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ABSTRACT

This publication examines production scheduling procedures for sheltered workshops. The manual includes three major sections: (1) the importance and benefits of production scheduling; (2) how-to information on performing basic scheduling in the workshop; and (3) answers to the question, What makes production scheduling work? The scheduling procedure presented in this manual has been designed to meet workshop requirements for a production schedule that takes client performance levels, varying work hours, and other factors into account. The guide has two practitioner-oriented goals: to enhance the user's understanding of production scheduling, and to provide the user with basic methods for performing production scheduling in the sheltered workshop. Sample production schedules are included. (KC)

PRODUCTION SCHEDULING
FOR
REHABILITATION WORKSHOPS

BY

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INTRODUCTION

This publication examines production scheduling procedures for the sheltered workshop. The manual includes three major sections: 1) the importance and benefits of production scheduling, 2) how-to information on performing basic scheduling in the workshop, and 3) answers to the question, what makes production scheduling work?

As with every procedure, each sheltered workshop must decide what is best for its individual, special needs. The scheduling procedure presented in this manual has been designed to meet workshop requirements for a production schedule that takes client performance levels, varying work hours, and other factors into account.

This publication has two practitioner-oriented goals: 1) to enhance the user's understanding of production scheduling and 2) to provide the user with basic methods for performing production scheduling in the sheltered workshop.

Production scheduling is a valuable asset for the sheltered workshop. Its effective use will help assure both continued growth and expansion. As a result of this, the workshop can deliver better services to more people, and better services and programs are what it's really all about.

David A. Hietala
December, 1980

WHAT'S PRODUCTION SCHEDULING?

In this manual, production scheduling for the sheltered workshop is defined as the planning process for determining: (1) what has to be done, (2) how long it will take, (3) who will work on which job, and (4) when to begin and finish each production job.

WHAT ARE THE BENEFITS OF A PRODUCTION SCHEDULING PLAN?

Since sheltered workshops contain both production and rehabilitation components, it is frequently the case that a program primarily designed to benefit one component will also benefit the other. Production scheduling provides positive testimony to this assumption. From the production/business perspective, production scheduling provides three direct benefits: increased profits, better supervision, and enhanced safety practices. Let's examine each benefit.

First, production scheduling is a tool for maximizing profits. With effective production scheduling, any workshop can increase its capacity and this increased capacity leads to higher profits through better utilization of machinery and manpower. For example, a workshop can schedule a job to run for six days with three people or three days with six people. Both options require the same number of hours. However, the decision to use one plan or the other will depend on present work levels, equipment requirements and availablity, client rehabilitation commitments, and other factors. In addition, profits are further increased through more effective contract procurement practices. For example, by examining the production schedules, contract procurement personnel can easily determine when and in which department the workshop will need more work. By effectively procuring work for these open periods, the workshop can avoid slowdowns or, even worse, shutdowns. This selective procurement process will help assure that the workshop is utilizing its full resources.

The second business benefit of production scheduling is that it is a useful tool for more effective supervision. Production scheduling helps a supervisor in three major ways. First, the production schedule eliminates the ambiguity of what has to be done, who will do it, where it'll be done, and how much should be produced each day. For example, the production schedule can indicate, for each department, exactly what, who, where, and how much for each contract. Secondly, the production schedule helps motivate workers as it demands a certain level of performance; hence, it forces worker accountability for the work performed. Last, the production schedule can deal with difficult client work personalities assuring clients, co-workers, and supervisors the best of possible working conditions. For example, clients with disruptive behavior can be placed on individual work tasks. This type of worker selection and scheduling helps assure optimal conditions and performance from all workers.

The last business benefit of production scheduling is that it increases safety. The use of production scheduling increases worker safety by maintaining a stable workload free of the big pushes that are otherwise inevitable with unorganized, unscheduled work. For example, the workshop that's forced to get the job done at any cost, might want to "look the other way" when it comes to making necessary but time killing safety improvements. Furthermore, where production scheduling is utilized, there is reduced risk that an untrained worker would be accidently assigned to operate a dangerous machine or some other piece of equipment. In addition, the production schedule can list the operations that must be done, along with the names of workers who will perform each operation, i.e., operate each machine, package parts, move materials, etc. By using the production schedule, any supervisor, from any department, can properly assign workers to the appropriate tasks.

From the rehabilitation perspective, effective production scheduling is important because of four major benefits: order (discipline), worker accountability, training, and scheduling rehabilitation activities.

The first rehabilitation benefit to be gained from production scheduling is that it provides a sense of order or discipline for the workshop's production environment. This order (discipline) helps clients adjust to a work environment that similates competitive conditions. Discipline not only simulates competitive employment, it leads to worker accountability.

Worker accountability is the second rehabilitation related production scheduling benefit. When workers are randomly and indiscriminately placed on different jobs, worker accountability and responsibility is difficult to assess. This is due to the fact that random and indiscriminate worker placement is inherently inconsistent, creating a self-inflicted situation that prevents worker responsibility and accountability. Production scheduling eliminates the indiscriminate, random placement of workers. Through the production schedule, workers and appropriate jobs can be matched, their production output projected, and worker accountability established. Client production records indicate client performance under controlled, realistic, and businesslike conditions. Furthermore, under an effective production scheduling plan, client production performance records are highly reliable.

More effective training is the third rehabilitation benefit that can be derived from production scheduling. For example, many workshops do not have the extra machinery needed for training new workers. If this is the case, how can new workers be trained? The answer is that through the production schedule, each job can be scheduled to allow for training time on the necessary machinery, tools, etc. A workshop utilizing production scheduling knows when equipment is needed for production and, on the other hand, when it would be available for other uses (i.e., training).

The final rehabilitation benefit of production scheduling is that it assists in scheduling rehabilitation activities. In many workshops there is a conflict between production and rehabilitation. This tug-of-war is due to a number of factors, the most visible being the continual

rehabilitation and production demands for client time. While both sides have valid arguments, this conflict can be reduced. Effective production scheduling helps eliminate this problem. In the production schedule, client rehabilitation and production time can be assigned without adversely affecting either production or rehabilitation commitments.

Where Does Production Scheduling Fit In The Workshop Production Scheme?

Based on the relationships of the production components (manufacturing, distribution, etc.), it is easy to see that production scheduling is the keystone holding the entire process together (Figure 1). Based on the production schedule, work can be procured, scheduled for manufacture, and distributed to the customer. Furthermore, when contracts are reviewed, this evaluative information provides additional input for even better, more accurate production schedules.

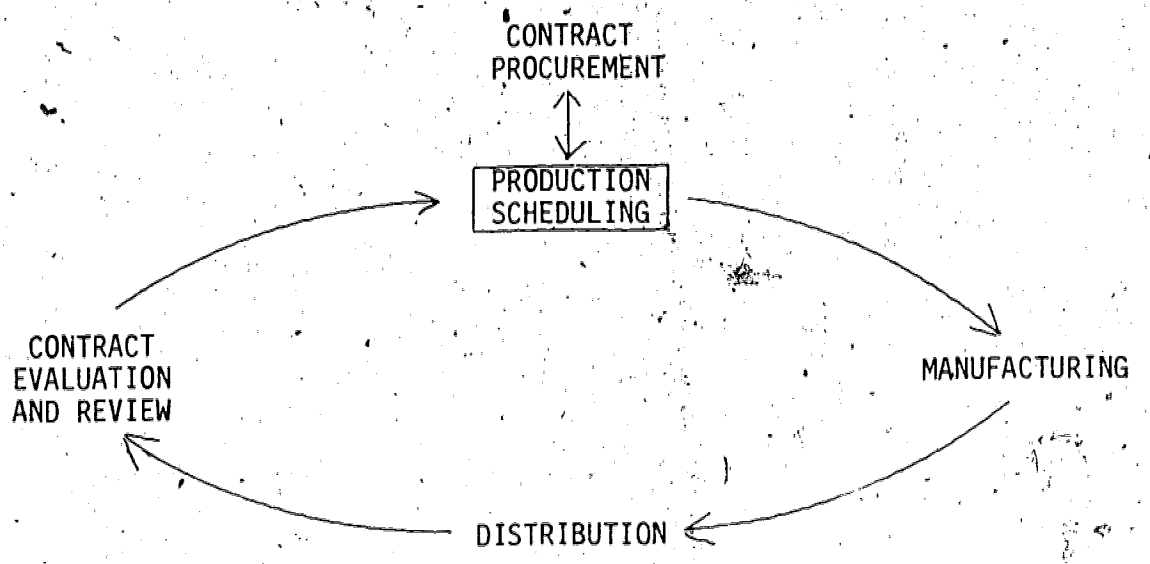

Figure 1

Scheduling Vs. Workshop Capacity

Is production scheduling necessary when the workshop is busy or slow? The answer "yes" is relevant for both cases. When the workshop is busy, the whirlwind of activity in the shop frequently makes it difficult to determine production priorities. The use of production scheduling can solve this problem by assigning priorities, and therefore, help assure that products are manufactured correctly and delivered on time. Similarly, in the shop that's slow or has no work, production scheduling can help determine where and how much work is needed. This information will help procurement

personnel obtain the type of work needed. Furthermore, by monitoring future production schedules, procurement personnel should be able to respond to changing work conditions and procure work long before potential slowdowns or shutdowns can occur.

How-To Schedule Production

Like every industrial procedure, production scheduling is an orderly step-by-step process. The production scheduling process as presented in this publication centers upon five basic steps:

Step 1: What do we really have to do?

Step 2: How long will it really take to do the job?

Step 3: Who will work on this job?

Step 4: When do we begin? and,

Step 5: Putting the schedule together.

The procedure that follows represents a new, composite approach to scheduling production and considers client performance, adjusted man/hours, and other factors special to a rehabilitation work setting.

Step 1: What do we really have to do?

As the above question indicates, Step 1 is the investigation phase of production scheduling. Specifically, facts must be uncovered about the production process and its methods. First, let's examine the production process.

Many workshops operate under the absolute assumption that the production process created and used for working up the bid is the same process that will be used later for actual work on the contract. While in most cases, this is a correct assumption, occasionally the original process may have to be further modified so that the handicapped worker can do the job. This means reanalyzing the job and determining the actual steps that are necessary for the job to be completed in the workshop. For example, a simple assembly job may have been bid as a two step process. Yet, in the workshop, this two step process may require four steps. The two extra steps must be taken into account as they are an important part of the reality of scheduling the job. While occasionally a workshop may have to modify the original process, the addition of more steps into the job should be avoided as it may directly increase the ultimate cost of doing the work.

After the basic production steps are determined, specific production methods must be refined. Two publications that provide assistance in designing

and refining work methods are: 1) Caddick's (1979) Production Improvement in a Rehabilitation Workshop and 2) Hietala's (1978) Workshop Production Management: Motion and Time Study. Both publications are available through the Materials Development Center. Ordering information is provided on the final page of this publication.

Other sources of information on methods are located right in your own facility. Procurement, production, rehabilitation, and managerial staff may all have information about the job and its methods. Not only will valuable information be gained, key staff will become involved in the production scheduling process. This type of "inside" support is essential for the success of all new programs, and especially for production scheduling. Sheltered workers are another valuable information source as they do the work and are most intimately involved with it. Their input and support will also prove to be valuable.

Step 2: How long will it really take to do the job?

Just as it was important that the actual job operations be determined, it is equally important that the actual times for these operations be determined. While this publication doesn't attempt to instruct the how-to of performing time study, Hietala (1978) lists time study as a five step process:

1. Define and improve the basic job method.
2. Document the method used (this allows later evaluations to be based on the original method).
3. Time study each job component.
4. Rate the operator's performance.
5. Compute the time standards in conjunction with operator performance, personal, fatigue, and delay time.

After the time study has determined how long it will take for one operation cycle (the time needed to produce one unit), multiply the time for this one cycle by the total number of units in the contract. The resulting time will indicate the total amount of time necessary for one normal worker to do the entire job. This total amount of time is expressed in man/hours--the number of hours needed to complete the job. Though the workshop may want to put more than one worker on the job, the number of man/hours remains the same. For example:

A contract of 1,750 pieces at a standard cycle time of 11 minutes yields:

1,750 pieces x 11 minutes = 19,250 minutes = 320.8 man/hours

This means that one normal worker can finish work on this entire contract in 320.8 man/hours or 40.1 days or two normal workers can complete the whole job in 320.8 total man/hours or about 20 days.

In either case, the number of man/hours remain the same at 320.8.

While normal man/hours are easy to understand, it is a truism that many sheltered employees work at performance levels far below the norm or 100% performance level. Since the jobs to be scheduled will be performed by handicapped workers, two additional factors need to be known. They are: (1) the amount of calendar time available and (2) the performance levels of the workers as indicated by their production records. Due to the fact that workers may have to be selected based on the amount of available calendar time, let's consider this factor first. Step 3 provides the discussion.

Step 3: When do we begin?

When to begin? It sounds like a simple question, however, there are three crucial factors that have a direct bearing on when contract work can begin: (1) other production contracts, (2) customer or vendor materials delivery dates to the workshop, and (3) workshop delivery deadlines back to the customer.

First, present job contracts and similar work commitments (e.g., prime manufacturing, etc.) greatly affect the possible starting dates for a new contract. The workshop or any other business operating at 100% capacity can't handle more work. Present work loads must be reduced or eliminated before the 100% capacity shop can perform more work. On the other hand, the shop operating at less than 100% capacity isn't influenced in this same manner. Yet, it is important that the needs, i.e., manpower, materials, equipment, etc., of the new job be examined in light of existing job demands.

Second, even if the workshop is ready to start work on a new contract, it can't do so without the necessary materials and equipment. Despite who may provide the materials/equipment, be it the customer or another vendor, the scheduler will need to know when the materials/equipment will be delivered and from whom. This materials delivery date in conjunction with the workshop's return delivery dates will help determine when the job can begin.

Finally, after determining when the contract can officially begin, it is necessary to know the dates for the outgoing shipping deadlines. These delivery dates are usually specified in the job specifications sheet. As such, these dates are, most likely, not negotiable.

The calendar time period between the start and finish dates is the period of time available to do the contract work. Once the facility knows the amount of available calendar time to do the job, should it use this total amount? Or,

should the workshop use only a portion of the available time? While there is no one correct answer, this question may be more easily answered in Step 4.

Step 4: Who will do the work?

When you start considering the "who" of doing the work, you'll want to take into account:

The Work:
- Safety Concerns
- Location Concerns
- Quality Requirements
- Production Quantity Needs (Quotas), Methods, and,
- Available Calendar Time.

The Workers:
- Those persons with the needed skills
- Those motivated persons that want to work on the job
- Those persons needing to be trained for this type of job

The selection of workers is not a haphazard activity. If possible, both production and rehabilitation needs should be served. In any case, the work must be done right and within the available time. All considerations for worker selection must fit into this axiom.

Step 5: Putting the Schedule Together

The final format for any production schedule will depend on the amount of information that the schedule must present. If the production schedule is to include projected output and workers' names, the format will differ from the schedule that is only concerned with the placement of a single job among others. All situations will demand a different approach and a different scheduling format. In this publication, four different scheduling formats will be presented. Each format represents a different production reporting level. Consider first:

Production Reporting Level 1: All Jobs vs. Dates Chart

Production Reporting Level 1 is the most basic of all production scheduling methods. The All Jobs vs. Dates Chart indicates the flow of all jobs against calendar time. This chart provides a birds'-eye view of the facility's present and future job commitments. The All Jobs vs. Dates Chart is excellent for facility managers and procurement personnel since it easily demonstrates the number of present and future contracts at a glance. The all Jobs ys. Dates Chart is presented in Figure 2.

PRODUCTION REPORTING LEVEL: All Jobs vs. Dates Chart

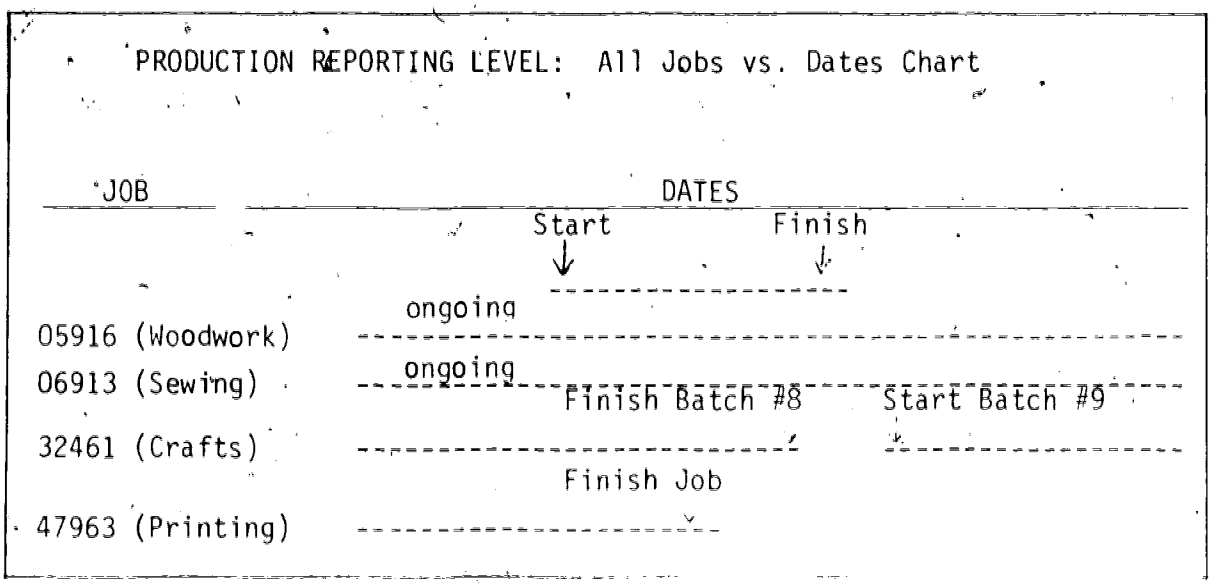

Figure 2

Production Reporting Level 2: Single Contract's Operations vs. Dates Chart

In this second Production Reporting Level, a single job or contract is examined and its specific operations plotted against calendar time. The Single Contract's Operations vs. Dates Chart is a valuable addition to the chart given in Production Reporting Level 1 (Figure 2) since it breaks down a single job into component operations. Work supervisors, facility managers, and rehabilitation staff will find this chart useful since it shows the commitments for equipment and other factors. Figure 3 provides an example of the Single Contract's Operations vs. Dates Chart.

PRODUCTION REPORTING LEVEL 2: Single Contract's Operations vs. Dates Chart

OPERATION	DATES					
1. Rip 2 x 4's to 1" width	S	F				
2. Crosscut to 20½" length		S	F			
3. Machine sand ends			S	F		
4. Package 5 pcs. per box				S		F

Key: S = Start
F = Finish

Figure 3

Production Reporting Level 3: All Contract's Operations vs. Dates Chart

The All Contract's Operations vs. Dates Chart is a combination of both Production Reporting Level 1 and Production Reporting Level 2. The chart

presents the schedule for each operation of each job, thus providing a more complete picture of all production work. Procurement personnel, work supervisors, and production managers will find the All Contract's Operations vs. Dates Chart useful as a planning and scheduling tool. Figure 4 presents an example of the All Contract's Operations vs. Dates Chart.

PRODUCTION REPORTING LEVEL 3: All Contract's Operations Vs. Dates Chart

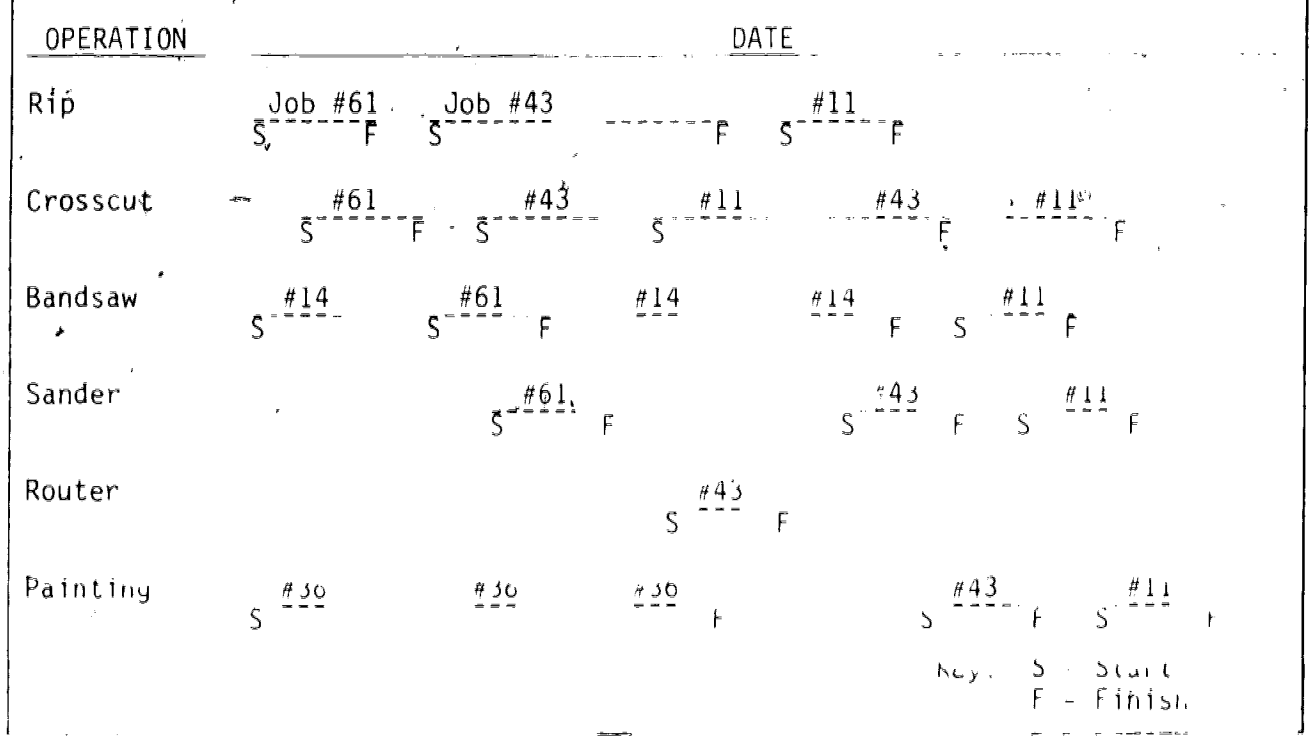

Figure 4

PRODUCTION REPORTING LEVEL 4: Single Contract/Date Time/Worker Chart

The Single Contract/Date Time Worker Chart represents the most detailed single contract production scheduling charts. The chart indicates, for a single production job (or contract), the schedule for each worker's production and rehabilitation activities, total projected production output, and minimum required production output. The chart is excellent for work supervisors, production managers, rehabilitation personnel, and others that need comprehensive scheduling information. While Figure 5 presents the Single Contract/Date Time/Worker Chart for a single contract, it is conceivable that a workshop may want to present this type of information in a manner similar to the chart given in Production Reporting Level 3. Workshops are advised to take the composite approach and combine the best features of each reporting level to obtain the type of chart most appropriate for their needs.

PRODUCTION REPORTING LEVEL 4: Single Contract/Date-Time/Worker Chart

Dates: 10/13 to 10/17/80

WORKER	Monday 8	Monday 4	Tuesday 8	Tuesday 4	Wednesday 8	Wednesday 4	Thursday 8	Thursday 4	Friday 8	Friday 4	Activity Key
1. Mary N.	----	----	----	----	----	----	----	----	----	----	---Production
2. Timm H.	----	****	----	****	----	****	----	****	----	****	***Rehabilitation
3. Jim R.	*---	----	*---	----	*---	----	*---	----	*---	----	
4. Nancy G.	----	----	----	----	----	----	----	----	----	----	Off
Projected Output	4,000		4,000		3,500		3,500		4,000		Total 19,000
Actual Output											Total

Scheduled by L. J. 9/24/80

Figure 5

PRODUCTION SCHEDULING EXAMPLE

In order that the above five step procedure be further clarified, a complete example follows:

JOB INFORMATION:

Product: TV Owner's Packaging Job

Description: 10 page 5½" x 8½" Manual (already collated and stapled) inserted into plastic bag 6" x 9"

Quantity: 75,000 (first order)

Job Start Date: October 7, 1980

Number available workdays: 12

Job Completion Date: October 23, 1980

Operation(s)	Standard Unit Time	Projected Total Time	Description(s)
Insert into bag	8.2 sec.	171 hrs.*	Reach for one owner's manual and plastic bag. Insert owner's manual (stapled end first) into plastic bag. Do not staple end. Place completed unit in box on left.

[Step 1: What do we have to do?]

As you can see, the above job indicates what has to be done. Because this job is very simple, the job will be performed with the same method created as part of the bid.

[Step 2: How long?]

In a packaging department, it has been determined that, based on the production records, an average productivity level of about 47% can be expected for this type of simple assembly work. Based on this fact, the amount of time needed to do the job would be greater than the "normal" time of 171 man/hours. To adjust the normal time to account for lower productivity, divide standard and total times by the percent productivity, to determine the adjusted values.

* The 171 hours are actually the number of man hours. Regardless of the number of people working on the job, the number of man/hours (171) remain constant.

From the example's data:

Adjusted unit time = $\frac{\text{Standard unit time}}{\text{Percent productivity}} = \frac{8.2 \text{ sec.}}{.47}$ = an adjusted unit time of 17.45 seconds

Adjusted total time in man/hours = $\frac{\text{Total time}}{\text{Percent productivity}} = \frac{171 \text{ hours}}{.47}$ = 364.0 adjusted man/hours

The total man/hours--364--indicates the number of hours needed by this workshop to do the job. The next step is to calculate how many days it will take.

To compute the number of days to do the job, you'll need to know:

1. The number of people available
2. The number of hours each person works per day

For purpose of example, in the workshop doing the above packaging job, the Assembly Department's 12 workers work an average of 6.5 hours per day.*

For the 12 workers, each contributes about 6.5 hours as a daily average for the packaging department--6.5 hours x 12 people = 78 total adjusted department man/hours per day. (On the average, most clients work less than 8 hours per day because of time spent in nonwork-related rehabilitation services.)

To determine the number of days needed to do the job, divide the number of total adjusted man/hours by the number of adjusted man/hours per day.

$\frac{\text{Total adjusted man/hours}}{\text{Adjusted man/hours per day}}$ = total days to do the job

$\frac{364 \text{ adjusted man/hours}}{78 \text{ adjusted man/hours per day}}$ = 4.66 total days to do the job

From the previous figures, we find that with regard to this workshop:

1. Number of workers = 12
   Number daily work hours = 6.5
   Average worker productivity = 47%

* By looking at each workers' time cards, you'll be able to roughly determine the individual and group average work hours.

2. The adjusted unit time is 17.45 seconds at 47% productivity

3. The number of adjusted total hours is 364.0 at 47% productivity

4. The number of days needed to do the job is 4.66 days

Step 3: Who?

In the TV Manual Packaging Job, a whole packaging department (12 people) was utilized. Of course, fewer people could have been selected.

The determination of who will do the work depends on: (1) the contract's production requirements, (2) worker performance levels, and (3) rehabilitation training needs.

Step 4: When do we begin?

As mentioned on page 6, the contract's starting date depends on the number and level of current jobs, materials delivery dates to the workshop, and workshop delivery dates back to the customer. All of these factors are considered with the resulting start/completion dates taking these factors into account.

In the above example, the workshop knows that it has 12 days to do the job. (This is between October 7 and October 23, 1980.) The workshop also knows that it will take approximately 4.66 days to complete the entire job. In the course of this example, the workshop should have adequate time to satisfactorily complete this packaging job.

Step 5: Putting the Schedule Together

Since the most appropriate format is [illegible] example, all formats will be presented.

PRODUCTION REPORTING LEVEL 1:

All Jobs Vs. Dates Chart

Job		Dates					
Number	Description	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
06913	Sorting Job	-----	-----	-----	-----	F	
32461	Stake Mfg.	S---	-----	F			
-----	xxxxxxxxxx			S----	----F		
-----	xxxxxxxxxx		S---F				
-----	xxxxxxxxxx			S----	----F	S----	---F
-----	TV MANUAL PKG. JOB	S October 7	=====	=====	F =====	October 23	
-----	xxxxxxxxxx	S---	----F				
-----	xxxxxxxxxx		S----	-----	-----	-----	---F
-----	xxxxxxxxxx		S	----F			

Key: S - Start
F - Finish

PRODUCTION REPORTING LEVEL 2:

Single Contract's Operations Vs. Dates Chart

Job _____

OPERATION	DATES Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
		S		F		
1. PACKAGE TV MANUAL	xxxxx	------	------	------	xxxxx	xxxxx
		October 7			October 23	

NOTE: Due to the fact that the above packaging job has only a single operation, the chart shown is greatly over-simplified. Most jobs would have more operations and the resulting chart would reflect this situation.

PRODUCTION REPORTING LEVEL 3:

All Contract's Operations
Vs.
Dates Chart

OPERATIONS	DATES					
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Sewing	#27 S---F	#69 S---	-----	---F	#29 S----	---F
Collating	#16 S----	-----	-----	--F		
Assembly	#41 #93 S F S	-----	#22 --FS	-----	#57 --F S	--F
Packaging	#146 ----F	TV MANUAL PKG ----- S--- -----		JOB #22 ---S F		F

PRODUCTION REPORTING LEVEL 4:

Single Contract/Date-Time/Worker Chart

JOB: TV MANUAL PKG. JOB

Dates: 10/13 to 10/17/80

WORKER	Monday 8 4	Tuesday 8 4	Wednesday 8 4	Thursday 8 4	Friday 8 4
1. Mary N.	---- ----	---- ----	---- ----	---- ----	---- ----
2. Timm H.	---- -***	---- -***	---- -***	---- -***	---- -***
3. Jim R.	*--- ----	*--- ----	*--- ----	*--- ----	*--- ----
4. Nancy G.	---- ----	---- ----	---- ----	---- ----	---- ----
5. Kim L.	....	....	....	....	....
6. Russel W.	---- ----	---- ----	---- ----	---- ----	---- ----
7. Wally S.	***- ----	***- ----	***- ----	***- ----	***- ----
8. Susan K.	---- ----	---- ----	---- ----	---- ----	---- ----
9. Cyndy R.	--*- ----	--*- ----	---* ----	---* ----	---* ----
10. Betty J.	---- ---*	---- ---*	---- ---*	---- ---*	---- ---*
11. Janice D.	---- ----	---- ----	---- ----	---- ----	---- ----
12. Rich K.	---- ----	---- ----	---- ----	---- ----	---- ----
13.					
14.					
15.					
Projected Output	16,000	16,000	16,000	16,000	16,000
Actual Output					

Activity Key

---Production

***Rehabilitation

---Off

Total 75,000

Total

Scheduled by L. J. 9/24/80

Figure 6

WHAT MAKES PRODUCTION SCHEDULING WORK?

Management's Commitments

Even though there may be competent staff skilled in production scheduling procedures, the ultimate success of every program (including production scheduling) depends upon management's commitment to the program. Specifically, management must support production scheduling by:

(✓) Informing staff about the new program and providing skills training where and when appropriate.

(✓) Allocating staff to do the actual scheduling.

(✓) Delegating authority and responsibility to the one individual or department responsible for production scheduling.

(✓) Supporting the production schedules and holding people and departments accountable for performing their task(s) on time.

(✓) Recognizing and rewarding persons and departments that do meet (or exceed) the scheduled requirements.

Communication

There is an optimum way to schedule a job. This method stresses communication and cooperation in conjunction with accurate technical procedures. The technical procedures can be found in any industrial text, including this publication. The other two factors, communication and cooperation, are not so easily obtained. It takes work to get things done through people. When it comes right down to it, there are only two methods for dealing with people: (a) cooperation or (b) confrontation. Considering the fact that production scheduling is an ongoing function, the first alternative, cooperation, is really the only choice.

While it has already been stated that production scheduling helps to ease the conflict between production and rehabilitation, communication will provide further resolutions to existing organizational problems.

The Deadline

Both commitment and communication contribute toward an effective production scheduling effort. Yet, a part of the production schedule itself the deadline - also directly contributes toward an effective production scheduling program. Let's examine the concept of the deadline; first the negative perceptions.

The deadline is frequently perceived as being a threat for three main reasons.

Perception 1: Failing to meet a deadline can result in punishment.

For example, if a worker doesn't meet the deadline:

1. the boss or supervisor may be mad,

2. the worker may be passed over for promotion or a better job, or

3. in the extreme, the worker may be fired.

In any of the above cases, the worker may perceive some form of punishment for failing to meet the deadline.

Perception 2: Deadlines are unrealistic.

Deadlines are frequently perceived as being unrealistic because deadlines are easily misinterpreted. This is especially true when working with the new job when no one is absolutely certain about the job's actual requirements and the resulting production schedule. For example, the workshop starting a new contract may not know the ramifications of increased machine usage, worker training needs, and other uncontrolled variables which are usually anticipated based on the knowledge gained from previous experience with the job. It is, therefore, the function of management to provide the amount and type of information necessary to eliminate misinterpretation of production schedules and other work related factors (i.e., wages, benefits, etc.).

Perception 3: Deadlines force responsibility.

Frequently, deadlines are negatively viewed because they force accountability (responsibility). For example, supervisors under a deadline situation have a concrete standard for reviewing worker performance and likewise, management has a concrete standard for reviewing the supervisor's performance. Based on the fact that many persons are uncomfortable with the pressure responsibility, it is easy to see why deadlines can be a threat.

The Brighter Side of Deadlines

Fair, unrealistic deadlines, when properly perceived and implemented, have a number of positive attributes that can outweigh any, or all, of the disadvantages.

1. Deadlines encourage management to carefully define who does what and when. This forces management to "get its act together."

2. With definitions as to who does what and when, resources will be more efficiently utilized. This helps contribute to higher wages for all employees, increased plant safety, and greater opportunities for performing more and better work.

3. Under fair deadlines, workers know exactly what is expected from them. There is no more of the ambiguity which contributes to uncertainty. Supervisors can now coach their workers with specific production deadlines in sight.

Deadlines do stress accountability. Yet, it is accountability that allows workers to function independently and without unnecessary supervision. Because of accountability, workers can better exercise control over their work and work related behaviors.

SUMMARY

Production scheduling is a valuable asset in the work environment of a sheltered workshop. From the business perspective, production scheduling increases profits, aids supervision, and promotes increased safety. From the rehabilitation standpoint, production scheduling increases discipline and worker accountability, promotes training, and assists in the scheduling of client production and rehabilitation activities.

This publication has attempted to present the basic rationale for production scheduling along with a scheduling procedure that touches base with the factors considered special to a sheltered workshop. The scheduling procedure detailed five basic steps:

Step 1: What do we really have to do?

Step 2: How long will it really take to do the job?

Step 3: Who will work on this job?

Step 4: When do we begin?

Step 5: Putting the schedule together.

In addition, a final section discussed the factors that make production scheduling work.

Through effective production scheduling, sheltered workshops can increase their overall performance. With increased performance, sheltered workshops can be assured of continued growth in today's competitive marketplace.

BIBLIOGRAPHY

Lock, Dennis, Industrial scheduling techniques. London Gower Press, 1971.

Mize, Joe H., Operations planning and control. Englewood Cliff, New Jersey, Prentice-Hall, Inc., 1971.

Muth, John F. (Ed.), Industrial scheduling. Englewood Cliff, New Jersey, Prentice-Hall, Inc., 1963.

PUBLICATION-ORDER INFORMATION

In this Materials Development Center publication, two other publications have been referenced as providing more information relevant to production scheduling.

Caddick, J., Production improvement in a rehabilitation workshop. San Francisco, California: University of San Francisco, College of Business Administration, Rehabilitation Workshop Administration, 1968. (Available as: Materials Development Center Reprint Series No. 17) Price: $2.50

This manual was designed to be used by workshop personnel to learn about two important areas of industrial engineering--work simplification and production standards. The section on work simplification includes: advantages and disadvantages, how it can be applied, and tools and techniques of work simplification. Flow diagrams and the use of process charts are explained. A second section on production standards includes information on work measurement, setting a production standard, principles of time study, work rating, using predetermined time systems, setting performance standards, and factors to be considered for the learning curve. This document was authored by James Caddick, a specialist in rehabilitation facility operations, and was originally distributed through the Rehabilitation Administration Department of the University of San Francisco.

Hietala, D., Workshop production management: Motion and time study. St. Paul. Minnesota: Minnesota Department of Economic Security, Division of Vocational Rehabilitation, Facilities Section, 1978. (Available as: Materials Development Center Reprint Series No. 19) Price $2.00

This publication discusses the "how to" aspects of performing methods improvement and conducting time studies. In addition, the manual provides concise information on plant layout, evaluating time standards, performance rating, and applications of the learning curve.

Both publications are available, at the listed prices, by ordering from:

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