Identify and select the process to be studied
- Record each element

Method Study

- Examine each element
- Reason for activity
- Location of Process
- Sequence
- Operator
- Method used

Method Study

- Construct the most economic method
- Define
- Record the information for future identification
- Introduce the new system as agreed standard practice
- Maintain the new standard practice

Method Study/Select Work

- Potential financial savings helps decide
- Work descriptions
- Material costs are high

Method Study - Examine the Facts

- Series of questions can help
- All aspects challenged
- Eliminate inefficiencies prior to new system

Questions of Method Study

- Purpose - What is done?
- Place - Where is it done?
- Sequence - When is it done?
- Person - Who does it?
- Means - How is it done?

Questions of Method Study

Purpose - To ensure that the job is necessary
Place - To ensure that it is being done where it should be done
Sequence - To ensure that it is in the correct position in the sequence of operations.

Questions of Method Study

- Person - To ensure that the operation is being performed by the right person
- Means - To simplify the job as much as is economically possible

Question Each Element

Reason for activity
Location of Process
Sequence
Operator
Method used

Points to Consider

- Suitability of materials for mass production processes
- Are there any specific problems associated with any of materials?
- What are the problems related to the activity?

What are the specifications of the job?

Points to Consider

Will the operation continue in the foreseeable future?
Will there be an increase in production requirements in the future?
How many operatives are employed on the operation? a. directly b. indirectly

Points to consider

How many pairs does each operative produce daily?
How does the hourly output compare with the daily output?
What is the form of payment? a. Team work b. Piecework c. Bonus d. Day rate

Points to consider

Are the machines in use for all of the working period?
Do mechanical breakdowns occur regularly on any of the machines?
If so, why?

Points to consider

Do any of the machines need to be replaced?
Is the layout suitable for the type of production process?
Is there surplus space available?
Is it possible to reduce the work content?

Points to consider

Is it possible to increase production with the existing layout?
Are frequent design changes causing problems?
Can the designs be altered for easier manufacture?
Are the operatives sufficiently skilled to achieve the required results?

Points to consider

What form of training occurs within the production unit?
Are experienced trainers available?
Is there enough work available to increase productivity?

Points to consider

Is there a constant work flow throughout the daily working period?
is the work load sufficient for the labour force?
Are there orders available for the amount of work required daily?

Method Study Savings/Improvement

Reduction in work content
Better machine utilization
Better use of labour

Method Study - Most Economic Method

- Simplify the product
- Perform most efficient manner
- Obtain more suitable material
- Extra training
- New work method
- Prepare a report

Method Study Report

- Comparisons of costs for the two methods
- Installation and training costs
- Charts and diagrams
- Decision and actions

New Method Implementation

- Define improved method - Management acceptance
- Install new method - Trust of workers

Maintain New Method

- Supervisor involvement in implementation
- Supervisor ensures no deviations
- Maintain enthusiasm and confidence

Work Measurement

To establish the time for a qualified worker, to perform a specified job at a defined level of performance

Uses of Work Measurement

- Comparisons of alternative methods of manufacture
- Determining the amount of work performed by an operative
- Ensure the division of labour
- Production Scheduling

Uses of Work Measurement

Information for labour cost control
Incentive schemes are possible
Estimation of future labour requirements
To optimize machine utilization and performance

Basic Procedures for Work Measurement

Select the work
Record the relevant data
Examine the recorded data
Measure the quantity of work
Compile the standard time for the operation
Define the activities and methods of operation

Selecting the Work to be studied

- Introduction of new operation
- Method or Material changes
- Workers are not satisfied

Selecting the Work to be studied

- Bottle-necks or production problems
- Introduction of new incentive scheme
- Required output is not achieved
- High operational costs

Steps in making a Time Study

Obtaining and recording all the information available
Breaking down the operation into "elements"
Ensuring that the most effective method are being used
Measuring with a timing device (usually a stop-watch)

Steps in making a Time Study

Assessing the effective speed of working
Extending the observed times to "basic items"
Determining the allowances
Determining the "standard time" for the operation

Checking the Method

Measure with a timing device
Time for each operation is found
Certain step watches are normally used

Rating

- Rating is a comparison of the rate of working noted by the Work Study Officer, with a standard rate, which in his or her opinion is normal

Rating

Unskilled worker may appear fast
Skilled worker may appear slow
Unnecessary motions are the reason
Knowledge needed to judge operations

Observed Time/Basic Time

- Observed time x Rating/100 = Basic Time

Allowance to be made over the basic time

Contingency allowance
Relaxation allowance

Standard time

- Standard time is the total time in which a job should be completed at standard performance

Checking the Method

It is important to check the method being used by the operative
Breaking down the job into elements

Definitions for Method Study

An element is a distinct part of a specified job
A work cycle is the sequence of elements
A work cycle starts at the beginning and continues to the same point in a repetition

Why Breakdown into Elements

To ensure that productive work (effective time) is separated from unproductive activity (ineffective time)
To enable elements to be identified and classified
To enable the performance of the operative to be "rated"

Types of Elements

- Repetitive element
- Occasional element
- Constant elements
- Variable element
- Foreign element

Elements

Examine Process overtime to know elements
Elements should be as short as timetable

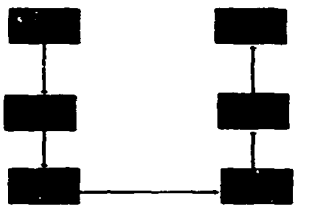
Checking the Method

Examine the breakdown to ensure most effective method and motions
Eliminate ineffective time/unnecessary motions
Eliminate ineffective time - Encourage increased output
Also eliminate excessive future earnings

Plant Layout

- Layout by fixed position
- Layout by process or function
- Layout by product (line layout)
- Group production processes

Plant Layout



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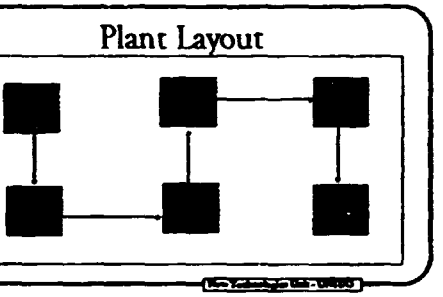

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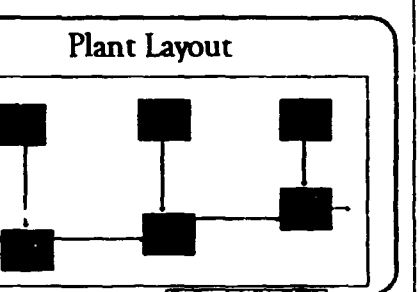

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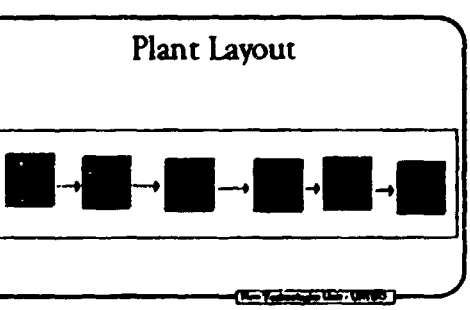

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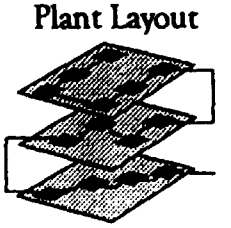
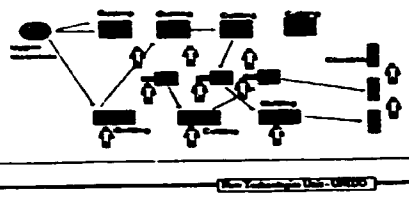


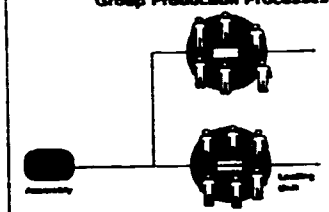
Plant Layout

Layout by Process or Function



Plant Layout

Group Production Processes



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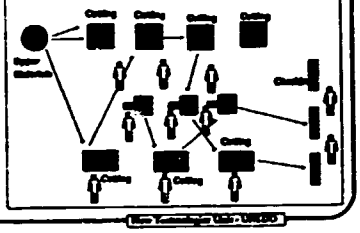
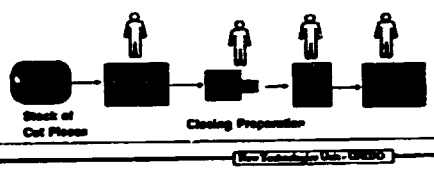
Layout by Process or Function



Plant Layout

Layout by Product (line layout)



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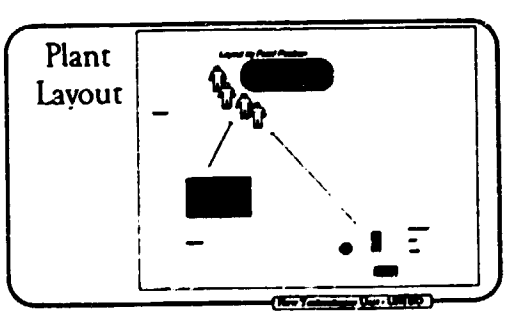


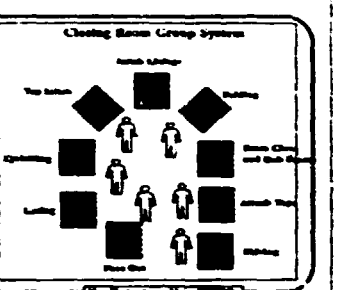
Rink Systems

Used increasingly
More economical cutting
Two main types of closing
1. Team 2. Toyota

Rink Systems

Many advantages
Reduction of work in progress
Improved Quality Standards

Plant Layout



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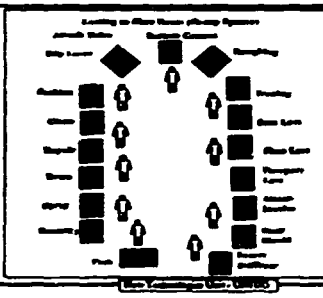

Role of Management

Achieve success through the work of other people
Achieve the specified targets
Contribute to success of the team
Unfortunately managers need always to be trained in management techniques

Role of Management

Responsibilities are not clear
Job descriptions are not always available
Needs to know what is requested on the job
In order to perform efficiently and competently

Job Specification

To whom are you responsible?
What does your job entail?
Did you receive a job specification?
What are your areas of responsibility?
If not informed, what did you do?

Job Specification

What are your targets for:

- Production forecasts
- Material gains
- Quality targets
- Reduction in costs
- Training
- Machine control

Why could not you obtain your target?

Are you Managing?

Do you have daily requirements?
Is your advice sought when the input is being planned?
Are there problems obtaining targets?
If so, what do you do?

Are you Managing?

Do you have a daily arrears report?
What do you do with it?
If there is no report, do you know the arrears?
What is your system?
Do you know the "customer arrears"

Are you Managing?

- Do you have the required resources for output? If not, what do you do?
- Can you cope with sales increases?
- What are the extra costs?
- What do you do to eliminate them?

Are you Managing?

What quality system is in place?
How effective is it?
Are there sub-quality shoes? What then?
What time is required to manufacture shoes? How do you reduce this?

Productive Approach to Time

- Time is difficult to control
- Problems for manager
- Problems for others

Productive Approach to Time

More efficient approach
Elimination of work
Time is valuable
Constant appraisal of time usage
Therefore.....

Productive Approach to Time

Record daily use of time, analyzing each activity.
Ask-
Can others do the job? Office work fo: secretaries? Is it necessary?
Do people visit the managers office by appointment?

Jobs Prior to Becoming a Manager

- Designing
- Costing
- Production planning and control
- Material supplies
- Quality control
- Manufacturing process

Managing

- Natural tendency to revert back
- Need to act continuously
- Replacement needs space to develop fresh approach
- Need to withdraw from active participation and....
- Improve team performance

Managing

Arrange a meeting with team weekly
Plan for following week

Staff Motivation

Policy which persuades staff to operate in a willing and enthusiastic manner to achieve the required results

Staff Motivation

Low morale from poor planning
Constant bottlenecks/poor planning/low productivity
Poor time keeping
Dropping quality standards
Excessive overtime - people tire easily
Conflict within work teams
Inflexible attitudes

Staff Motivation

- Need good working conditions
- Remove efficiency obstacles
- Fair and acceptable financial reward
- Recognize good performance
- Compliment staff for efficiency
- Develop staff/management trust

Delegating Authority

Many managers are reluctant to delegate
Therefore efficiency and performance decrease
But shrewd managers delegate to achieve more

Delegating Authority

- Requires a calculated risk
- Can he concentrate on jobs which require his personal skill, knowledge and experience
- Manager should plan future, not reacting to events
- Anticipate and delegate
- Delegation allows training of staff

The Art of Negotiating

Arises from a conflict of interests
Lowest price/highest price
buyer/customer
Arrive at a compromise
Enables working together without animosity

The Art of Negotiating

- Develop the issue for discussion
- What will you settle for? Ideal and lowest bid.
- What points will the two sides raise?
- What concessions can be made?
- What arguments will both sides use?
- What are the strengths and weaknesses of both?

The Art of Negotiating

There are certain rules which apply:

- A settlement acceptable to both sides
- Offers/counter offers occur
- Firm offers must be adhered to
- Private discussions are not official
- Typed agreement - the final output

The Art of Negotiating

During discussions, the rules are:

- Allow ample time to discuss union case
- Non-committal to union suggestions
- Challenge union with questions/comments
- Assess level of bluff
- Change voice from low to loud
- Avoid being abusive
- Finalize only after covering all issues

Total Quality Management

In the past managers managed without management training

Workers carried out instruction with no operative training

Total Quality Management

This past way is changing

New "Customer Satisfaction "approach

- Satisfy customers; Achieve all commitments
- Aims must be realistic
- Quality ownership of job
- Review current strategies

"TOTAL QUALITY STRUCTURE"

Total Quality Management

How are the needs of the market assessed?

How often are you in contact with the retailers?

Do they provide you with the designs for manufacture?

Total Quality Management

Does the company employ a designer and pattern cutter?

Does the company produce initial designs?

From where are the initial styling ideas?

Do you examine the shoes being sold in the market place?

Costing a Shoe

Cutting coefficient - issued coefficient
95 coefficient - increase at 5% pattern allowance
70 coefficient - increase at 30% pattern allowance
Pattern assessment decides how much material is needed

Costing a Shoe

There are rules for laying out a pattern:
- The pattern must not be turned over
- The positions of the patterns must be as close together as possible
- The relative positions must be either the same or exactly 180 degree opposite

Costing a Shoe

Connect four corresponding points on four patterns:
- Pattern Area
- Interlocking or First Waste
- Second Waste

Production Processes and Productivity

- Efficient, well structured operations
- With a minimum of handling
- Blend readily with high productivity

Production Processes and Productivity

Eliminate unnecessary parts of the job
Combine some operations
Inefficiencies exist

Total Quality

- Examine the possibility of combining certain operations
- Examine the productivity performance within the plant. Is your company operating at a 67, 100, 133, or 167 rate
- Examine whether modifications can occur in the methods being used at each operation

Total Quality Management

What market exposure does the designer receive?
Do you have competition from imports?
Do they compare in quality standards?
Do you deliver orders to customers on the specified day? If not, what are the problems that prevent you from doing so?
Do you discuss the "successes and failures" with the operatives?

Total Quality Management

Need to continuously assess the market
Need of efficient customer service
Development programmes for "problem free products and designs"
Each design fits last
Manufactured without difficulties

Total Quality Management

Test of path-finder sizes
Involve development/production in discussion
Also key operatives
This promotes "Quality ownership"

Cost Structure

- Comparison Method and the Trusting by Experience Method
- There are many problems
- Upper materials can be 35% at total cost

Costing a Shoe

Begin by marking off all unsuitable areas
Leather assessor familiar with shoe's construction
Also with limits of quality

Costing a Shoe

Find shoe coefficient
Six skins from three bundles
Express as percentage of total area
Get average co-efficient
Tanner's discrepancy

Costing a Shoe

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Costing a Shoe

Connect four corresponding points on four patterns:
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- Interlocking or First Waste
- Second Waste

Cutting Department

- Amount of material specified for the job
- Amount of material returned to the leather
- Materials entering and leaving the leather store should be recorded
- Savings should amount to 4% to 6%
- Graders are sufficiently skilled

Production Processes and Productivity

Efficient, well structured operations
With a minimum of handling
Blend readily with high productivity

Production Processes and Productivity

Elimi. ate unnecessary parts of the job
Combine some operations
Inefficiencies exist

Total Quality and High Productivity go hand in hand

Labour Costs

- Small and medium sized companies have fixed wage rate
- Bonus rates may apply
- Extra hours on overtime

Disadvantage of Fixed Wage Rate

- Workers adjust speed
- Labour losses can occur
- Designs vary in work content
- With labour time per style - weekly time

Machinery and Equipment - Efficient Maintenance System

- Faulty machinery/equipment - Missed targets
- Lack of spares
- Poor maintenance system
- Operations by hand
- Machines are idle

Maintenance

- Drop in production, loss of labour
- Problem with parts local supply
- Long order delays
- Fully trained maintenance staff
- More training required

Cutting Department

- Amount of material specified for the job
- Amount of material returned to the leather
- Materials entering and leaving the leather store should be recorded
- Savings should amount to 4% to 6%
- Graders are sufficiently skilled

Leather and Component Store

- Stock card system in use?
  Lead time in purchasing before manufacture?
  How are input needs assessed?
- Do material shortages occur?

Leather and Component Store

Excess and redundant stock problems
Fitted to daily requirements in advance
Material control system in use
In Cutting Department?
In Production Unit?

Quality of the Product

- Quality standards = Customer standards
- No obligation for the customer
- Quality needs need to be met
- Skills to manufacture crucial to improvement
- But management gives tools to improve

Quality of the Product

- Management builds quality values into company operations
- Management provides good designs
- Management provides equipment and work conditions
- Company takes customer oriented approach where each operative represents customer and his interests

Operatives - Training Needs

Not always possible to have instructor
But one staff member can do this
No training - difficulties in performance
Operative pass on efficiencies to trainees, generation to generation

Operatives - Training Needs

UNIDO establishing cutting/closing training institutions
Train to cut as economically as possible
Speed with Quality goal
Lasting and Making training needs should be examined