

Referring to the master operation sheet for Type B bevel gears, of cast iron from four to eight inches in diameter, the operation as performed on the Jones and Lamson machine is broken down with its elements, all times for machine manipulation being given, totalling one and one-half minutes. The average depth of cut and the proper speed and feed are also listed and the cutting times computed

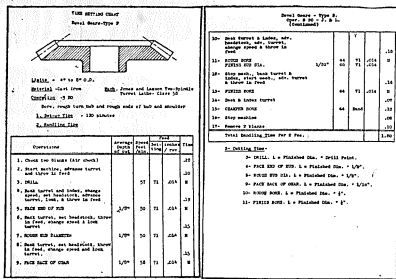


Figure 5

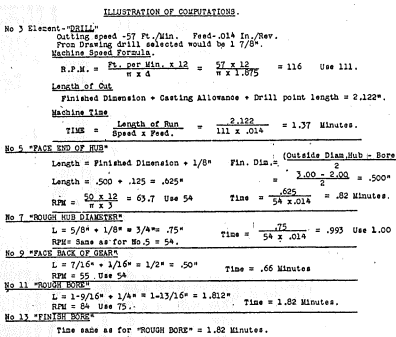


Figure 6

from them. The formulas for the computations are listed under No. 3 (Figure 6). The computations are shown here, the first machining time being that for element No. 3 "Drill."

The cutting speed from the master operation chart was fifty-seven feet per minute, and the feed .014 inches per revolution. Substituting in the

machine speed formula, we get 116 revolutions per minute, but by reference to the Jones and Lamson speed chart (Figure 7), it is found that the nearest speed is 111 revolutions per minute. This is then used in Figure 6. The length of cut is the distance this drill must travel, plus the allowance for the drill point length, found in the table given in Figure 8. Here also are given the speeds and feeds

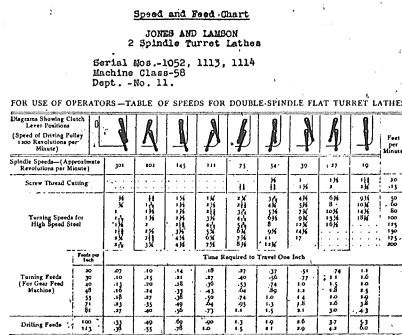


Figure 7

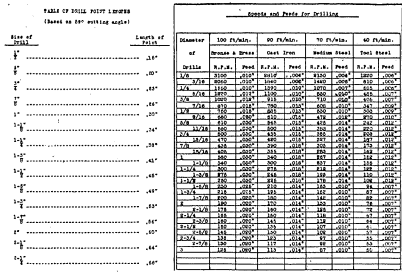


Figure 8

for drilling. Thus the length of cut is determined in Figure 6. The machine time computation is made by substituting in the formula, the result being 1.37 minutes (Figure 6).

These computations will be very greatly simplified by using the Barth slide rules, the settings for the previous computation being shown in Figure 9.

The remainder of the computations are made in the same manner, and the total machine or cutting time adds to 7.49 minutes. This, totalled with 1.50 minutes, handling time, gives the base time, to which the necessary allowance is added, thus giving the standard time.

This is used in making out the cost estimate, and when the order is received, as a basis for sched-

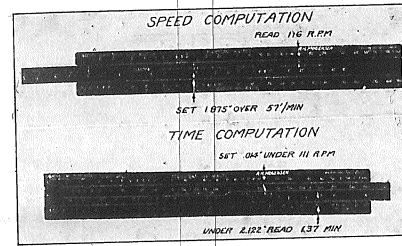
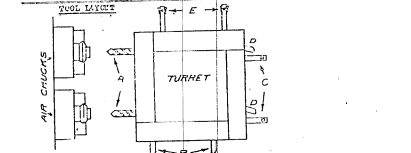
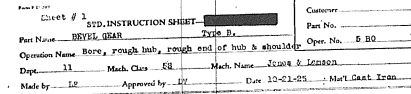


Figure 9



**Table 2: Standard Instruction Sheet**

No.	Procedure	Time (min)	Speed (RPM)	Feed (IPR)	Time (min)
1- Check 2 blanks		.88			
2- Start mach., adv. turret and throw in feed		1.37			
3- DRILL	A - Drills	1.37	111	0.014	1.37
4- Back turret, index, change speed, set headstock, adv. turret, lock, and throw in feed		.10			
5- FACE END OF HUB	B - 5/8" x 1 1/4" Tools	.82	54	0.014	.82
6- Back turret, set headstock, throw in feed, change speed & lock turret		.15			
7- ROUGH END DIAMETER	B - Same as #5	1.00	54	0.014	1.00
8- Back turret, set headstock, throw in feed, change speed & lock turret.		.15			

Figure 10

Sheet # 3  
 Part Name: BEVEL GEAR  
 Operation Name: Bore, rough hub, rough end of hub & shoulder  
 Dept: 11  
 Made by: IR

**Table 3: Standard Instruction Sheet**

No.	Procedure	Time (min)	Speed (RPM)	Feed (IPR)	Time (min)
9- FACE BACK OF GEAR	B - Same as #5	.66	55	0.014	.66
10- Back turret & index, set headstock, adv. turret, change speed & throw in feed		.10			
11- ROUGH BORE	C - 3/8" x 1 1/4" Tools	1.02	64	0.014	1.02
12- Stop mach., back turret & index, start mach., adv. turret & throw in feed		.10			
13- FINISH BORE	E - Kelly cutter	.07	64	0.014	.07
14- Back & Index turret		.10			
15- CHAMFER BORE	Hand Scraper	.08	64	Hand	.08
16- Stop machine		.10			
17- Remove 2 blanks		.10			
Total Handling Time For 2 Pcs.		1.50			1.50
Machining Time		6.99			6.99
Allowance 25% of Mach. Time		1.75			1.75
Standard Time Each		8.24			8.24

Figure 11

uling. Standard instruction sheets are available (Figures 10 and 11), in blue print form, so that with the scheduling of the job these can be filled in with the machine times and sent to the respective departments. In this manner, where the method is known in advance, the time study and instruction card have actually been made out before the job is started through the plant.

Obviously, in the second case, where the exact method of procedure is not known in advance, this method could not be used. Here, as Mr. Lórvy says, "It is generally necessary to go on the floor and make an analytical motion study in order to determine the elements that are required for the operation." Having the standard data, it is merely necessary to fill in the standard allowed time for each element in the study. This, as he points out, results in a great saving of time and increases the uniformity and accuracy of the results.

It is hoped that the possibilities afforded by these applications of time study will be more universally appreciated, whether used for an exact predetermination of time or in the rougher form as a basis for scheduling or cost estimation, and that the predictions made by Frederick W. Taylor will become an accomplished fact. The result should be improved conditions for all concerned in industrial enterprises.