late any fundamental human right, by all means change the method, but do not for this reason abandon time study. There is no valuable instrument that cannot be turned to a wrong use. This match that lights my cigarette can burn down a block of houses or touch off a powder magazine. Obviously, then, a scientific attitude toward time study will be one that sees clearly its value, is fully sensible of its besetting dangers, and concentrates on safeguarding its reasonable use.

A brief description of a time study method that I have employed with success in one union shop may interest members of this Society. I make no extravagant claims for the method other than that it has worked in a few instances, and as long as it does so, I shall continue to use it until I discover something better. Time study, in the first place, is undertaken without any idea of regimentation, restriction, minute direction, or harmful speeding-up of workers' movements. It thus becomes an instrument for: first, removing obstacles that prevent the worker from giving his best to work; second, providing a technical comparison between different ways of performing operations, such, for instance, as a choice between two different available machines; third, determining the output capacities of operations for order scheduling purposes, and fourth, providing an equitable basis for piece work prices where these are used. The confidence and co-operation of labor must be won at the start by fairness, open dealing and positive recognition of the union. Unit times are taken during the observation and these, wherever possible, are compiled into standard data, so as to save unnecessary duplication of time study effort in the event of future rate setting on similar work. The operation instruction sheets for shop use are drawn up as simply as possible and show no irrelevant information. Component stages in the operation are indicated in a somewhat *general* way so as to convey no suggestion that the worker's movements are regimented or must be performed automatically, each in a given time. Elementary or unit times, of course, are omitted for a similar reason. In most cases a *total* standard time for the operation, together with the corresponding number of pieces per hour, are indicated for the workers' information. Finally, and I consider this last detail immensely important, the operation instruction sheet is a fluid, evolving record, subject to change as often as the worker thinks out a demonstrably better way of performing the operation. It has been

STANDARD OPERATION INSTRUCTION SHEET

PART NO. 21955 | NAME CRANKCASE MAIN SECTION | PART NO. 21955
DATE Nov.1,1928 | MATERIAL | SHEET NO. 9
MACHINE 3 ft. SENSITIVE RADIAL DRILL | DEPT. NO. 413 | CHANGE NOS. | OPER. TIME 4.0 min. piece 15.0 pieces per hr. | OPERATION NO. 512

DESCRIPTION OF OPERATION	TOOLS, FIXTURES AND GAUGES	TOOL NUMBER
Drill (3) 11/32" dia. holes x 3/64" deep	Drill Jig & Base	21888-T-61
(Grind point of Std. Drill to 7°)	11/32" HS Drill point ground to 7°	Std
Remove jig		
Countersink all holes slightly to remove burr	Drill point gage	21888-T-66
(flange face side only)	Burring Tool	21888-T-67
Use Hand burring countersink		
Refer to B/P 21955 for proper data as to speeds and feeds.		

SKETCH OF OPERATION

PREPARED BY [redacted]
APPROVED
APPROVED [redacted] SUPERINTENDENT
PRODUCTION ENGINEER

Figure 1

FORM 525

STANDARD OPERATION INSTRUCTION SHEET

PART NO. 22089 | NAME PISTON - COMPRESSED RATIO 5.2 1 | PART NO. 22089
DATE Oct 11,1928 | MATERIAL | CHANGE NOS. | SHEET NO. 14
MACHINE BENCH | DEPT. NO. 411 | OPER. TIME 7.5 min. per Piece 8.0 Pieces per Hr. | OPERATION NO. 4111

DESCRIPTION OF OPERATION	TOOLS, FIXTURES AND GAUGES	TOOL NUMBER
Remove all burrs & sharp edges and scrape sand from inside of casting	Files	Std
	Scrapers	Std

SKETCH OF OPERATION

PREPARED BY
APPROVED
APPROVED SUPERINTENDENT
PRODUCTION ENGINEER

Figure 2

STANDARD OPERATION INSTRUCTION SHEET

PART NO. 21955 | NAME CRANKCASE MAIN SECTION | PART NO. 21955
DATE Nov. 6,1928 | MATERIAL | CHANGE NOS. | SHEET NO. 6
MACHINE 36" BULLARD | DEPT. NO. 413 | OPER. TIME | OPERATION NO. 2111

DESCRIPTION OF OPERATION	TOOLS, FIXTURES AND GAUGES	TOOL NUMBER
Rough face rear section flange to 6-13/16" from center of cylinder hole (check 3/16" thickness of flange)	Holding Fixture	21888-T-1
Rough face crankshaft bearing hub to 2-5/16" from face of flange.	3.7035" - 3.7055" Lt. Plug Gage	21888-T-4
Rough turn 12-9/16" dia. to 12-5/8" dia. making 2.252" dim. 2-1/4".	17.3105"-17.3135" Lt. Plug Gage	21888-T-5
Form recess to 12-5/8" dia. holding 45° angle turn 12-5/8" dia. making 2.907" dim. 2-29/32"	2.810" 2.814" Flush Pin Gage	21888-T-6
Rough bore 3.703" dia. hole to 3-41/64" dia.	2.280 - 2.284" Flush Pin Gage	21955-T-22
Rough bore 17.312" dia. to 17-1/4" dia. x 5/16" deep	2.895 - 2.909"	
Finish face flange to 6-25/32" from center of cylinder holes.	Flush Pin Gage	21955-T-23
Finish face crankshaft bearing hub to 2.312 ± .002" from face of flange.	12.553" - 12.572" Lt. Snap Gage	21955-T-5
Finish turn 12-9/16" dia. up to 2.252" ± .002" dim.	Forged Tools	Std
Finish form recess to 12-9/16" dia. turning 12-9/16" dia. up to 2.907" ± .002" dim.		
Finish bore 17.312" ± .0015" dia. x 5/16" deep Holding 1/16" radius and forming 1/16" x 45° chamfer		
Finish bore 3.703" ± .0005" dia. hole		
Finish bore 5/16" wide x 2-9/32" dia. recess in 3.703" hole holding 1/32" radius in corner.		
Refer to B/P 21955.		
NOTE. If this operation is done on #4 Warner and Swasey Universal Turret Lathe Adapter TAM 1099 will have to be fastened to fixture 21888-T-1		

SKETCH OF OPERATION

PREPARED BY
APPROVED
APPROVED SUPERINTENDENT
PRODUCTION ENGINEER

Figure 3