



*Production/
Engineering*

A SUGGESTED SYSTEM FOR PRODUCTION SCHEDULING

TEXTILE RENTAL
SERVICES
ASSOCIATION
OF AMERICA

TRSA

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TIRSA

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TRSA gratefully acknowledges the work of Phil Lewis of Lewis & Strauss. This manual is the result of his professional efforts and understanding of the linen supply industry.

Its aim is to enable linen suppliers to use effectively their productive capacity to fill daily delivery requirements.

Production managers will find this manual most valuable as a training aid and as a reference guide for scheduling and monitoring the flow of work through the laundering process.

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INTRODUCTION

Historically, production scheduling in the linen supply industry has been performed by intuition, rather than by system.- So much so, that most plants consider themselves fairly well advanced when daily requirements are posted on a blackboard, and the plant superintendent crosses the various items off the list as he processes them. Then, there is a frantic effort to find or produce the still-needed items, at the end of the day.

However, the growth in size of processing plants as well as in the number of items served, has created a need for more systematic production scheduling. In addition, there are other factors working to create this need. Among them: a growing awareness of the cost of maintaining linen inventories; and the entry into the industry of newer supervisors, who must rely less on long acquired practical experience, and more on general managerial skills.

Many of the scheduling techniques generally accepted in manufacturing operations cannot be applied in the linen supply industry because processing requirements are determined by the day-to-day usage of the customer. To this extent, requirements are outside the control of the processing plant management.

In manufacturing operations, long range schedules can be established by management, and variances from anticipated sales can be accommodated through properly planned warehousing functions.

Such an approach might most closely be duplicated in the linen supply industry by setting up fixed daily schedules and carrying enough merchandise in the make-up departments to fill any variations in daily requirements. However, this ideal is rarely implemented because of the cost of the inventory required and because the soil pick-up is too unpredictable to set fixed production schedules.

The more usual circumstance is that an unusually heavy soil pick-up, or extraordinary customer demand, creates an almost instantaneous overload on the plant; and conversely a seasonal lull may create idle capacity and manpower. This effect is most dramatic when a week of low soil pick-up is followed by a week of high customer demands.

Theoretically, under a delayed even exchange delivery system, this difficulty is overcome by proper pre-planning of customer inventories, but even in such cases, "special" deliveries are the rule rather than the exception.

These factors make production scheduling in the linen supply industry more difficult, and yet at the same time more needed.

Second, to avoid over-reliance on new stock to make up shortages that might have been avoided by proper scheduling. Such pre-planning surely will help to keep linen replacement costs under control.

Third, to make most effective use of manpower and of production facilities. Effective scheduling can help to keep overtime under control and to avoid idle or inefficient labor.

If adopted, the scheduling program must be effective, but must not be so burdensome as to cost more in effort and money than is realized from the above advantages.

The objective of a production scheduling program should be to know, early enough to be of value, not only the number of items that will be required but also the processing time in each work center, so adjustments in working hours and transfers of employees from one work center to another can be made in time to meet delivery needs at the lowest possible overall cost.

Such a program could also be useful in the longer range functions of planning the equipment and personnel revisions needed for seasonal volume variations and for style changes in fabric and services.

In this connection, an effective scheduling program could serve to improve communications between the sales and the production departments. If carried to a high degree of sophistication it could coordinate long range sales forecasting with production facilities planning.

For purposes of this manual, emphasis will be placed on the delayed even exchange system of delivery, although some consideration will be given to even exchange.

Under delayed even exchange, the primary input into the scheduling program will be the soil counts, since these determine delivery requirements.

Basically the scheduling program will start with an accumulation of soil counts by item and by day of delivery. These quantities will then be converted into work hours required in each work center by applying appropriate production expectations. If standards are not available in the plant, then average industry-wide production expectations may be used, provided judgement is exercised to establish that they are applicable.

To schedule properly, the required man-hours must be determined and also the machine capacity in each work center must be considered. For example, if a wash-room has the machine capacity to produce 3,000 pounds per hour, manpower may be assigned to achieve up to this production rate, but no amount of additional manpower will produce any more than this rate. Conversely, the full machine capacity of any given work center may not be realized if sufficient manpower is not available. Thus productive capacity is limited by machine capacity or operator capacity, whichever is the lower.

Another factor which* must be considered is that most laundry operations occur in sequence, and not simultaneously; i.e., finishing follows washing, which in turn

Why Is Scheduling Needed?

First and foremost, to avoid panic in the shipping department when it is discovered that there is not enough merchandise to make up all the deliveries.

follows soil check-in. Thus appropriate factors for "lead time" must be built into any scheduling program.

Finally, the resources of the organization to prepare and use the needed information must be considered, before embarking on a scheduling program. Access to data processing systems is of great help in accumulating the basic data, but alternative methods are available if properly planned.

This manual will outline procedures for:

- a. *Determining work center capacity.*
- b. *Accumulating soil counts.*
- c. *Converting item counts to work hours.*
- d. *Establishing lead times.*
- e. *Designing the required forms.*
- f. *Charting production schedules.*
- g. *Using and monitoring the production schedule.*

It is unlikely that all of the procedures described in this manual could be adopted intact in any specific plant, but adoption of the general principles outlined should be useful to any plant.

Finally, it should be emphasized that a scheduling program will be effective only to the extent that management wants it, believes in it, and expends enough effort to assure that it operates.

Determining Work Center Capacity

In this section, some general principles will be discussed which apply to the determination of capacity in each of the work centers normally found in a linen supply processing plant.

The work centers which will be considered for scheduling purposes are:

Soil Room
Wash Room
Flatwork Ironing
Tumble Dry Department
Garment Finishing
Linen Make-Up
Garment Make-Up

Operations follow in sequence from soil room to wash-room; then may occur simultaneously in flatwork iron-

ing, or fluff dry, or garment finishing; and finally flow to either linen make-up or garment make-up. (Mending is a work center which has a tangential effect on scheduling, but will be omitted from consideration in this manual.)

When establishing work center requirements, production standards may be used, but more accurate scheduling can be achieved by taking into account the actual history of performance on that item.

For example, the production standard for ironing sheets may be 600 per machine-hour, yet actual performance may normally run 25% higher. A more accurate figure to use for scheduling would therefore be 750 per machine hour.

Similarly production expectations should be the average for the day, after making allowances for rest periods and other non-productive time. And finally, production expectations should be expressed as good pieces (after rejecting stained and torn items). For example, if 9% of the napkins are historically rejected, then 1100 per hour may be fed into each ironer lane, but the rate of usable pieces is only 1,000 per hour.

SOIL ROOM

Since soil room operations are essentially manual operations (except where automated equipment, such as a classifier is used), the capacity of the work center is basically determined by the number of operators which the available space and physical facilities can effectively accommodate. Production rates for sorting and counting soil average about 800 pounds per operator-hour for flat pieces or 300 pieces per operator-hour for garments. Thus one operator-hour will be required for every 800 lbs. of flat pieces and one operator-hour for every 300 garments. If physical facilities are available for five operators, then the capacity of the department may be effectively stated as 4,000 flatwork pounds or 1,500 garments per hour.

(The production rate, however, may vary from plant to plant depending upon the sophistication of the system (i.e. storage conveyors, sorting conveyors, etc.).

If automated sorting and counting equipment is used, then the capacity of the work center is determined by the capacity of the equipment, and will be expressed directly in pieces or pounds per hour produced with a full crew.

WASH ROOM

Since the washroom generally encompasses several operations, i.e. washing, extracting, and, in many cases, conditioning, the overall capacity of the work center is limited by the operation with the lowest capacity. Therefore the capacity of each operation must be individually determined.

If facilities for storage of a substantial amount of work are available between the various washroom operations, then the capacity of the washroom is less restricted by the "slowest" operation. But this effect has limited application, and for all practical purposes, the washroom capacity is essentially the capacity of the "slowest" of its component operations.

Washing: The productive capability of each wash-wheel is a function of the dry weight capacity times the cycle time (i.e. average formula time plus "turn around," or loading and unloading time).

To take an example: A conventional 60" x 96" wheel will normally take a load of 900 lbs. It is most effectively loaded and unloaded by a two-man team, who will average 20 minutes to load and unload. If the machine is used half the time on motel linens with a washing cycle of 30 minutes and half the time on restaurant linens with a washing cycle of 50 minutes, then the average washing cycle is 40 minutes.

Thus one 900 lb. load can be expected from this machine every hour. A wash aisle containing three such machines will provide a capacity of 2,700 lbs. per hour.

This is a simplified example and in actual practice, the entire product mix should be considered in establishing cycle time.

Extracting: Similarly, the productive capability of each extractor is a function of the dry weight capacity times the cycle time (i.e. running time plus "turn around" time). A conventional 54" centrifugal extractor has a dry weight capacity of 350 lbs., and may run an average of 12 minutes. If the time to unload and reload is 3 minutes, then it will produce 350 lbs. every fifteen minutes or 1,400 lbs. per hour. Two such machines should provide a capacity of 2,800 lbs. per hour.

Caution: *If the loading of the extractor is limited by the configuration of the pockets of the washwheel, then an appropriate adjustment must be made. For example, if only 300 lbs. normally constitutes an extractor load, then the capacity is obviously reduced.*

Conditioning: Here, too, the productive capacity of each conditioning tumbler is a function of the dry weight capacity times the cycle time (i.e. running time plus loading and unloading time). If the average conditioning time in a 400 lb. tumbler is 5 minutes and the loading and unloading time is 2 minutes, then it will produce 400 lbs. every 7 minutes, or 3,400 lbs. per hour.

Note however that if the loading module is less than 400 lbs. because of the limitation of the size of the extractor load, then the capacity is reduced. Some time may be shaved off the running time, but the loading and unloading time probably remains constant.

If the same tumblers are used for both conditioning and drying, then the conditioning capacity is reduced by the amount of time required of the tumblers for drying. However, for purposes of this manual, all drying is assumed to be done separately in a tumble dry department.

FLATWORK IRONING

Productive capacity of the flatwork ironing department is best expressed separately for each item, for example, 750 sheets per hour, since a wide variety of items with varying production rates is usually processed. The required machine hours are then established by dividing the quantity needed of each item by the production rate for that item. If only one ironer is available, then machine hours are determined first for large pieces which can be processed in only one lane. Machine hours are determined then for pieces which can be processed in two lanes, such as table tops, followed by three lane items, four lane items, five lane items, and occasionally six lane items. In making such determinations, the auxiliary equipment on the ironer must be considered to establish how many lanes of each item can be effectively processed.

In multi-ironer plants, the required machine hours will generally be established separately for the machines doing large pieces, small pieces, and medium sized or miscellaneous pieces. If one ironer is set up with folder and cross-folder for large pieces, then it will not effectively process small pieces. Similarly, if one ironer is set up with five or six lanes of small piece folders installed to receive directly from the ironer, then it will not effectively process large pieces.

TUMBLE DRY DEPARTMENT

Capacity in this work center is determined both by machine capability for drying, and man-hours available for folding and packing.

To establish drying capability, the dry weight capacity of each available machine is considered along with the average cycle time (i.e. drying time plus turn-around, or loading and unloading time). Thus if a 400 lb. tumbler is normally fully loaded and averages 15 minutes for drying, and if 3 minutes are required for loading and unloading, then its capacity is 3.3 loads or 1330 lbs. per hour.

Folding and packing capacity is largely a matter of how many operators can physically be accommodated and what equipment they are given to work with.

For example, if one towel folding machine is available, plus space for two manual folding operators, then machine folding capacity will be available for about 1,000 bath towels (or other machine folded items) per hour; plus two times the production expectancy per operator-hour of other items. Every 500 bath mats will probably require one man-hour, every 1,000 wash cloths one man-hour, etc., so that in this example the manual folding capacity is 1,000 bath mats per hour, 2,000 wash cloths per hour, etc.

GARMENT FINISHING

If this department consists only of general purpose units, which can do any or all items, then the capacity of the department is simply the production rate (per unit) for each item times the number of finishing units. For example, if there are three general purpose units, each of which can turn out 40 pants per hour, then the work center's capacity is 120 pants per hour. The work center's capacity (by item) is then divided into the quantity required of each item to determine the work center hours that will be needed.

If, however, special purpose units are used, then the capacity of these must be considered independently. (For example, if a cabinet pants unit is available, its capacity alone may be 150 pants per hour.)

If the requirement exceeds the capacity of the special purpose unit, and if general utility capacity is available, then the excess may be shifted to the general purpose units, at of course, the appropriate rate. (For specific examples, see section on Converting Item Counts to Work Center Hours.)

LINEN MAKE-UP

As in the soil room, the capacity of this work center is basically determined by the number of operators which the available space, procedures, and physical facilities can effectively accommodate. Production rates vary widely with systems and procedures, and type of customers, but the general average for the industry probably runs about 2,500 pieces per operator-hour for an average mix of work.

Thus, a linen make-up department which has space for three operators and procedures designed for such a team to work effectively, would have a capacity of 7,500 mixed flat pieces per hour.

GARMENT MAKE-UP

Here, too, capacity is essentially determined by the number of operators which the system, space, and physical facilities can effectively accommodate.

Again, production rates vary widely with procedures and systems but a general industry average for folding, inspecting, and making up orders of garments probably runs about 100 pieces per operator-hour.

Thus, a garment make-up department which has the system and space to accommodate three operators has a capacity of 300 pieces per hour.

Note that if inspection or folding is done elsewhere -for example, in the press department-then make-up capacity is obviously higher.

In both linen and garment make-up departments, achievement of full potential capacity depends to- a large extent on a smooth and adequate flow of work from the processing departments. Shortages and an imbalance in the work flow obviously impede seriously the effectiveness of the make-up operations, and this is one more reason why scheduling is important.

This section of the manual has presented some general considerations which apply to the various work center capacities. Specific applications are described in the section on Converting Item Counts to Work Center Hours.

Lead Time

To illustrate the time sequence leading up to an actual delivery, this section will trace a typical linen supply situation.

In the ordinary course of events, orders (or merchandise) will be made up the day before delivery. With proper scheduling, a full day's deliveries should occupy the make-up department one full day, and therefore to complete Friday's load, for example, by Thursday night

(quitting time) requires that it be started Thursday morning. Thus the minimum lead time for the make-up departments (linen or garments) is one day ahead of delivery.

The finishing departments (flatwork, tumble dry, and garments) must have enough done so that the make-up department in the above example can get started Thursday morning (although they do not necessarily need to have the entire load done). The finishing departments should, however, have the entire load done by noon on Thursday so that even with contingencies, the make-up departments can complete their work by Thursday night.

To do this, the finishing departments must start the day's work by Wednesday noon, so that their minimum lead time is $\frac{1}{2}$ day ahead of make-up or $1\frac{1}{2}$ days ahead of delivery.

Similarly, the washroom must have work available for the finishing departments to start by Wednesday noon and finish by Thursday noon. It should therefore have the complete day's work finished before Thursday morning which means it has to start the day's work Wednesday morning.

Thus the washroom requires a minimum lead of $\frac{1}{2}$ day ahead of the finishing departments, or 2 days ahead of delivery.

Finally, the soil room must have the work ready for the washroom to start Wednesday morning and finish before Thursday morning. It must therefore have the day's work completed by Wednesday noon and must start on it Tuesday noon.

Thus the soil room requires a minimum lead time of $1\frac{1}{2}$ day ahead of the washroom, or $2\frac{1}{2}$ days ahead of delivery.

If the soil room works at night, then it may start the day's work in the above example on Tuesday night instead of Tuesday noon, but the lead time is still at least one-half day (of working time) ahead of the washroom. If the soil room worked a full night shift and finished the day's work before Wednesday morning, then it would actually have a full operating day's lead on the washroom, instead of the minimum half day lead.

The above discussion perhaps over-simplifies the handling of lead time, but in general it is valid for scheduling purposes.

With possible individual plant variations, therefore, it may be assumed that the following lead times will be required. Note that the lead time refers to when the day's work load must be started in order to be completed on schedule.

MINIMUM LEAD TIME

Soil Room	:	2½	days	ahead	of	delivery	day
Washroom	:	2	"	"	"	"	"
Flat Ironing	:	1½	"	"	"	"	"
Tumble Dry	:	1½	"	"	"	"	"
Garment Finishing	:	1½	"	"	"	"	"
Linen Make-Up	:	1	day	"	"	"	"
Garment Make-Up	:	1	"	"	"	"	"

These are minimum lead times needed to be just on schedule. Any additional safety factor (such as is commonly expressed in the industry as "being a day ahead"), must be added to these requirements.

Theoretically, the more safety factor or "days ahead" the plant has, the better, but this is limited by the availability of work in the various departments. Thus the plant may be so far ahead that the washroom instead of having the minimum 2 days lead shown in the above table, could be processing work 5 or 6 days ahead of delivery, but is prevented from doing so because the merchandise has not yet been received and processed by the soil room.

As a practical matter, therefore, there is also a maximum lead time which must be considered.

In a plant operating basically on a week-to-week delivery system (with a five day one shift work week), the merchandise will generally be available in the soil room four working days ahead of delivery. That is, Friday's pick-up is available for processing on Monday.

MAXIMUM LEAD TIME

Soil Room	:	4	days	ahead	of	delivery
Wash Room	:	3½	"	"	"	"
Flat Ironing	:	3	"	"	"	"
Tumble Dry	:	3	"	"	"	"
Garment Finishing	:	3	"	"	"	"
Linen Make-Up	:	2½	"	"	"	"
Garment Make-up	:	2½	"	"	"	"

From the above table, it can be seen that the processing time of any one item through the plant is normally 1½ days. This provides a clue as to what is possible with delivery schedules of shorter than week-to-week.

Consider, for example, a plant operating generally on week-to-week delivery. If one particular customer is on a shorter delivery (for example, pick up Tuesday and delivered Friday), then that delivery must take precedence through the plant in order to catch up with the balance of the schedule. (See discussion on supplementary load lists in the section on Accumulating Soil Counts.)

If sufficient merchandise is available to fill the order from other pick-ups, then adding the count of the order to the work schedule is all that is needed. However, if the merchandise is used only for that customer, then the merchandise itself must be expedited through the plant.

It follows from the above discussion that a full day's work could not normally be processed on a three-day delivery schedule. That is, for example, a full day's pick-up on Tuesday could not be delivered on Friday. In this example the first of the soil would be, started Wednesday morning and be through the make-up departments 1½ days later, or Thursday noon. But the last of the soil would be started late Wednesday and would not be through the make-up department until Friday noon.

Half of the pick-up would theoretically be ready Friday morning, but the balance would have to be on a longer delivery schedule.

It should be borne in mind that all of the scheduling days discussed in this manual refer to a single eight-hour working day. Plants operating a day and a night shift have in effect two working days in each calendar day.

If the soil room operates only at night while the balance of the plant works only days, then the processing time is reduced on a calendar basis (but not on a work day basis), and therefore the capability exists for a shorter delivery schedule.

For example, in the case cited above, a full pick-up on Tuesday could be completely ready Thursday noon if the soil room works on it Tuesday night.

It is possible to generalize, therefore, that a plant working only a day shift of five days, can normally operate effectively only if most of the work is on a week-to-week delivery schedule, with some possibly on a four-day or three-day delivery schedule. To work effectively on a shorter delivery schedule requires night lift operations.

The above discussion does not, of course, consider filling orders from stock-room merchandise. In those cases, the items are already available and require no lead time for the laundering process.

Accumulating Soil Counts

The objective of any scheduling system is to know in advance whether you can reasonably expect to complete the required work load on time. This knowledge is useful only if it is available far enough in advance so that planning is possible to avoid being late (or at the opposite extreme, to have costly non-productive time).

In the linen supply industry, there is very limited time for such specific advance knowledge. At most, four days are available (for week-to-week delivery), and often only two or three days are available (for more frequent delivery schedules).

The general level and trend of the company's sales, knowledge of customer usage, seasonal influences, and past experience, all provide clues to production requirements and are customarily used. But in order to schedule production in the sense that this manual is concerned with, each day's work load must be known.

In a delayed even exchange system or in a bundle delivery system, this information comes from the count of soiled items picked up.

It follows, therefore, that each pick-up must be identified as to the day of the equivalent clean delivery, and that the count of each item must show on a "soil ticket" for each customer. This count may be entered either by the routeman or by plant personnel, but must be available for compilation into daily load requirements as early as possible.

In plants utilizing data processing, the preparation of a "load list" is usually a by-product of and occurs almost simultaneously with the pricing and invoicing procedure. However, this is usually not true of manual invoicing systems, and therefore, if the system permits it, the accumulation of a load list should be done from the soil tickets *before* the pricing and invoicing process, since the invoice is needed only on the day of delivery for delayed even exchange (or the day before for bundle delivery), whereas the scheduling information is needed several days before that.

If data processing is not available, then bookkeeping machines, such as Burroughs, NCR, etc. may be adapted for this purpose. All that is needed are enough accumulator keys for the variety of items being serviced. If there

are not quite enough accumulator keys, then some similar items may be grouped together, or some infrequently used items may be entered under one miscellaneous key and a manual count kept of the individual items in the miscellaneous category.

As a matter of fact, for scheduling purposes, many items having similar weights and production rates may be grouped together to avoid making the list too long. For example, table cloths over 54" and under 90" of all colors, can probably be grouped together (at an average weight). Those 54" and under are usually grouped as table tops, and those 90" and over are usually grouped as banquet cloths.

Although the load list may show each individual item for purposes of route make-up, the total count for groups such as above may be posted to the work schedule (see following section).

If a bookkeeping machine is used to prepare load lists, the procedure starts with the operator having available all of the soil tickets for a particular day's delivery. Completing one ticket at a time, she enters the count of each item in the machine, with the appropriate key depressed for that item. Upon completion of that soil ticket, she proceeds to the next ticket until all tickets for the particular day's delivery are so processed. A total of each item is then printed out on the machine tape.

All items serviced must, of course, be coded to a key number, and the entire operation is facilitated if the key number appears on the soil ticket, and the soil ticket is designed so as to list the items in the same sequence as is shown on the machine's keyboard.

If no machine is available, then the same process can be accomplished by use of a spread sheet. In this case, the operator also starts with all the soil tickets for a particular day's delivery, and taking one ticket at a time, enters the count of each item in the column for that item. (It is not necessary to have separate columns for various sizes of the same garment, or even of table cloths, since for scheduling purposes, this is of no consequence.)

After all the tickets for a day's delivery are so posted, a total is taken of each column.

A simplified example of such a spread sheet might look like this:

Customer No. (Optional)	Sheets	P.C.	Table Tops	Table Cloths	Napkins	Pants	Shirts
2012	312	280	120	50	264		
2056			212	88	315	20	18
2115	184	202				6	9
2004	606	560				18	16
2220			410	202	893	26	28
2600	415	483	104			41	55
Totals	1517	1525	846	340	1472	111	126

Several complicating factors occur in many plants because of variations from normal routine. One is that some customers may be on a week-to-week delivery schedule, while others may be on a shorter schedule.

Thus, week-to-week customer A may be picked up on Friday and delivered on the following Friday. His soil count may be available by Tuesday morning.

Customer B may be picked up on Tuesday and delivered Friday, so that his soil count is not available until Wednesday at the earliest. (Good practice would, of course, dictate that this bundle be counted in before any Tuesday to Tuesday bundles were processed in the soil room. In other words, the soil room should always be working on the bundles in the plant which call for the earliest delivery date.)

Such a situation is best handled by delaying as long as possible the accumulation of the load list. However, as outlined in the section on Lead Time, the washroom work load must be known at least two days before the delivery day, so that this limits the time that soil tickets can be held before preparation of the load list for scheduling purposes.

Soil tickets which become available only after the load list is prepared must be accumulated into a supplementary load list, which is added to and modifies the original load list. If such supplementary load lists occur regularly and represent a substantial volume of work, then due allowance for this additional work must be made, from experience, in scheduling production from the original load list.

Another complication arises if some large customers are processed as individual lots with the count taken after the lot is processed instead of in the soil room. Since, in this case, by the time the count is available, it is of little or no value for scheduling purposes, it is best to estimate a count based on previous history of the deliveries each day of the week to those accounts, and to add this estimate to the original load list. Such estimates are set up by management and remain fixed as long as the activity of that customer remains relatively stable.

Still another complication arises when a customer requires a delivery of more items than were picked up soiled, and therefore a "Special" must be created. The earlier such "Special" requirements are known, the easier it is to accommodate them into the schedule by merely adding them to the supplementary load list.

Last minute "Specials" cannot normally be included in the production schedule and must be allowed for, if prevalent, by adding a contingency factor into the load list, or by filling the "Special" with new merchandise.

Converting Item Counts to Work Center Hours

In the finishing operations of the laundering process, production is usually measured, and scheduling is controlled by piece count. Therefore the item count of the load list can be converted directly into machine or work center hours.

However, in washroom and drying operations, production is usually expressed in pounds, and therefore, the item count must be converted to pounds before work center hour requirements can be determined.

For this purpose, standard conversion factors for the various items served can be used with accuracy well

within the limits needed by a scheduling program. Weight conversion factors published by the LSAA may be used (see appendix), but if non-standard items are served, or if greater accuracy is desired, a sampling for each item of ten individual batches of ten pieces each will normally provide an accurate weight factor.

The weight-conversion factors, once determined, are constant, and are pre-printed on the daily scheduling form.

The next step of the scheduling process is the conversion of pounds or pieces to machine or work center hours. This requires the establishment of machine or work center capacity ratings, (see section on Determining Work Center Capacity), which, once established, are also pre-printed on the daily scheduling form. (The manual on Production Methods published by LSAA as well as other available sources of production standards may be helpful in establishing production rates.)

SOIL ROOM

The hours required to process the day's work load through the soil room are determined by dividing the total weight of flatwork (including tumbled items) by the work center's capacity for flatwork, and the total number of garments by the work center's capacity for garments.

(If some accounts are processed as lots and therefore by-pass the soil room, then this count is not included in the soil room's work load.)

The capacity of the soil room is the expected production per operator-hour times the normal complement of operators.

For example, a soil room consisting normally of five operators with a production expectancy of 800 lbs. of flatwork or 300 garments per operator-hour, will have a capacity of 4,000 flatwork pounds or 1,500 garments per hour. If the day's load list contains 20,000 lbs. of flatwork and 3,000 garments, then the soil room's work load is 5 hours for the flatwork and 2 hours for the garments, or 7 hours in all.

Note that the count of the soil room's work load is not known until the day's work is completed, and therefore the count for the same day in the previous week must be used as a guide if it is desired to know the required work hours *in advance*.

WASHROOM

The hours required to process the day's work through the washroom are determined by dividing the total weight of the entire day's work load by the capacity of the washroom.

For example, if the day's load is 23,280 pounds and the capacity of the washroom is 2,700 pounds per hour, then 8.6 hours of washroom time will be required.

In the above example, it is assumed that the various elements of washroom capacity (i.e. washing, extracting, and conditioning) are fairly well balanced. If they are not, then it is best to use the lowest capacity, since this will normally limit the output of the entire washroom. Occasionally such limitation can be avoided by providing a great deal of storage between washing and extract-

ing, or between extracting and conditioning, but generally this approach is not too practical. For purposes of scheduling, this manual treats the entire washroom as one work center.

FLATWORK IRONING

In a multi-ironer plant, where each ironer is specially equipped for certain items, it is best to determine the machine-hour work load independently for each ironer. Then, if one ironer is over-loaded and another under-loaded, a judgment can be made as to which items can most readily be shifted from one ironer to another. Machine capacities must be pre-determined for each item, and once determined, are constant (as long as methods remain the same). They therefore can be pre-printed on the daily scheduling form.

A simplified example will illustrate the general approach to flatwork ironer scheduling for a 3-ironer plant in which one ironer is set up for large pieces, one for 5 lanes of small pieces, and one for two or three lanes of miscellaneous pieces.

(1) Item	(2) Quantity	(3) Pieces Per Machine Hr.	(4) Work Hrs. Required Irons #1	(5) Work Hrs. Required Irons #2	(6) Work Hrs. Required Irons #3
Sheets	3,600	600	6.0		
Table Cloths (over 54")	750	500	1.5		
Table Tops	2,500	1000 (2 lanes)		2.5	
Aprons	6,000	1200 (3 lanes)		5.0	
Pillow Cases	4,000	2000 (5 lanes)			2.0
Hand Towels	9,000	4500 (5 lanes)			2.0
Napkins	20,000	5000 (5 lanes)			4.0
Total			7.5	7.5	8.0

Column (3) remains constant, once production rates are established. Column (2) is posted daily from the load list. Columns 4, 5, and 6 are calculated daily by dividing the production rate (pieces per machine hour) into the quantities needed.

TUMBLE DRY DEPARTMENT

Work hours required to process the day's work through the tumble dry department are best determined by dividing the total weight of tumbled work by the capacity of the dryers, to establish drying machine hours, and then determining folding time separately.

If towel folding machines are available, then these also should be considered as a separate work unit from the manual folding operations.

A simplified example will illustrate the general approach to tumble dry scheduling for a department that has one 400 lb. gas tumbler, one towel folding machine and two manual folding operators. It is assumed that one additional operator is occupied with tying and packing and also operating the tumbler.

(1) Item	(2) Quantity	(3) Weight Conver- sion Factor (lbs. per pc.)	(4) Pounds	(5) Pieces Per Hr. Folding	(6) Work Hrs. Required Manual Folding	(7) Work Hrs. Required Machine Folding
Bath Towels	4,000	0.50	2,000	1,000		4.0
Massage Towels	4,200	0.25	1,050	1,200		3.5
Bath Mats	2,000	0.60	1,200	1,000	2.0	
				(2 Oper.)		
Wash Cloths	2,000	.06	120	2,000	1.0	
				(2 Oper.)		
Blankets	200	3.00	600	200	1.0	
				(2 Oper.)		
Patient Gowns	1,200	.65	780	300	4.0	
				(2 Oper.)		
Total pounds dried			5,750	Total	8.0 hrs.	7.5 hrs.
A. Drying Capacity (lbs. per hour)			1,330			
B. Drying Hours			4.3			

Column (3) and (5), and line A are pre-determined and remain constant. Column (2) is posted daily from the load list. Column 4 is the multiplication of column (2) by column (3), and columns (6) and (7) are calculated daily by dividing column (5) into column (2).

GARMENT FINISHING

Work hours required to process the day's work through this department are best determined individually for each group of special units. However, all general purpose units may be considered as one group.

A simplified example for a department containing one cabinet-style pants unit and three general purpose press units, follows:

(1) Item	(2) Quantity	(3) Pieces Per Hour	(4) Work Center Hours Required Pants Unit	(5) Work Center Hrs. Required General Purpose Units
Pants	1210	120	8.0(960 pcs.)	
		150		1.7(250 pcs.)
Shirts	200	195		1.0
Short Coats	145	180		.8
Long Coats	350	120		2.9
Dresses	140	105		1.3
		Total	8.0	7.7

Note that the pants unit is scheduled for its full eight-hour output and that the excess of pants is scheduled to be done in the general purpose units.

FLATWORK (LINEN) MAKE-UP

The work hours required to process the day's load through this department are determined by dividing the

total number of pieces of flatwork (including tumbled work) by the work center's capacity.

Thus, if the production expectancy is 2,500 mixed pieces per operator-hour, and three operators are normally assigned to the work center, then its capacity is 7,500 pieces per hour. If the day's load shows a total of 59,450 flatwork pieces, then the hours required of the work center are 8.0.

(In some plants it may be more practical to express linen room capacity in pounds, in which case the conversion of flat and tumbled pieces to pounds is used to establish the work center's hours.)

GARMENT MAKE-UP

The work hours required to process the day's load through this department are determined by dividing the total number of garments by the work center's capacity.

Thus, if production expectancy for folding, inspecting, and making up orders is 100 pieces per operator-hour, and if three operators are normally assigned to this work center, then its capacity is 300 pieces per hour. If the day's load list shows a total of 2,045 garments, then the hours required of the work center are 6.8.

Designing the Required Forms

Any production scheduling program will bog down and eventually be useless or discontinued if the procedures are too complicated. Unfortunately, the nature of the linen supply business is such that a simple system of scheduling is not available. Yet, a system can be devised which most well-managed plants can live with.

Much of the practicality of the system will depend on using forms which will make the procedure routine, and the statistical work such that an average clerk can readily complete it.

Two forms are suggested. The first is a daily form for the conversion of load requirements into work center hours requirements, and is the subject of this section. This form will normally be completed by an office clerk, or by appropriate programming into a data processing system.

The second form is a weekly scheduling chart to which are posted the required work hours of each work center, and from which planning and control are effected. This chart will normally be posted by, or for, the plant superintendent. It is the subject of the next section of this manual.

The type of form discussed in this section for determining work center hours is intended to be used where the entire program is manual, or where the load list is prepared by data processing but the remainder of the program is manual.

A suggested form is shown in Figure I. The design of columns (1) through (5) can normally be adopted by any plant, since they show piece counts, weight conversion factors, pounds and work center capacity which all plants would have to develop for scheduling purposes.

The design of the columns from (6) on, may vary from plant to plant depending on the type and number of work centers for which control is sought. A typical breakdown for a 3-ironer plant is shown.

Figure I shows the blank form before it is filled out. All of the information shown in the blank form is pre-determined by management and printed on the form.

Figure 1

Work Load For Delivery

(Day)

(Date)

ITEM (1)	PIECES (2)	WEIGHT FACTOR (3)	POUNDS (4)	WORK CENTER CAPACITY PER HOUR (5)	REQUIRED WORK CENTER HOURS			
					(6)	(7)	(8)	(9)
FLATWORK DEPT.					IRONER 1 (a)	IRONER 2 (b)	IRONER 3 (c)	
Sheets		1.50		600 pc's. (a)				
Table Cloths (over 54")		1.20		500 pc's. (a)				
Table Tops		.50		1,000 pc's. (b)				
Aprons		.50		1,200 pc's. (b)				
Pillow Cases		.32		2,000 pc's. (c)				
Hand Towels		.15		4,500 pc's. (c)				
Napkins		.10		5,000 pc's. (c)				
ALL FLATWORK								
TUMBLED WORK DEPT.					Drying (a)	Manual Folders (2) (b)	Machine Folders (1) (c)	
Bath Towels		.50		1,000 pc's. (c)				
Massage Towels		.25		1,200 pc's. (c)				
Bath Mats		.60		1,000 pc's. (b)				
Wash Cloths		.06		2,000 pc's. (b)				
Blankets		3.00		200 pc's. (b)				
Patient Gowns		.65		300 pc's. (b)				
ALL TUMBLED WORK				1,330 lbs. (a)				
GARMENT FINISHING DEPT.					Pants Unit (a)	Utility Units (3) (b)		
Pants		1.20		120 pc's. (a)				
				150 pc's. (b)				
Shirts		.50		195 pc's. (b)				
Short Coats		1.00		180 pc's. (b)				
Long Coats		1.50		120 pc's. (b)				
Dresses		.90		105 pc's. (b)				
ALL GARMENTS								
WASH RM., SOIL RM. & MAKE-UP					Soil Room (a)	Wash Room (b)	Linen Make-up (c)	Garment Make-up (d)
Total Flat & Tumbled (Make-Up)				7,500 pc's. (c)				
Total Flat & Tumbled (Soil Rm)				4,000 lbs. (a)				
Total Garments (Make-Up)				300 pc's. (d)				
Total Garments (Soil-Rm)				1,500 pc's. (a)				
TOTAL WORK LOAD				2,700 lbs. (b)				

Once the load list is available, the report may be prepared by an office clerk using only a calculator.

Referring to **Figure II** the sequence of steps for this procedure are as follows:

- a. *Enter in Column (2) the count of each item (or group of items) from the load list.*
- b. *Multiply the count of each item by its weight factor and enter the resulting pounds in Column 4.*
- c. *For each item divide the work center capacity (Column 5) into pieces, if the capacity is expressed in pieces or into pounds, if the capacity is expressed in pounds. Enter the resulting work center hours in the proper column.*
- d. *Total the combined work hours for all items for each work center.*
- e. *Add total pieces and pounds of flat and tumbled work, and total pieces and pounds of garments, and enter in the appropriate spaces in the lower section of the form.*
- f. *For each work center in the lower section of the form, divide the work center capacity (Column 5) into the pieces, if the capacity is expressed in pieces - or into pounds if the capacity is expressed in pounds. Enter the resulting hours in the column for the appropriate work center.*

(Note that if some customers are processed as lots and thus by-pass the soil room, then the estimated counts of those customers are not included in the soil room figures, but are included in the make-up figures.)



The report is now ready to be forwarded to the plant superintendent. He can see at a glance the work load that each department will have to complete.

In order to reduce the possibility of clerical errors, those spaces in the form which normally will not be used are blanked out, so as automatically to direct the clerk's attention to the correct space.

Note should be taken of the fact that capacity in the case of manual tumbled work folding is expressed for the entire work center (in the example shown, consisting of 2 folding operators). Also, capacity for the general purpose utility garment units is expressed for the entire work center of 3 units. An alternative would be to express these capacity figures per operator or press unit hour, and the resulting required hours would be for operator or unit hours.

However, this would require some judgment on the part of the clerk to establish the number of operators needed before converting to the hours that the work center must operate.

For this reason it is felt that the number of operators should be pre-determined by management. Then, if the calculation shows too short or too long a day for the work center, the plant superintendent can plan an adjustment in the number of operators.

Note that in the Garment Finishing Department, 1210 pants was the requirement and that this requirement translated into 10.0 hours on the pants unit. This is as far as the clerk would go.

On receiving the report, the plant superintendent sees that the pants unit is overloaded and that he has the capacity to do some of the pants in the utility units. He therefore loads the pants unit with 8 hours of work (960 pants), and schedules the remaining 250 pants to be done in the utility units. He may not actually direct the 250 pants to the utility units, but he should alert the press department that they may have to do approximately this number in the utility units.

The Production Scheduling Chart

The report described in the preceding section will give the plant superintendent a clue as to which work centers, if any, may be overloaded, and which work centers, if any, may be underloaded. However, to take effective action, he must also consider overloads or underloads from previous days or following days.

For this reason, the preparation of a weekly schedule chart is suggested. It consists basically of adding in graphic form each day's load in each work center to the load already accumulated in the other days of the week.

Figure III shows a suggested chart (blank) for the work centers used as examples in this manual. Each day is divided into 8 one-hour time periods. Space is provided in each work center for entering the complement of operators in that work center, since this will in most cases determine the capacity of the work center. More operators than the normal complement will usually (though not always) shorten the time taken in each work center while fewer than the normal complement may lengthen the time.

If the chart (when filled out) shows an overload in a department even with the normal complement of operators, then the plant superintendent must consider ways of increasing the work center's output (probably by assigning additional operators if possible).

Figure IV shows the chart filled in with the work load for one day (Wednesday's delivery), using the figures developed in the examples used in the manual, and summarized in the Work Load form for Wednesday (as illustrated in **Figure II**). (Note that only 2.6 hours are charted for the soil room on Monday, despite the fact that the Work Schedule calls for 6.6 hours in the soil room. The remaining 4 hours might have appeared on the chart for Friday of the preceding week.)

As outlined in the section on Lead Time, the soil room is scheduled to start the day's load $\frac{1}{2}$ day ahead of the washroom; the washroom is scheduled $\frac{1}{2}$ day ahead of the finishing departments and the finishing departments are scheduled $\frac{1}{2}$ day ahead of the make-up departments.

Figure V shows the chart further developed by adding (in different colors or patterns) the load, when determined, for each of the remaining days of the week. Each day should have its own fixed color for quick recognition on the chart. For purposes of this illustration, the

Figure II

Work Load For Delivery Wednesday, Feb. 17, (Day) (Date)

ITEM (1)	PIECES (2)	WEIGHT FACTOR (3)	POUNDS (4)	WORK CENTER CAPACITY PER HOUR (5)	REQUIRED WORK CENTER HOURS			
					(6)	(7)	(8)	(9)
FLATWORK DEPT.					IRONER 1 (a)	IRONER 2 (b)	IRONER 3 (c)	
Sheets	3,600	1.50	5,400	600 pc's. (a)	6.0			
Table Cloths (over 54")	750	1.20	900	500 pc's. (a)	1.5			
Table Tops	2,500	.50	1,250	1,000 pc's. (b)		2.5		
Aprons	6,000	.50	3,000	1,200 pc's. (b)		5.0		
Pillow Cases	4,000	.32	1,280	2,000 pc's. (c)			2.0	
Hand Towels	9,000	.15	1,350	4,500 pc's. (c)			2.0	
Napkins	20,000	.10	2,000	5,000 pc's. (c)			4.0	
ALL FLATWORK	45,850		15,180		7.5	7.5	8.0	
TUMBLED WORK DEPT.					Drying (a)	Manual Folders (2) (b)	Machine Folders (1) (c)	
Bath Towels	4,000	.50	2,000	1,000 pc's. (c)			4.0	
Massage Towels	4,200	.25	1,050	1,200 pc's. (c)			3.5	
Bath Mats	2,000	.60	1,200	1,000 pc's. (b)		2.0		
Wash Cloths	2,000	.06	120	2,000 pc's. (b)		1.0		
Blankets	200	3.00	600	200 pc's. (b)		1.0		
Patient Gowns	1,200	.65	780	300 pc's. (b)		4.0		
ALL TUMBLED WORK	13,600		5,750	1,330 lbs. (a)	4.3	8.0	7.5	
GARMENT FINISHING DEPT.					Pants Unit (a)	Utility Units (3) (b)		
Pants	960	1.20	1,450	120 pc's. (a)	8.0			
	250			150 pc's. (b)		1.7		
Shirts	200	.50	100	195 pc's. (b)		1.0		
Short Coats	145	1.00	145	180 pc's. (b)		.8		
Long Coats	350	1.50	525	120 pc's. (b)		2.9		
Dresses	140	.90	130	105 pc's. (b)		1.3		
ALL GARMENTS	2,045		2,350		8.0	7.7		
WASH RM., SOIL RM. & MAKE-UP					Soil Room (a)	Wash Room (b)	Linen Make-up (c)	Garment Make-up (d)
Total Flat & Tumbled (Make-Up)	59,450		20,930	7,500 pc's. (c)			8.0	
Total Flat & Tumbled (Soil Rm)	59,450		20,930	4,000 lbs. (a)	5.2			
Total Garments (Make-Up)	2,045		2,350	300 pc's. (d)				6.8
Total Garments (Soil-Rm)	2,045		2,350	1,500 pc's. (a)	1.4			
TOTAL WORK LOAD	61,495		23,280	2,700 lbs. (b)	6.6	8.6	8.0	6.8

Production Chart For Week Ending _____

WORK CENTER	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Soil Room _____ OPERATORS					
Wash Room _____ OPERATORS					
Flat Ironer #1 _____ OPERATORS					
Flat Ironer #2 _____ OPERATORS					
Flat Ironer #3 _____ OPERATORS					
Tumble Drying _____ OPERATORS					
Manual Fold _____ OPERATORS					
Machine Fold _____ OPERATORS					
Pants Unit _____ OPERATORS					
Utility Units _____ OPERATORS					
Linen Room _____ OPERATORS					
Garment Make Up _____ OPERATORS					

Figure IV

Production Chart For Week Ending Feb. 20,

WORK CENTER	MONDAY				TUESDAY				WEDNESDAY				THURSDAY				FRIDAY							
Soil Room <u>5</u> OPERATORS	████████																							
Wash Room <u>4</u> OPERATORS	████████████████																							
Flat Ironer #1 <u>4</u> OPERATORS					████████	████████	████████	████████																
Flat Ironer #2 <u>6</u> OPERATORS					████████	████████	████████	████████																
Flat Ironer #3 <u>6</u> OPERATORS					████████	████████	████████	████████																
Tumble Drying <u>1</u> OPERATORS					██████	██████																		
Manual Fold <u>2</u> OPERATORS					████████	████████	████████	████████																
Machine Fold <u>1</u> OPERATORS					████████	████████	████████	████████																
Pants Unit <u>1</u> OPERATORS					████████	████████	████████	████████																
Utility Units <u>3</u> OPERATORS					████████	████████	████████	████████																
Linen Room <u>3</u> OPERATORS						████████	████████	████████	████████															
Garment Make Up <u>3</u> OPERATORS						████████	████████	████████																

daily loads in each work center are assumed to have been found from the Work Load forms to be as follows:

	Thursday's Delivery	Friday's Delivery	Monday's Delivery	Tuesday's Delivery
Soil Room	8.0 hrs.	7.0 hrs.	6.0 hrs.	7.0 hrs.
Wash Room	9.5	8.5	8.0	8.5
Flat Ironer #1	8.0	7.7	7.0	8.0
Flat Ironer #2	8.0	8.5	8.0	8.0
Flat Ironer #3	8.0	8.5	8.5	8.0
Tumble Drying	5.0	4.5	5.0	4.5
Manual Fold	8.5	8.0	8.0	8.0
(tumbled work)				
Machine Fold	8.0	7.0	7.5	8.0
(tumbled work)				
Pants Unit	8.0	8.0	8.0	8.0
Utility Units	8.0	7.5	7.0	7.8
(garments)				
Linen Room	8.5	8.0	7.5	8.0
(flatwork)				
Garment Make-up	8.0	7.0	7.5	7.5

The day's load in each work center is charted immediately following the end of the preceding day's load except where it exceeds the maximum lead time outlined in the section on Lead Time, or where the work is not available from a preceding operation. For example, note that Thursday's load in tumble drying could not be started until the second hour on Tuesday because it did not start in the washroom until the first half hour on Tuesday. There is therefore a gap in the chart for Tumble Drying which indicates more capacity than is needed. (In actual practice, when this occurs, the operation will frequently be performed inefficiently and be spread over the entire work day.)

Note also the chart shows that Manual Folding of tumbled work will probably be the last of the finishing operations to finish Thursday's work load, and that the Linen make-up room will probably be a half-hour late getting out Thursday's load.

Note that the Friday work day ends with most departments scheduled to be working on Tuesday's delivery.

In all work centers except the washroom, the balance of the load for Tuesday delivery is carried forward to Monday on the following week's chart. Such a carry-over is impractical in the washroom because it already has more than a full week's work load, and the same condition is likely to continue into the following week. It will probably, therefore, require some overtime.

Of interest in this hypothetical chart (Figure V) are the following:

a. *The washroom will probably require 2½ hours of overtime to complete the week's work.*

b. *Ironer #1 may lose time because of waiting for the washroom. Notice the gaps in the chart for Ironer #1 before the load for Monday's delivery and Tuesday's delivery. To avoid this, the washroom should probably work some overtime during the week rather than wait until the end of the week.*

c. *For the same reason, the utility units may have some waiting time before starting the load for Tuesday delivery; and the machine folding of tumbled work may be delayed because of waiting for the drying, which in turn is delayed by the washroom.*

As stated before, such waiting time is rarely obvious, but rather manifests itself in "stretched out" or inefficient production.

After scheduling production to the end of the week, the balance of the work load in any work center that is not completed, is brought forward to the chart (Figure VI) for the following week. This, of course, can be done only if the schedule will still meet delivery requirements. Work not completed on Friday in the make-up department can be carried over to Monday, for example, if it is not to be delivered until Tuesday, but Monday may be too late to wash items that must then be finished and made up for delivery Tuesday.

In practice, the actual production time will rarely coincide exactly with the time scheduled. The actual time to complete a work load may be extended by machine breakdowns, absenteeism, etc., and may be shortened by better than normal productivity or temporary assignment of extra operators to a particular work center.

Such variances from scheduled time will normally not destroy the validity of the weekly schedule, although they should be noted on the chart.

However, if these variances are accumulated for several weeks without correction, then the chart may eventually become distorted. For this reason, any necessary corrections should be made at the beginning of each week's chart. For example if ironer #1 had a two-hour breakdown (and no provision was made to catch up by overtime or by assigning extra operators), then two hours extra should be charted at the beginning of the following week, (assuming of course that the merchandise processed by that machine was not done during overtime hours because it was needed earlier.)

Similarly, if two hours were gained because of above normal productivity, then the work load starting the following week's chart may be started two hours ahead of where it would normally begin.

Even Exchange

With a direct even exchange system, the exact delivery requirement is not known until the driver arrives at the customer's location, since he will count the soil pick-up and replace it with clean merchandise.

Therefore it is impossible to schedule exact requirements, and the best that can be done is to schedule approximate requirements. Once this approach is accepted, then the procedures are very similar to those outlined for delayed even exchange.

From the route books, or invoices on which the driver has entered the soil pick up counts, a load list is prepared for the next delivery day. The load list may be prepared using an accumulating machine, or a spread sheet as previously described.

This procedure assumes that the deliveries on any day will be substantially the same as the deliveries (or

Production Chart For Week Ending Feb. 20,



Figure VI

Production Chart For Week Ending Feb 27,

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WORK CENTER	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
Soil Room <u>5</u> OPERATORS						
Wash Room <u>4</u> OPERATORS						
Flat Ironer #1 <u>4</u> OPERATORS	████████					
Flat Ironer #2 <u>6</u> OPERATORS	██████████					
Flat Ironer #3 <u>6</u> OPERATORS	██████████					
Tumble Drying <u>1</u> OPERATORS						
Manual Fold <u>2</u> OPERATORS	██████████					
Machine Fold <u>1</u> OPERATORS	██████████					
Pants Unit <u>1</u> OPERATORS	██████████					
Utility Units <u>2</u> OPERATORS	██████████					
Linen Room <u>3</u> OPERATORS	████████████████					
Garment Make Up <u>3</u> OPERATORS	██████████					

pick up) on the same day of the previous week. (Variations from this assumption are of course handled by having the driver bring back as clean returns any merchandise not served.)

However, to offset the disadvantage of working with approximate requirements, there is the advantage of not requiring supplementary load lists, since the approximate requirements are always known a week in advance.

For example, the delivery to a Monday to Monday customer is known Monday night when the route book is returned to the office, so that the load list can be prepared as early as Tuesday morning for the following Monday's delivery. If the customer is served Monday and Thursday, then a card for that customer will normally be included in both Monday's route book and Thursday's route book. In this case Monday's book is used to make up the following Monday's load list, and Thursday's book is used to make up the following Thursday's load list, since the requirement is more likely to be similar to the delivery on the same day of the previous week, than to the previous delivery in the same week.

For plants on direct even exchange whose business is relatively stable, it may be possible to establish a fixed load list for each day of the week on the assumption that the changes from week to week are minor. However, even in such cases, it would be well to review the load list at least quarterly (by making up an actual load list as above described), to make sure that it is still valid.

Once the load list is prepared, the remaining procedures are as outlined elsewhere in this manual.

Using and Monitoring the Production Schedule

If, over a period of time, the production schedule consistently shows a comfortably full work week in all work centers (and assuming the plant's actual performance is reasonably close to schedule), then no further steps are necessary.

However, if the schedule consistently shows gaps (indicating excess capacity), or a longer work week requiring more overtime than is economical, then corrective steps must be considered. It is not suggested that such steps be taken on the basis of only one week's experience since that week may not be representative, but if the situation occurs repeatedly, then analytical evaluation is called for.

(It may be that plants whose work load is relatively stable may be able to simplify the scheduling procedure by assuming that the load on any given day is similar to the load on the same day of preceding weeks. Thus the preparation of the Work Load form (**Fig. II**) may be by-passed, after a dependable experience pattern has been established. However, even if this procedure is adopted, it is suggested that a current Work Load form be prepared at least quarterly to detect any new conditions. This approach is similar to that described in the section on Even Exchange. In any event, the Production Chart should be prepared weekly, because this will be used to monitor the plant's actual performance against the schedule.)

The solution to excess capacity is relatively simple. While, in most cases it will not be desirable to remove

equipment that is in good condition, it would be foolhardy to waste labor as well as equipment. Reducing the size of the crew to the level which will provide the required capacity, is therefore the answer. (This will mean of course that the equipment's full capability will not be utilized, but labor costs, at least, will be in line.)

Increasing capacity, on the other hand, may not be so simple. Each work center should be considered independently.

Soil Room: Additional operators here will increase capacity, provided space and facilities are available. If not, capacity may be increased somewhat up to a certain point, with additional operators, but only at the serious expense of operator-hour efficiency. In short, when considering additional operators, the available physical facilities must also be considered.

Washroom: In many cases, restriction of washroom capacity is caused by imbalance in the component operations. Therefore, the first consideration is to determine which is the restricting element (washwheels, extractors, or conditioners) and to examine what can be done to eliminate this restriction.

Occasionally additional operators or a re-balance of the duties of the crew may improve the situation even without additional equipment. Frequently also, improvement in the material handling methods may remove the restriction on flow of work.

Flatwork Ironing: Increased capacity for ironing small pieces may frequently be achieved by adding operators (if all lanes are not already filled). In such cases, capacity may be released on other ironers by shifting suitable work to the small piece ironers.

Capacity for ironing large pieces may sometimes be increased by more careful preparation, or shaking, but again usually at the expense of operator-hour efficiency.

In flatwork is not conditioned, additional capacity of about 15% can probably be achieved by conditioning.

Tumble Drying: Additional equipment is usually the only answer to inadequate drying capacity, since the complement of operators is almost never a restricting factor. However, the mechanical efficiency of the dryers and the loading and unloading methods should be reviewed to establish that cycle times are as low as can be obtained.

Tumble Folding: Mechanical folding equipment must be the first consideration to relieving inadequate capacity here, provided there is a sufficient volume of items which lend themselves to machine folding. If additional operators are needed for hand folding, then adequate space must be provided for them.

Garment Finishing: For expansion of capacity as well as to reduce labor costs, special finishing equipment (tunnel finishers, cabinet finishers, etc.) should be given serious consideration if sufficient volume is available.

For general purpose utility units, first thought should be given to expanding the capacity of the unit by re-arrangement of the presses, addition of presses (if there are less than four in the unit), or by replacement with larger buck sizes. Only as a last resort, should additional units be considered.

Make-Up Departments: If not already given careful attention, the methods and procedures in these departments should be given first consideration if sufficient capacity is not available. If the methods are already effective, then additional operators (with adequate physical facilities) will probably be necessary.

All of the above approaches to corrective action apply when the work schedule, as prepared, shows an imbalance.

However, there still remains the function of monitoring performance to determine if actual output is meeting the schedule.

Such monitoring can best be done in the finishing departments (i.e. flatwork, tumbled work, and garment finishing), since if the item is finished on time, then the washroom schedule has been met, and the make up departments will also likely be on time.

The monitoring function requires that actual production be known, (i.e. that production be recorded), and that it be recorded with the same breakdown of items as is used on the Work Load tabulation. In most cases, this will be the natural breakdown of items for production measurement purposes because (as described in the section on Accumulating Soil Counts), the Work Load items are grouped according to like production rates.

A daily production sheet should be maintained for each work center (i.e. each flatwork ironer, the tumbled work department, each specialized garment finishing unit, and all general purpose garment pressing units).

Each production sheet will normally have pre-printed on it, the items which can be produced in that work center. There should be a space to indicate each day the quantity needed of each item (from the Work Load form) and the time of day that the Production Chart shows the work center should have completed its load.

Actual production is obtained and recorded from counting devices, which can be applied in many cases, or from manual counts.

When the required production of each item is reached, the time is noted along with the quantity produced. The same item may then continue to be

produced (if the schedule permits), and the usable quantity in excess of the day's requirement credited toward the next day's requirement (i.e. only the balance still required is posted to the next day's production record).

The actual time of completion of each item is compared with the scheduled time, and appropriate steps taken to expedite items behind schedule. This responsibility is best fulfilled by the departmental supervisor working under the coordination of the plant superintendent. Substantial deviations from schedule are reported to the plant superintendent, so that he can make the necessary adjustments to the Production Chart, as outlined in the section on the Production Scheduling Chart.

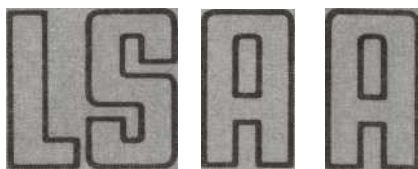
A sample Production Record is shown in Fig. VII for purposes of illustration. The quantities and scheduled times shown are intended to correspond with the illustrations already used in this manual. For example, the entire 4,000 pillow cases shown as needed for Wednesday's delivery (Fig. II) are still needed at the start of Tuesday's production day. Of the 9,000 hand towels required, it is assumed that 5,000 were done the previous day, leaving 4,000 still needed, and of the 20,000 napkins required, it is assumed 10,000 were done the previous day, leaving 10,000 still needed.

The time needed is posted from Fig. IV, which shows that Wednesday's load should be completed by Ironer #3 at 11:30 on Tuesday (assuming an 8:00 a.m. starting time).

The above requirements should be posted at the beginning of each day (or the night before) by the plant superintendent or someone to whom he has delegated this responsibility.

At the end of the day, the production in excess of requirement is credited to next day's requirement. Thus, in the example shown, 1,900 pillow cases, 3,200 hand towels, and 8,600 napkins are available for Thursday's delivery, and are deducted from that day's requirement when posting the balance needed for Wednesday's production.

The procedures outlined in this manual must be used with discretion and judgement. They are not intended to account for every piece produced, nor will they, by themselves, guarantee that all delivery schedules will be met. However, they will further an understanding of scheduling problems, and will provide the plant superintendent and departmental supervisors with the information needed to fulfill their scheduling responsibilities.



LINEN SUPPLY ASSOCIATION OF AMERICA

Daily Production Record

WORK CENTER Ironer #3DATE Tues. Feb. 16

	Pillow Cases	Hand Towels	Napkins								
Balance Needed For <u>Wed</u> Delivery	4,000	4,000	10,000								
Time Needed	11:30	11:30	11:30								
Produced	1600	4,000	3,000								
	500		1,000								
	2000		5,000								
			500								
			600								
SUB-TOTAL	4,100	4,000	10,100								
Time of Day	10:00	11:00	1:30								
	1,800	2,000	2,500								
		1,200	1,200								
			3,000								
			1,800								
TOTALS	5,900	7,200	18,600								
OPERATORS	From	To	Hours	Delay Time			Explanation				
				From	To						
Sue H.	8-	5-	8								
Mary S.	8-	5-	8								
Helen W.	8-	5-	8								
Dorothy M.	8-	5-	8								
Eve L.	8-	5-	8								



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