ACTIVITY CHARTS: MAN AND MACHINE CHARTS

IENG 301

FUNDAMENTALS OF WORK STUDY AND ERGONOMICS

ACTIVITY CHARTS: MAN AND MACHINE CHARTS

- Although the process chart and the flow diagram give a picture of the various steps in the process, it is often desirable to have a breakdown of the process or of a series of operations plotted against a time scale.

- Such a picture is called an **activity chart.**

MAN AND MACHINE CHARTS

- The operator and the machine work intermittently on some types of work.

- That is, the machine is idle while the operator loads it and while he or she removes the finished work from it, and the worker is idle while the machine is in operation.

- It is desirable to eliminate idle time for the worker, but it is equally important that the machine be kept operating as near capacity as possible.

MAN AND MACHINE CHARTS

- The first step in eliminating unnecessary waiting time for the operator and for the machine is to record exactly when each works and what each does.
- Such a record is called Man & Machine chart. Many operations consist of three main steps:

  (1) GET READY, such as putting material in the machine;

  (2) DO (doing the work), such as drilling a hole; and

  (3) Waiting for an operation to be completed or “Idle.”
- Very often a clearer picture of the relationship of the operator’s working time and the machine time can be obtained by showing the information graphically to scale.

Example 1: Sandblasting Casting

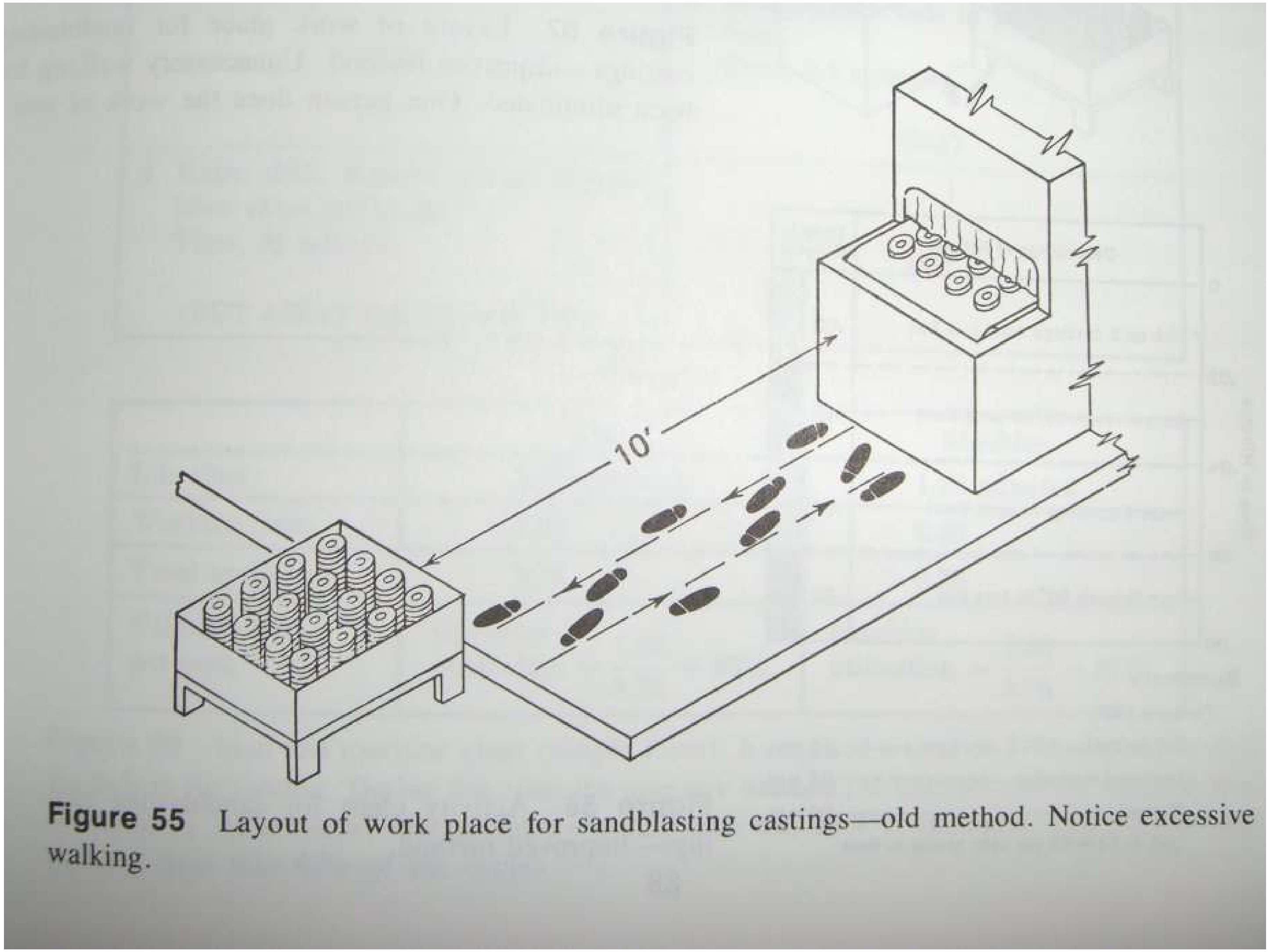

Figure 55 Layout of work place for sandblasting castings—old method. Notice excessive walking.

Example 1: Sandblasting Casting

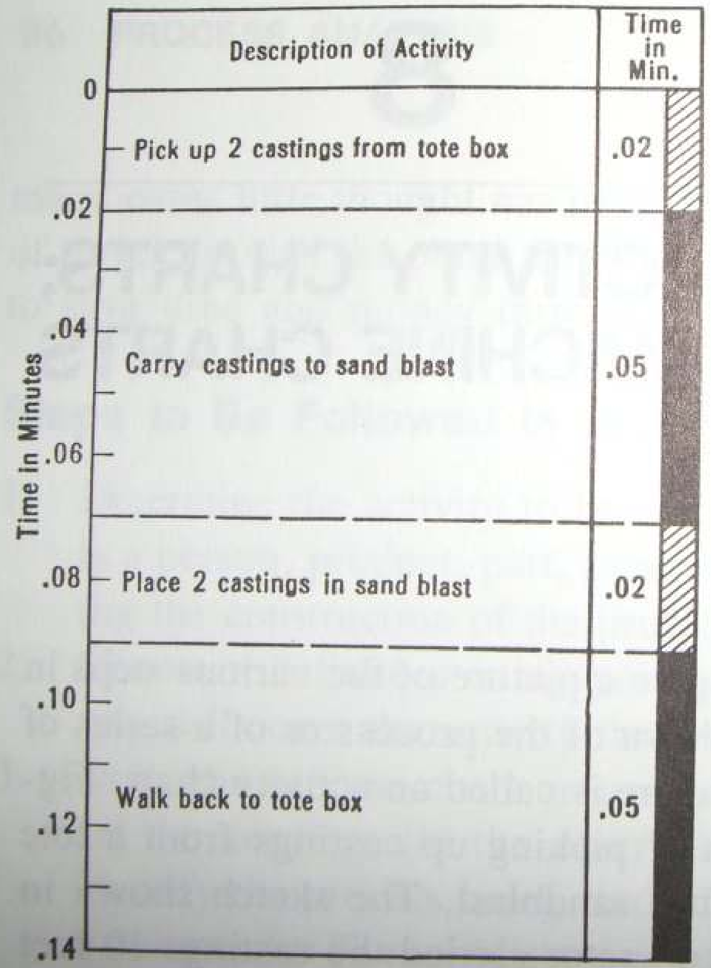

Figure 56 Activity chart castings—old method.

Example 1: Sandblasting Casting

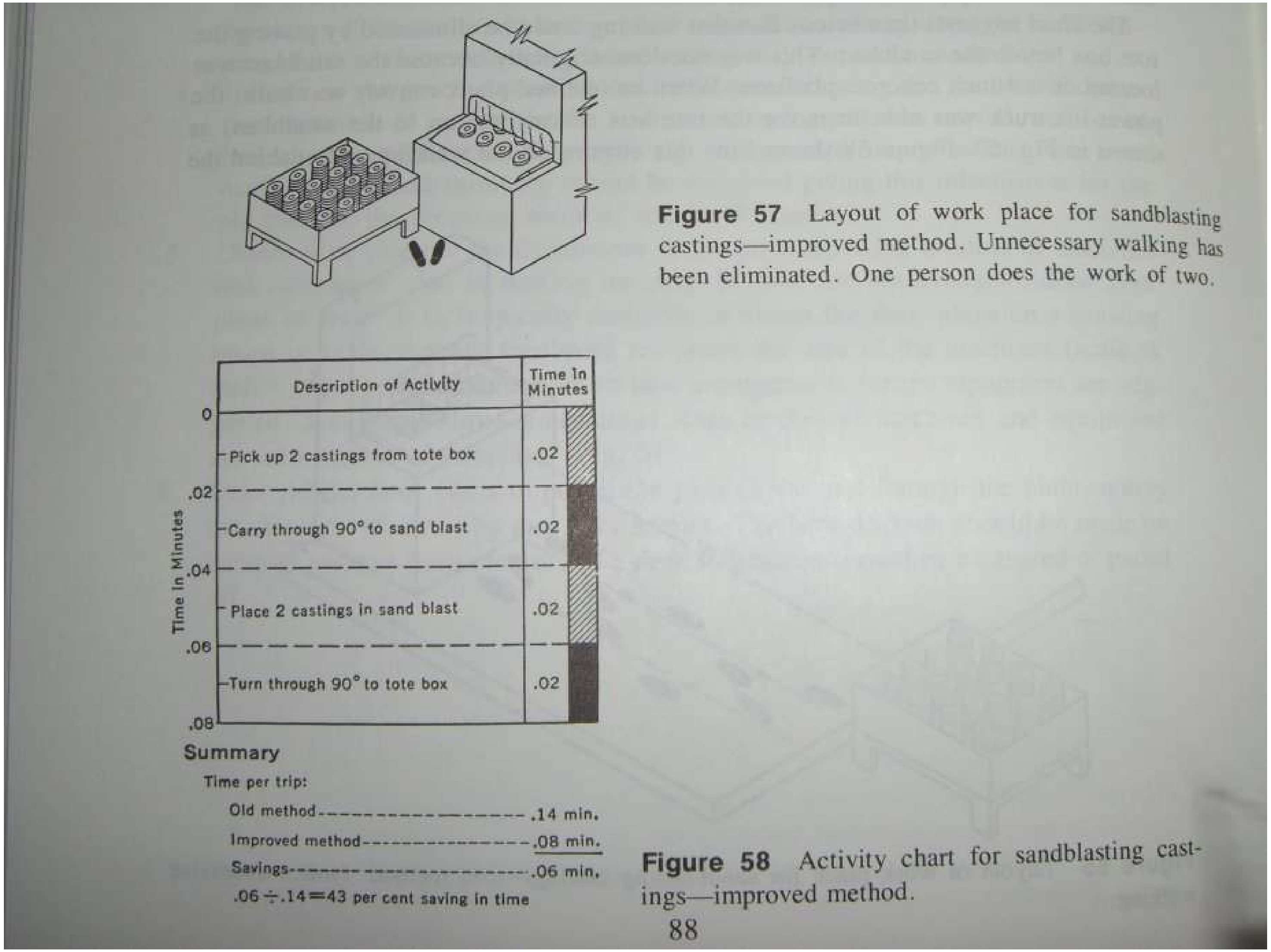

Figure 57 Layout of work place for sandblasting castings—improved method. Unnecessary walking has been eliminated. One person does the work of two.

Time in Minutes	Description of Activity	Time in Minutes
0	Pick up 2 castings from tote box	.02
.02	Carry through 90° to sand blast	.02
.04	Place 2 castings in sand blast	.02
.06	Turn through 90° to tote box	.02
.08		

Summary

Time per trip:

Old method ---------------- .14 min.

Improved method ---------------- .08 min.

Savings ---------------- .06 min.

.06 ÷ .14 = 43 per cent saving in time

Figure 58 Activity chart for sandblasting castings—improved method.

Example 2: Drilling a hole in a steel casting

Drill Hole in Casting

Man	Machine
1. Pick up piece, place in jig, clamp, lower drill, throw in feed. Time, ½ minute. (GET READY)	Idle
Idle	2. Drill ½-inch hole in piece. Power feed. Time, 2.5 minutes. (DO)
3. Raise drill, remove piece, dispose, blow chips out of jig. Time, ¾ minute. (PUT AWAY OR CLEAN UP)	Idle

SUMMARY

	Man	Machine
Idle time	2.50 minutes	1.25 minutes
Working time	1.25	2.50
Total cycle time	3.75	3.75
Utilization in per cent	Operator utilization $= \frac{1.25}{3.75} = 33\%$	Machine utilization $= \frac{2.50}{3.75} = 67\%$

Example 3: Toaster Example

- Each of the two sides of a hand-operated electric toaster can be operated independently of the other. A spring holds each side of the toaster shut, and each side must be held open in order to insert bread. Assume that the toaster is hot and ready to toast bread. The following are the elemental times necessary to perform the operations. Assume also that both hands can perform their tasks with the same degree of efficiency.

Place slice of bread in either side of toaster:	4 seconds
Toast either side of bread:	30 seconds
Turn slice of bread on either side of toaster:	2 seconds
Remove toast from either side of toaster:	4 seconds

- By using an activity chart for toasting three slices of bread, what method would you recommend to obtain the best equipment utilization that is, the very shortest over-all time?

Example 3: Toaster Example

- Solution