Factory Model and Test Data Descriptions: OPIS Experiments

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Abstract

This report defines a factory model and a set of experiments that can be used to compare alternative scheduling methods. The factory model defines parts, process plans, resources, and constraints. Multiple sets of test data are defined to test the scheduling algorithms under varying factory loadings. The model and test data are based on the ISIS/OPIS projects.

1 Introduction

The goal of this report is to define a factory model and a set of experiments that can be used to compare alternative scheduling methods. The model was originally created to provide a comparative analysis of the OPIS [4] [5] and ISIS [3] constraint directed scheduling systems and the COVERT dispatch rule[1]. The model is a simplification of the model used originally to test ISIS [2].

This report defines a Job Shop in terms of:

- Parts, including physical characteristics.
- Process plans composed of operations, precedence relations, and resource requirements.
- Resource descriptions, including labor machine ratios.
- Constraints covering due dates, work in process, machine restrictions, etc.

Twenty-two experiments are defined each containing orders composed of release dates, due dates, parts, quantity, and priority. Orders were statistically generated based on the parameters described in the latter sections.

The data described in this report is available online by sending email to Mark.Fox@cs.cmu.edu.

2 Model Overview

The factory being modeled is a Turbine Component Plant. A turbine blade is a complex three dimensional object composed of two parts: root and airfoil. The root is designed to clamp the blade into the turbine shaft and the airfoil is to transform the kinetic energy of hot stream or air traveling on it into the rotational motion of the turbine. A blade as in figure 1 is produced by a sequence of forging, milling, grinding and finishing operations to tolerances of a thousandth of an inch. There are three types of blades: t blade, cse blade, and sse blade. (Short for T-shape, Curved Side Entry, and Straight Side Entry blades.) They differ in the operations and materials required to produce them.

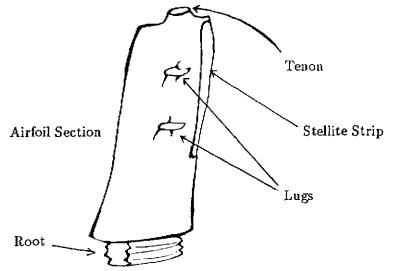


Figure 1: A Turbine Blade

The three product families are further divided into six different products, Figure 2 shows the jobshop used in the tests and the three routes an order for a product could follow through the shop. This environment and the three routes are simplifications of the actual jobshop. The simplifications were made by extracting three of the most popular families of products and omitting linear portions of the original routings for each family. For the operations in the remaining routings, the actual estimates of operation times and machine setup times were retained. This model jobshop was tested to make sure that the locations of bottlenecks corresponded to the actual jobshop experience.

The resources in the model are located in separate work-areas. Work-areas consist of one or more identical machines or work-stations. For example, WA1 in Figure 2 is made up of 12 workstations. When an order arrives at WA1 for processing, any of these work-stations may be selected for the job. Machines or work-stations may only process one order at a time and no operation on an order may start until its preceding operation has ended.

The three product families are further divided into six different products, two products per family. Each family has its own set of alternative routes through the shop, as shown in Figure 2. Where a route forks, a choice has to be made as to which work-area the order should be routed to next. Notice that orders follow an acyclic path through the shop. The routes are represented as an operations graph for each product family. Additional information in the graphs includes processing time and setup time for each operation. Whenever a machine is assigned to perform a different operation from the one that it has most recently performed, or is scheduled to start for the first time, it must be appropriately setup with the right tools, fixtures, etc. The machine must remain idle for the duration of the setup.

The processing times required for each operation in producing each product may place different demands on the capacity of the work-areas. When these demands exceed the available capacity of a machine, that machine becomes a bottleneck. For the set of products and orders defined in our experiments, the bottleneck work-areas are WA2, WA3, WA4, WA5 and WA6.

The size of an order is the number of units to be produced, and this number is drawn from a uniform distribution, U(100, 150) units. An order may also be assigned to one of six priority classes with equal probability of being in each class:

- Forced outages (FO): Orders to replace blades which malfunctioned during operation. It is important to ship these orders as soon as possible, no matter what the cost.
- Critical replacement (CR) and Ship Direct (SD): Orders to replace blades during scheduled maintenance. Advance warning is provided, but the blades must arrive on time.
- Service and shop orders (SO, SH): Orders for new turbines. Lead times of up to three years may be known.
- Stock orders (ST): Order for blades to be placed in stock for future needs.

3 Factory Model

3.1 Parts

Each part is a blade product defined by a blade type, process plan and length of its airfoil as in Table 1.

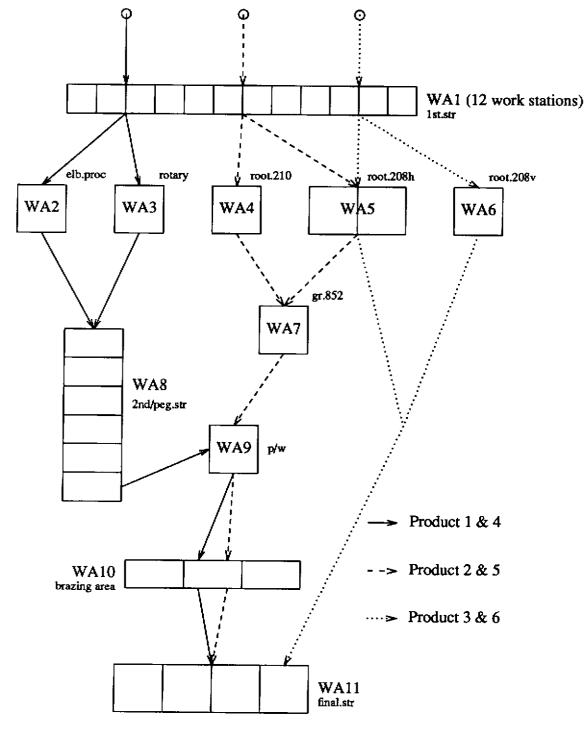


Figure 2: Jobshop Model

part	blade type	process plan	air-foil length
Pblade1	CSE blade	produce-Pblade1	26
Pblade2	SSE blade	produce-Pblade2	26
Pblade3	T blade	produce-Pblade3	26
Pblade4	CSE blade	produce-Pblade4	26
Pblade5	SSE blade	produce-Pblade5	26
Pblade6	T blade	produce-Pblade6	26

Table 1: Parts in OPIS Factory Model

3.2 Process Plans

There exists more than one way to produce a part in the factory. Consequently, a part's process plan is represented as a directed graph of operations. Nodes in the graph represent operations, and arcs represent precedence relations. Any path through the graph represents a "legal" process plan for the part. In the following operation schemata, the actual duration and resource needed for each operation are described for each part.

3.2.1 Process plan for Produce-Pblade1:

Table 2 is the process plan for *Produce-Pblade1* with the operation name, operation type, machine working area, the previous operation and next operation in the process sequence. Op-1.blade1 is the first operation in the process plan for Pblade1, therefore it does not have any previous operation. Then, this operation is followed by either of the two alternative rooting operation: op-2a.blade1 or op-2b.blade2. The rest of the operations are op-3.blade1, op-4.blade1, op-5.blade1 and op-6.blade1. The last operation op-6.blade1 has no next operation.

operation	type	area	prev-operation	next-operation
op-1.blade1	ws-operation	1st.str	N/A	(or op-2a.blade1
-				op-2b.blade1)
op-2a.blade1	rooting	elb.a.proc	op-1.blade1	op-3.blade1
op-2b.blade1	rooting	rooting area	op-1.blade1	op-3.blade1
op-3.blade1	ws-operation	2nd/peg.str	(or op-2a.blade1	op-4.blade1
			op-2b.blade1)	
op-4.blade1	airfoil	airfoil-area	op-3.blade1	op-5.blade1
op-5.blade1	ws-operation	brazing area	op-4.blade1	op-6.blade1
op-6.blade1	ws-operation	final.str	op-5.blade1	N/A

Table 2: Process Plan For Produce-Pblade1

There is different time duration for each operation in the process plan. In Table 3, two kinds of duration information are listed for each operation: setup time and piece time. Setups are needed when two successive operations on any particular machine are not of the same product family. Piece time is the processing time per piece for the required operation. Setup time and piece time are measured in seconds.

Process plans for the other blade parts in the following subsections have same columns as the above tables.

operation	set-up	piece
op-1.blade1	25200	1238
op-2a.blade1	49500	471
op-2b.blade1	59400	759
op-3.blade1	9000	1123
op-4.blade1	5400	162
op-5.blade1	10800	860
op-6.blade1	14400	658

Table 3: Time Table for Produce-Pblade1

3.2.2 Process plan for Produce-Pblade2:

Table 4 and 5 are the process plan and its time table for producing Produce-Pblade2, respectively.

operation	type	area	prev-operation	next-operation
op-1.blade2	ws-operation	lst.str	N/A	(or op-2a.blade2
				op-2b.blade2)
op-2a.blade2	rooting	root.210	op-1.blade2	op-3.blade2
op-2b.blade2	rooting	root.208h	op-1.blade2	op-3.blade2
op-3.blade2	ws-operation	tapered-blade-	(or op-2a.blade2	op-4.blade2
		area	op-2b.blade2)	-
op-4.blade2	airfoil	airfoil-area	op-3.blade2	op-5.blade2
op-5.blade2	ws-operation	brazing area	op-4.blade2	op-6.blade2
op-6.blade2	ws-operation	final.str	op-5.blade2	N/A

Table 4: Process Plan For Produce-Pblade2

operation	set-up	piece
op-1.blade2	25200	957
op-2a.blade2	55800	2995
op-2a.blade2	55800	2995
op-3.blade2	16019	396
op-4.blade2	5400	205
op-5.blade2	10800	619
op-6.blade2	14400	468

Table 5: Time Table for Produce-Pblade2

3.2.3 Process plan for Produce-Pblade3:

Table 6 and 7 are the process plan and its time table for producing Produce-Pblade3, respectively.

operation	type	атеа	prev-operation	next-operation
op-1.blade3	ws-operation	lst.str	N/A	(or op-2a.blade3
				op-2b.blade3)
op-2a.blade3	rooting	root.208h	op-1.blade3	op-3.blade3
op-2b.blade3	rooting	root.208v	op-1.blade3	op-3.blade3
op-3.blade3	ws-operation	final.str	(or op-2a.blade3	N/A
			op-2b.blade3)	

Table 6: Process Plan for Produce-Pblade3

operation	set-up	piece
op-1.blade3	18000	356
op-2a.blade3	54000	2818
op-2b.blade3	54000	2818
op-3.blade3	25200	345

Table 7:	Time	table	for	Produce-Blade3
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3.2.4 Process plan for Produce-Pblade4:

Table 8 and 9 are the process plan and its time table for producing Produce-Pblade4, respectively.

operation	type	area	prev-operation	next-operation
op-1.blade4	ws-operation	lst.str	N/A	(or op-2a.blade4
				op-2b.blade4)
op-2a.blade4	rooting	elb.a.proc	op-1.blade4	op-3.blade4
op-2b.blade4	rooting	rooting.area	op-1.blade4	op-3.blade4
op-3.blade4	ws-operation	2nd/peg.str	(or op-2a.blade4	op-4.blade4
			op-2b.blade4)	_
op-4.blade4	airfoil	airfoil-area	op-3.blade4	op-5.blade4
op-5.blade4	ws-operation	brazing area	op-4.blade4	op-6.blade4
op-6.blade4	ws-operation	final.str	op-5.blade4	N/A

Table 8: Process Plan for Produce-Pblade4

operation	set-up	piece
op-1.blade4	25200	1238
op-2a.blade4	49500	471
op-2b.blade4	59400	759
op-3.blade4	9000	1123
op-4.blade4	5400	162
op-5.blade4	10800	860
op-6.blade4	14400	658

Table 9: Time Table for Produce-Pblade4

3.2.5 Process plan for Produce-Polade5:

Table 10 and 11 are the process plan and its time table for producing Produce-Pblade5, respectively.

operation	type	area	prev-operation	next-operation
op-1.blade5	ws-operation	1st.str	N/A	(or op-2a.blade5
				op-2b.blade5)
op-2a.blade5	rooting	root.210	op-1.blade5	op-3.blade5
op-2b.blade5	rooting	root.208h	op-1.blade5	op-3.blade5
op-3.blade5	ws-operation	tapered-blade-	(or op-2a.blade5	op-4.blade5
		area	op-2b.blade5)	-
op-4.blade5	airfoil	p/w	op-3.blade5	op-5.blade5
op-5.blade5	ws-operation	brazing area	op-4.blade5	op-6.blade5
op-6.blade5	ws-operation	final.str	op-5.blade5	N/A

Table 10: Process Plan for Produce-Pblade5

operation	set-up	piece
op-1.blade5	25200	957
op-2a.blade5	55800	2995
op-2a.blade5	55800	2995
op-3.blade5	16019	396
op-4.blade5	5400	205
op-5.blade5	10800	619
op-6.blade5	14400	468

Table 11: Time Table for Produce-Pblade5

3.2.6 Process plan for Produce-Pblade6:

Table 12 and 13 are the process plan and its time table for producing Produce-Pblade6, respectively.

operation	type	area	prev-operation	next-operation
op-1.blade6	ws-operation	lst.str	N/A	(or op-2a.blade6
				op-2b.blade6)
op-2a.blade6	rooting	root.208h	op-1.blade6	op-3.blade6
op-2b.blade6	rooting	root.208v	op-1.blade6	op-3.blade6
op-3.blade6	ws-operation	final.str	(or op-2a.blade6	N/A
_		ļ	op-2b.blade6)	

Table 12: Process Plan for Produce-Pblade6

operation	set-up	piece
op-1.blade6	18000	356
op-2a.blade6	54000	2818
op-2b.blade6	54000	2818
op-3.blade6	25200	345

Table 13: Time Table for Produce-Pblade6

3.3 Resource

Following are the machines used in the scheduling task with detailed descriptions of which resource area it belongs to, and preference constraints¹ [See Table 14]. However, notice that there is an operation, *straightening*, that uses manual workstations only instead of automated machines.

3.4 Constraint

Constraints are generated automatically for different product type, and its priority class. Some are preferences which could be relaxed and some are hard constraints to be exactly satisfied.

One more point to mention here is that the two constraints we had here for the experiments are:

- 1. due-date-constraints: each priority class has its own due date constraint providing a utility which varied with how early or late an order was.
- 2. q-preference: it specifies preference for sequencing parts of similar type.

Also, there are several preferences attached with the machines [See Table 14]:

- 1. shift constraints: it is to confine the operation on the machine within a certain shift restriction.
- 2. length preference: a preference constraint with true utility 1.1 and false utility of 1.0. This is to differentiate the length of a turbine blade they would work on.
- 3. lug preference: preference constraint with true utility 1.1 and false utility of 1.0. This is to differentiate machines for the number of lugs on a turbine blade.

¹/usr/isis/3/db/6.new/Winston-model/ws-instance/resources/ws-mach.l

machine	3163	description	constraints
str-la	lst.str (WA1)	first straightening w/s	1st str-shift-constraint
str-1b	3st.str (WA3)	first straightening w/s	1st.str-shift-constraint
str-1c	1st.str (WA1)	first straightening w/s	1st.str-shift-constraint
str-1d	144.647 (WA1)	first straightening w/s	1st,str-shift-constraint
str-le	1st.str (WA1)	first straightening w/s	1st.str.shift.constraint
atr-1f	1st.str (WA1)	first straightening w/s	1st.str-shift-constraint
str-1g	1st.str (WA1)	first straightening w/s	let.str-shift-constraint
str-1h	1st.str (WA1)	first straightening w/s	1st str-shift-constraint
etr-li	lat.str (WA1)	first straightening w/s	jat str-shift-constraint
atr-1j	lst.str (WA1)	first straightening w/s	1st.str-shift-constraint
sir-1k	lst.str (WA1)	first straightening w/s	lat.str-shift-constraint
etr-11	1st.str (WA1)	first straightening w/s	lat.str-shift-constraint
elb.a.proc	elb.a.proc (WA2)	elb form grinder A	elb-a-shift-constraint
rotary	rooting-area (WA3)	rotary 8 station mill	rotary-shift-constraint
r210a	root.210 (WA4)	XLO 210 A rooting machine	r210a-shift-constraint
r208c	root.208h (WA5)	XLO 208 C rooting machine	r208c-shift-constraint
r208h	root.208h (WA5)	XLO 208 H rooting machine	206h-shift-constraint
r208-9	root.208v (WA6)	XLO 208 9 rooting machine	r208-9-shift-constraint
gr.852	tapered-blade-area (WA7)	XLO 852 root grinder	gr.852-shift-constraint
str-2a	2nd/peg.str (WA8)	second straightening w/s	2nd/peg.str-shift-constraint
str-2b	2nd/peg.str (WAS)	second straightening w/s	2nd/peg str-shift constraint
str-2c	2nd/peg.str (WA8)	second straightening w/s	2nd/peg.str-shift-constraint
etr-2d	2nd/peg.str (WA8)	second straightening w/s	2nd/peg.str-shift-constraint
str-2e	2nd/peg.str (WA8)	second straightening w/s	2nd/peg.str-shift-constraint
str-2f	2nd/peg.str (WA8)	second straightening w/s	2nd/peg.str-shift-constraint
p/w	airfoil-area (WA9)	Pratt Whitney wolverine	p/w-shift-constraint
brazer-a	brasing-area (WA10)	induction brazer 1	braser-a-shift-constraint
brazer-b	brazing-area (WA10)	induction brazer 2	brazer-b-shift-constraint
brazer-c	brazing-area (WA10)	induction brazer 3	brazer-c-shift-constraint
sir-3a	final.str (W11)	final straightening w/s	final-shift-constraint
str-3b	final.str (WA11)	final straightening w/s	final-shift-constraint
str-3c	final str (WA11)	final straightening w/s	final-shift-constraint
str-3d	final.str (WA11)	final straightening w/s	final-shift-constraint

Table 14: Machines in OPIS Factory Model

4 Experiments

The experiments were designed, primarily, to focus on three scheduling objectives:

- Minimize total tardiness cost of all orders.
- Minimize the total number of setups to be performed at each machine.
- Minimize the work-in-process time (wip) of orders.

Tardiness cost is computed based on the relative tardy costs per day late. Work-in-process time refers to the length of time an order remains in the shop, assuming that it enters the shop only when it is scheduled to begin processing, not when it is first released to the shop.² Order release time refers to the earliest possible time an order may start.

The characteristics of the orders were varied by manipulating the following parameters.

Product Mix. The probability of an order being for a particular product type is a variable. Two probability distributions were used, PM1 and PM2, shown in the Table 15:

The probability distributions were designed so that the resulting loads on the bottleneck machines would be approximately equal. Products 1 and 4 take proportionately shorter time relative to available capacity than the other products, hence more of those orders would be processed in a fixed period of time.

Priority class. An order can be assigned to one of six priority classes with equal probability of being in each class, as in Table 16:

²This is generalizable to the case where the order has to enter the shop (say, in the form of raw materials) some constant period of time before processing starts.

Prod. Mix	Prod. 1	Prod. 2	Prod. 3	Prod. 4	Prod. 5	Prod. 6
PM1	0.34	0.08	0.08	0.34	0.08	0.08
PM2	0.5	0.04	0.12	0.18	0.12	0.04

Table 15: Product Mix in OPIS Factory Model

Priority class	Relative cost	Description
FO	20	Forced Out
CR	16	Critical Replacement
SD	12	Ship Direct
SO	8	Service Order
ST	4	Stock order
SH	1	Shop Order

Table 16: Order Priority Class in OPIS Factory Model

Order Lead Time. The length of time between the earliest time at which an order may start and its due date. Two main methods of generating order lead times were tested. The first was derived from policies in the actual jobshop. The shop charged a premium for "rush" orders which thus had a higher tardiness cost weighting. At the other extreme, orders that were fed to other sister shops were used in large construction projects with very long lead times and were more negotiable. These had lower tardiness cost weightings attached. Therefore, lead times were correlated with priority class and so we used a different lead time distribution for the test data depending on the priority class of the order where P is the average total processing time for an order. The uniform distributions used for determining orders lead times in each priority class are shown in Table 17. (including setup time). The second method of generating order lead times assumed that order lead times were independent of priority class. Hence, a single uniform distribution was used.

Priority class	FO	CR	SD	SO SH ST
distribution	$\overline{\mathrm{U}(0,4\mathrm{P})}$	U(0,6P)	U(0,6.5P)	U(0,8P)

Table 17: Order Lead time in OPIS Factory Model

Order Release Pattern. Each order is associated with an earliest time at which that order is released for processing in the shop. Release times or start times are similar to arrival time of jobs in the shop, but in our experiments the release times are known at the start of scheduling. Just as the arrival pattern is typically manipulated in scheduling experiments to detect the effects on performance, we tested three different patterns of order release - (i) daily releases of orders; (ii) weekly releases; and (iii) exponentially distributed intervals between releases. In the last case, we tested mean intervals of 3 days, EXP(3), and 7 days, EXP(7), between releases.

Batchsize. Orders are released in batches. Batchsizes were drawn from uniform distributions and were coordinated with the order release patterns to obtain loads of approximately 70% and 105% on the bottleneck machines assuming no setup times. Two of the earlier tests involving daily releases of orders had bottleneck loads of 1200f lead times were sufficiently long to keep the number of tardy orders low.

4.1 Experiment Generation Parameters

This section summarizes the different parameter settings for generating the order sets. Each parameter setting creates an order set belonging to a particular order category, which is identified by a number in the *Category* column. 22 order sets were created covering 18 categories. Two order sets were created for certain categories. The load of the shop was affected by the product mix, order release pattern times and batchsize together. The order lead time distribution was the strongest influence over the *tardiness factor* of the schedule[6]. The tardiness factor is a coarse measure of the proportion of tardy jobs in a random schedule. The four variables were manipulated to examine how the three systems would perform under varying conditions of our model shop. Two of the tests are comprised of 85 orders. All others have 120 orders [See Table 18].

Category	Product mix	Batchsize	Release	Leadtime	Approx. Load
1	PM1	U(0,8)	Daily	U(0, 4P20P)	120%
2	PM1	U(0,8)	Daily	U(0, 4P8P)	120%
3	PM2	U(0,15)	Exp(3)	U(0,4P8P)	105%
4	PM2	U(0,15)	Exp(3)	U(0.67P, 5P)	105%
5	PM1	U(0,29)	Weekly	U(0, 4P8P)	90%
6	PM2	U(0,29)	Weekly	U(0, 4P8P)	90%
7	PM2	U(0,29)	Weekly	U(0, 4P)	90%
8	PM1	U(0,29)	Weekly	U(0, 4P)	90%
9	PM1	U(0,29)	Exp(7)	U(0, 4P8P)	90%
10	PM1	U(0,29)	Exp(7)	U(0.67P, 5P)	90%
11	PM2	U(0,11)	Exp(3)	U(0, 4P8P)	77%
12	PM2	U(0,11)	Exp(3)	U(0.67P, 5P)	77%
13	PM1	U(0,22)	Weekly	U(0, 4P8P)	70%
14	PM2	U(0,22)	Weekly	U(0, 4P8P)	70%
15	PM1	U(0,22)	Weekly	U(0.67P, 5P)	70%
16	PM2	U(0,22)	Weekly	U(0.67P, 5P)	70%
17	PM1	U(0,22)	Exp(7)	U(0, 4P8P)	70%
18	PM1	U(0,22)	Exp(7)	U(0.67P, 5P)	70%

Table 18: Experiment Generator by Categories

4.2 Experiments

This section defines each experiment. The 22 experiments relate to each of the categories defined earlier as in Table 19:

The order generator would take input in the order init file³ as in the following program example:

³file /test-series6/orders-db/order.init under the directory /usr/isis/3/isis-test/pso-exps

The experiment files thus generated are listed in the sequence of test series in the following subsections. Each order has its associated lot number, lot name, priority class, manufacturing start quantity, requested schedule date and requested due date.

Catego	ry Test-series
1	1
2	2, 3
3	9
4	17
5	6
6	5
7	13, 21
8	14, 22
9	10
10	18
11	8
12	16
13	7
14	4
15	15
16	20
17	11
18	19

Table 19: Test-Series In OPIS Experiment

4.2.1 Test-series1

с+ - С С - 1 - С	:12 06-25-R	5:11 06-22-8	:16 06-14-8	0:47 06-03-8	:53 06-01-8	:51 05-27-8	:46 U3-12-8 -16 05-17-8	:33 05-10-8	8-03-03-8	5:39 05-01-8	8-90-50 IC:	0:44 06-14-8	1:08 04-25-8	5:52 04-12-8	9:17 04-23-8		6:25 04-10-8	2:06 04-12-8	2:27 04-18-8	9:35 04-18-8	5:59 03-29-8	0:43 04=02=8 0:38 04=16=8	3:37 04-17-8	54 03-31-8	6:40 03-28-8	:30 04-10-8	8:02 04-10-8	0:55 U.S-18-8 3.44 D1-25-9	8:30 04-09-8	9:30 04-07-8	3:09 03-27-8	6:12 03-21-8	:20 04-07-8 -54 03-13-8	7:43 04-07-8	6:28 04-03-8	1:52 03-08-8	1:13 04-02-8	4:49 04-02-8	2:07 03-19-B	1:21 04-01-8	5:37 03-07-8	5:34 03-08-8	1:13 03-10-8 1:13 03-10-8	:16 03-26-B	:19 03-17-B	:18 03-26-8	6:59 03-08-8	1:25 03-21-8	22:42 03*25-85 18:46 03-07-85	8-10-E0 0E10	19 03-25-8
Ras	0:00 03-04-8	0:00 02-26-8	0:00 03-07-8	0:00 02-20-8	0:00 03-11-8	0:00 02-27-8	8-T0-20 00:0	0:00 02-28-8	0:00 03-08-8	0:00 03-04-8	8+11+50 03-01-0	0:00 02-20-8	0:00 03-11-8	0:00 02-26-8	0:00 03-06-8		0:00 02-22-8	0:00 03-06-8	0:00 03-08-8	0:00 03-06-8	0:00 05-50 00:0	8-80-20 00.0	0:00 03-06-8	0:00 03-06-8	0:00 03-06-8	0:00 02-21-8		8-8(-20 00:0	0:00 03-08-8	0:00 02-14-8	0:00 03-01-8	0:00 03-01-8	0:00 03-11-8 0-00 02-14-8	0:00 02-15-8	0:00 02-27-8	0:00 03-08-8	8-/7-70 00:0	0:00 02-22-8	0:00 03-01-8	D:00 02-22-8	D;00 03-06-8	0:00 02-14-8	B-80-50 00:0	0:00 03-01-8	0:00 03-07-8	0:00 03-04-8	0:00 02-27-8	0:00 02-22-8	0:00 02+27-85 0:00 03+04-85	0:00 02-26-8	0:00 03-01-8
oduct MS	ladel 14	1adel 12	ladel 11	ladel 12	ladel 14	ladel 11	lade3 10	ladel 12	ladel 12	ladel 14	ladel 10	lade2 10	ladel 11	lade2 10	Ladel 13	77 - 1979 1979	lade2 13	lade2 10	ladel 14	Ladel	71 60001 7200	lade' 10	ladel 13	lade3 13	lade? 11	ladel 11	Ladel 14	lade3 13	ladel 11	ladel 13	Lade2 14	Lade3 14	Ladel IO Lade3 14	ladel 12	ladel 10	lade2 10	Ladel IV	ladel 10	lade2 12	ladel 10	lade? 11	rade3 IU	adel 11	iadel 11	ladel 11	ladel 13	lade]]]	lade2 11	ē ē	lade2 17	ladel 14
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ROS	4:37	14:05	0:58	9;04	1-18	7:18	10:44	10:03	2:41	11:45	6:45	12:56	23:26	22:52	12:24	8:29	22:48	1:36	17:19	8:27	22:40	10:45	8:55	1:37	3:39
Rast-SD	03-01-85	02-28-85	02-26-85	02-18-85	02-14-85	02-22-85	02-26-85	02-25-85	02-26-85	02-19-85	02-20-85	02-19-85	02-15-85	02-19-85	02-19-65	02-19-65	02-19-85	02-19-85	02-18-85	02-14-85	02-15-85	02-15-85	DZ-14-85	02-15-85	02 - 14-B5
Rgs	00:00	00:0	00:00	00:00	00:00	00:0	00:00	00:0	00:0	00:00	00:00	00:00	00:00	0:00	00:00	00:00	00:0	00:0	00:0	00:0	00:00	00:00	0:00	00:00	00:0
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Product	P bladel	P bladel	P bladel	P blade2	F blade3	F blade3	P_blade1	P_blade1	P_blade1	P_blade3	P_blade1	P_blade3	P blade2	Pladel	P_bladel	P_blade1	P_bladel	P_blade1	P_bladel	P_blade1	P_blade1	P_bladel	P bladel	P bladel	P_blade1
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# 1 #	61	62	63	64	65	66	67	68	69	70	71	72	٤٢	74	75	76	77	96	56	80	81	82	83	84	69

4.2.2 Test-series2

Rost +DD	3:38 04-19-8	1:07 04-12-8	1:08 04-09-8	:23 04-15-8		1:58 04-10-8	:29 04-24-8	6:34 04-05-	8-80-10 55:	8-80-70 823	6:35 04-09-8	3:12 04-07-8	:15 04-05-8	2:07 03-27-8	0.45 04-30-8	06 04-04-8	:09 04-01-8	4:14 O3-24-8	:37 04-21-8	8-50-60 07:7 8-50-60 07:7	8-07-04-50-8	14 04-03-8	:29 04-13-8	5:09 04-03-8	4:34 03-17-8	11-04-11-8	17 03-20-8	B:12 03-12-8	9:15 04-01-8	1:30 03-25-8	7:10 03-14-8	8:15 03-22-8	22 03-15-B	8:18 03-31-B	3:01 03-14-8	0:01 03=12-8 7.15 03-37-0	8:35 03-25-8	2:57 03-24-8	:11 03-12-8	9:07 03-09-8	8:11 03-14-8	8-91-60 71:5	5-35 03-22-6 5-35 03-21-8	2:40 03-10-8	9:18 03-06-8	8:18 03-22-8	8-EO-EO 64:6	57 03-16-8	6:09 03-17-8 2:40 00 :0	2:43 03-T0-8 1:20 03-10-8	10 03-13-8
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4.2.3 Test-sorfes3

Froduct MSQ Rqst-SD Rqst-DD Pbladef 149 0:00 03-08-95 7:57 04-05 Pbladef 149 0:00 03-20-85 7:57 04-05 Pbladef 149 0:00 03-20-85 7:57 04-05 Pbladef 147 0:00 03-14-85 6:12 04-05 Pbladef 147 0:00 03-14-85 6:12 04-05 Pbladef 149 0:00 03-01-85 13:149 03-3 Pbladef 149 0:00 03-01-85 13:149 03-3 Pbladef 149 0:00 03-06-85 0:03 04-0 Pbladef 119 0:00 03-02-30 93-13 14-0 03-3 Pbladef 119 0:00 03-02-30 93-10 03-3 14-03 03-3	mo-00205 CR Ladad3 145 U00 U2-2/-W3 U315-05 U315-05 U315-05 U312-05 U312-05 <thu312-05< th="" th<=""><th>5H P.blade5 101 0:00 03-08-95 20:33 0 50 P.blade4 132 0:00 03-13-95 14:43 0 50 P.blade4 132 0:00 03-13-95 14:43 0 50 P.blade4 136 0:00 03-13-95 14:43 0 50 P.blade4 136 0:00 03-13-95 15:59 0 50 P.blade4 133 0:00 03-13-95 15:59 0 50 P.blade4 110 0:00 03-11-85 15:59 0 51 P.blade4 110 0:00 03-11-85 15:29 0 0 51 P.blade4 110 0:00 03-11-85 15:29 0 0 0 0 15:29 0 0 0 0 0 0 0 15:29 0</th><th>mo-00143 FU Plades 143 0:00 03-06-95 mo-00079 ST Plades 134 0:00 02-25-95 mo-00065 ST Plades 131 0:00 02-21-85 mo-00073 SD Plades 131 0:00 02-21-85 mo-00037 SD Plades 131 0:00 02-21-85 mo-00037 SD Plades 131 0:00 02-21-85 mo-00037 SD Plades 131 0:00 02-21-85 mo-0017 SD Plades 111 0:00 02-21-85 mo-0017 ST Plades 112 0:00 02-19-85 mo-0013 ST Plades 112 0:00 02-19-85 mo-0013 CR Plades 114 0:00 02-15-85 mo-0013 CR Plades 116 0:00 02-15-85 mo-0013 ST Plades 100 0:00 02-27-85 <!--</th--><th>$\begin{array}{c} \mbox{morely} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$</th></th></thu312-05<>	5H P.blade5 101 0:00 03-08-95 20:33 0 50 P.blade4 132 0:00 03-13-95 14:43 0 50 P.blade4 132 0:00 03-13-95 14:43 0 50 P.blade4 136 0:00 03-13-95 14:43 0 50 P.blade4 136 0:00 03-13-95 15:59 0 50 P.blade4 133 0:00 03-13-95 15:59 0 50 P.blade4 110 0:00 03-11-85 15:59 0 51 P.blade4 110 0:00 03-11-85 15:29 0 0 51 P.blade4 110 0:00 03-11-85 15:29 0 0 0 0 15:29 0 0 0 0 0 0 0 15:29 0	mo-00143 FU Plades 143 0:00 03-06-95 mo-00079 ST Plades 134 0:00 02-25-95 mo-00065 ST Plades 131 0:00 02-21-85 mo-00073 SD Plades 131 0:00 02-21-85 mo-00037 SD Plades 131 0:00 02-21-85 mo-00037 SD Plades 131 0:00 02-21-85 mo-00037 SD Plades 131 0:00 02-21-85 mo-0017 SD Plades 111 0:00 02-21-85 mo-0017 ST Plades 112 0:00 02-19-85 mo-0013 ST Plades 112 0:00 02-19-85 mo-0013 CR Plades 114 0:00 02-15-85 mo-0013 CR Plades 116 0:00 02-15-85 mo-0013 ST Plades 100 0:00 02-27-85 </th <th>$\begin{array}{c} \mbox{morely} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$</th>	$ \begin{array}{c} \mbox{morely} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
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4.2.4 Test-series4

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4.2.5 Test-series5

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4.2.6 Test-series5

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4.2.7 Test-scries7

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4.2.8 Test-scries8

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4.2.10 Test-series10

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4.2.12 Test-series12

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Rast - DD 23 - 23 - 24 - 25 23 - 23 - 23 - 23 - 23 - 23 - 23 - 23 -		942 03-13-8 01:20 03-14-8 1440 03-14-8 31:39 03-102-8 6102 03-02-8 6102 03-02-8 6112 03-02-8 6112 03-02-8 6112 03-02-8 0141 03-02-8 2113-8 2113-8 2113-8 2113-8 2113-8 2113-8 2113-8 212-8 5100 03-126-8 3100 03-126-8 31000 03-126-8 3100 03-126-8 31000000000000000000000000000000000000
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	រព្យក្បួយក្បួយក្បួយប្រកបស់ស្រួសស្រ័យស្រួយក្រូលប្រួយប្រួយ គេណភាគស្រុកហេត្តស្រុកស្រុកស្រុកស្រុកស្រុកស្រុកស្រុកស្រុក	<pre>x = = = = = = = = = = = = = = = = = = =</pre>
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4.2.16 Test-series18

$ \begin{array}{c} Fraider, Fig. Ref = 50 \\ Fidder, Hig etc. 00 03-28-65 \\ Diadeh 111 8:00 03-28-65 \\ Diadeh 111 8:00 03-28-65 \\ Diadeh 112 8:00 03-28-65 \\ Diadeh 113 8:00 03-28-65 \\ Diadeh 113 8:00 03-28-65 \\ Diadeh 113 8:00 03-128-65 \\ Diadeh 113 8:00 03-28-65 $	Let PC Product MSQ Rqst-5D mo-00188 FO P.bladel 137 8:00 03-16-95 20:15 mo-00146 5D P.bladel 137 8:00 03-08-85 20:15 mo-00154 FO P.bladel 137 8:00 03-08-85 12:26 mo-00156 5D P.bladel 107 8:00 03-12-95 12:26 mo-00130 FD P.bladel 127 8:00 03-12-85 5:43 mo-00138 FO P.bladel 127 8:00 03-12-85 5:43 mo-00138 FO P.bladel 123 8:00 03-12-85 5:43	mc-00175         SD         Plade4         127         8:00         03-12-85         7:17           mc-00152         SD         Plade1         111         8:00         03-12-85         18:31           mc-00166         FO         Plade1         114         8:00         03-12-85         18:31           mc-00126         FO         Plade1         149         8:00         03-12-85         2:00         2:26           mc-00126         FO         Plade4         141         8:00         03-12-85         17:24           mc-00172         SD         Plade4         111         8:00         03-12-85         17:24           mc-00172         SD         Plade4         115         8:00         03-12-85         17:24           mc-00172         SD         Plade4         113         8:00         03-12-85         17:24           mc-00140         SD         Plade3         109         8:00         03-12-85         14:09           mc-00147         SD         Plade4         113         8:00         03-08-85         5:31           mc-00147         SD         Plade4         113         8:00         03-08-85         5:31	$\begin{array}{c} $\rm mo-00132$ \ FO \ Plade4 \ 113 \ 8:00 \ 03-08-85 \ 21:145 \\ \mbox{$\rm mo-00102$ \ FO \ Plade4 \ 113 \ 8:00 \ 03-02-85 \ 21:18 \\ \mbox{$\rm mo-0014$ \ FO \ Plade4 \ 123 \ 8:00 \ 03-02-85 \ 21:18 \\ \mbox{$\rm mo-0014$ \ FO \ Plade4 \ 117 \ 8:00 \ 03-02-85 \ 19:20 \\ \mbox{$\rm mo-00103$ \ SH \ Plade4 \ 117 \ 8:00 \ 03-18-85 \ 16:50 \\ \mbox{$\rm mo-00103$ \ SH \ Plade4 \ 117 \ 8:00 \ 02-18-85 \ 8:06 \\ \mbox{$\rm mo-00103$ \ SH \ Plade4 \ 117 \ 8:00 \ 02-18-85 \ 8:06 \\ \mbox{$\rm mo-00103$ \ SH \ Plade4 \ 117 \ 8:00 \ 02-18-85 \ 8:06 \\ \mbox{$\rm mo-00103$ \ SH \ Plade4 \ 117 \ 8:00 \ 02-21-85 \ 2:2:07 \\ \mbox{$\rm mo-00103$ \ SP \ Plade4 \ 117 \ 8:00 \ 02-21-85 \ 2:2:07 \\ \mbox{$\rm mo-00103$ \ SP \ Plade4 \ 117 \ 8:00 \ 02-21-85 \ 2:2:07 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 107 \ 8:00 \ 02-21-85 \ 2:2:07 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 107 \ 8:00 \ 02-21-85 \ 2:2:07 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-21-85 \ 2:2:07 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-2-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-2-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-2-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-2-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-2-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 02-2-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 03-02-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 03-02-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 03-02-85 \ 2:05 \\ \mbox{$\rm mo-00112$ \ SP \ Plade4 \ 101 \ 8:00 \ 03-02-85 \ 2:05 \ \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-85 \ 00-$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	113       8:00       02-21-85       21:22         103       8:00       02-21-85       17:41         107       8:00       02-18-85       25:51         107       8:00       02-18-95       55:51         133       8:00       02-18-95       55:51         133       8:00       02-18-95       55:51         133       8:00       02-18-95       55:51         133       8:00       02-18-85       21:09         133       8:00       02-21-85       21:09         133       8:00       02-21-85       21:05         147       8:00       02-21-85       9:26         143       8:00       02-21-85       9:26         133       8:00       02-18-85       9:25         134       8:00       02-18-85       9:25         135       8:00       02-18-85       9:12         137       8:00       02-18-85       9:12         137       8:00       02-18-85       9:12         137       8:00       02-18-85       9:12         137       9:00       02-18-85       2:55         137       9:00       02-18-85       2:55
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4.2.19 Test-suries19

1	s rroduct MSQ Rqst-SD Rqst-DL 8 SH Plade6 149 8:00 03-31-85 23:55 A	mo-00128 SH P blade6 135 8:00 03-31-85 10:37 (37 0)	SH P bladel 115 8:00 03-30-85 21:00 05-0	mo-00114 SH P blade3 121 B:00 04-05-95	mo - 00110 SD P D1 adel 147 8:00 01-02-85 8:47	mo-00120 SD P bladed	mo-00074 Fo P bladel 107 8:00 01-30-65 23:42	FO P blade4 117 8:00 03-31-95	mo-00090 SH P blade2 129 8:00 03-11-85 21:22 04-27-8	mo-00100 FO Philadel 103 8:00 03-30-85 3:07	mo-00116 \$D P_blade3 113 8:00 03-31-85	00-0008 50 P bladel 133 8:00 03-31-85 18:16	No-00112 FO P.bladed 132 8:00 03-31-85 17:41	mo-00132 SD P_bladel 141 8:00 04-05-55 21:22	bladel 145 8:00 04-05-85 6:13	Mo-00080 SD P_blade2 147 4:00 04-05-85 9:08	mo-00096 FO Pbladel 127 8:00 03-31-85 21:0	mo-00092 SD P higher 143 8:00 03-30-85 2:5	7 mo-00070 5H P blade4 145 8:00 03-31-85 17:1	mo-u0078 SD P blade3 135 8:00 03-30-85 5:52 mo-00122 SD P blade3 135 8:00 03-30-85 5:5	mo-00086 SD P_bladed	mo-00124 For blade4 103 8:00 04-03-85 23:01 mo-00104 For blade4 103 8:00 04-03-85 9:21	mo-00094 5D P bladed 113 8:00 03-31-85 9:12	FO P bladel 113 8:00 03-31-85 17:02	ma-u0068 FO P blade4 131 8:00 03-30-85 22:53	mo-00048 SD P Dlade2 131 8.00 03-09-85 23:42	103 8:00 03~09-85 22:47	mo-00062 FO P bladel 145 B:00 03-09-85 19:59	P_blade2 115 8:00 03-04-85 5:51	mo-00042 SD P blader 12 2:00 03-09-85	SH P bladel 113 8:00 03-04-85 4:56	mo-00054 FO P bladet 103 8:00 03-09-85 10:48	SH P Dlade4 127 8:00 03-09-85 4:38	mo-00057 20 21 21 141 8:00 03-04-85 22:27 mo-00057 20 22:27	mo-00022 SH P bladed 132 5.00	mo-00056 FO P_bladel 101 A:00 03-04-05 2:15	P_blade4 117 8:00 03-09-85 13:29	1 mo-00030 SD Phi-doc 123 8:00 03-04-85	mo-00036 5D P_ladel 127 9.00 03-04-85 8:46 04-05-8	SD P_bladel 115 8:00 03-04-85 22:29 03-2	mo-00032 SH P blade4 109 8:00 03-04-85	00024 FO P_bladel 133 8:00 03-04-85 22:19 03-09-8	mo-00016 SH P_blade1 113 8:00 02-18-85 1:39 03-3	
Rqst-SD :00 05-25-8	mo-00180 F0 Puller 149 9:00 05-22-85 17:05 06-2 mo-00250 gv puller 101 9:00 05-19-85 2:05 06-2	mo-00196 5H P blade4 135 9:00 05-25-85 11:18	Mu-40230 SH P. blade2 117 9:00 05-22-85 71-30 Mo-40228 SH P. 117 9:00 05-22-85 71-30	mo-20208 SH P blade2 117 0.00 05-22-85 13:34	9 mo-D0220 FO P_bladel 139 9:00 05-22-85 4:29 ( 0 mo-D0/se 20 2-14 139 9:00 05-22-85 13:33	Diade4 109 9:00 05-19-65 0:37 Diade1 135 0:00 05-19-65 0:37	2 mo-00232 5H P blade4 123 9:00 05-22-85 2:38	mo-00178 SH P bladel 11 9:00 05-22-85 5:03	o mo-00186 SD P_blade4 107 9:00 05-19-85 6 mo-00184 cv 2_1 de4 107 9:00 05-19-85	7 mo-20240 5K P bladed 133 9:00 05-19-85 9:10	Dlade2 129 9:00 05-22-85 2:31	mo-05194 5H 2 Diamai 10 9:00 05-19-85 5:29	mo-00246 5D P_blade2 127 9:00 05-19-85 18:19	wo-00248 SH P bladel 129 9:00 05-22-85 33.5	ac-00188 SH P blade1 127 2200 05-25-85 2212	cu-00236 5/ P_bladel 119 9:00 05-19-85 1014		:0-0252 52 7 Diadel 131 9:00 05-19-85 19:41	0-00248 50 P blade4 17 9:00 05-25-85 5:31 0-00244 50 2 blade4 17 9:00 05-25-85 6.51	0-00234 F0 P bladel 107 9:00 05-25-85 15:11	blade2 149 9:00 05-22-95	0-00168 SH Phades 101 9:00 05-22-85 15:43	0-00218 FO F.Diadel 143 9:00 05-19-65 20:16	0-00192 F0 Pblade7 137 9:00 05-19-85 21:15	00224 50 P bladel 109 9:00 05-19-85 19:10	000182 SD P bladel 11 9:00 05-22-85 22:47	-00210 FD Philade6 131 9:00 05-19-85 15:07	mo-00202 SD P bladel 115 9:00 05-22-85	mo-00190 FO P blade( 141 9:00 05-19-85 10:19 mo-00190 FO P 5:22 14: 9:00 05-19-85 10:24	mo-00166 SH Puladel 127 a.A. 2. 21:02	SH P. blade2 125 8:00 04-21-45 17:50 05-13-8 SH P. billion 125 8:00 04-21-45 6:38 6:38 6:10-0	8 mo-C0136 70 Publadel 107 Public 9:25	FO P bladel 149 8:00 04-21-85 21:38	mo-00142 F0 P-biade5 123 8:00 04-21-85 19:40	mo-00140 SD P blade2 120 8:00 04-21-85 21:55	mo-cols2 50 P bladel 109 8:00 04-21-85 5:17 0	0-00160 F0 F124 50 P124 50 04-21-85 17:02 0	mu-20158 F0 Paladel 105 5:00 04-21-85 10:18	00148 SD P_bladel 149 8:00 04-21-85 17:43 05-15	9 mo-00144 SH P bladne 101 8:00 04-21-85 0:35 04-20	164 FO P bladel 147 8:00 04-21-85 10	10:30 04-51-82 10:30		

4.2.20 Test-series20

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	-SD	4-08-85 J1:5	3-25-85 9:0	4-08-85 I:3	E:/ CB-80-6	6.10 CB-67-9 6.10 CB-67-9	4-29-85 21-52	4-29-85 16:1	4-29-85 12:3	4-29-85 2:2	4-29-85 4:0	4-29-85 5:3	4-01-85 4:3	4-29-85 5:0	4-01-85 22:55	9-29-85 16:1	4-29-85 17:0	4-29-85 17:3	4-29-85 12:3	4-29-85 3:3	17:1	0:11 08-67-69 9-00 98-80-9		3-25-85 18:4	3-25-85 6:1	4-08-85 9:4	4-08-85 16:3	4-01-85 2:4	4-06-65 9:4 4-22-85 10-3	4-22-85 20-1	4-22-85 17:1	4-01-85 0:1	4-22-85 7:2	4-22-85 19:4 4-22-65 19:4	<b>٦</b> 0	4-22-85 17:2	3-25-85 21:0	4-01-85 9:5	1-01-02 0-01-02 0-02 0-02 0-02 0-02 0-02	4-08-85 8:1	4-01-85 3:2	4-15-85 2:5 2 00 00 2:5	4-01-85 10:2	4-01-85 13:0	4-08-85 22:2	4-01-85 IO:1	4-01-85 14:3	4-08-85 5:1	9-01-85 11:2	4-08-85 17・2	4-08-85 010	3-25-85 6:4	4-08-85 15:3
	c MSQ Rqs			00128 851 2 105 8500		00-8 LPL	110 9:00	00:6	106 9:00	00:6 001	146 9:00	126 9:00	146 8:00	120 9:00	142 8:00	00:6 671	00:6 101	148 9:00	104 9:00	i 102 9:00	1 116 9:00			3 125 8:00	1 145 8:00	1 115 8:00	1 115 8:00		124 8:00 3 124 8:00	149 8:00	129 8:00	112 8:00	107 8:00	105 8 21	142 8:00	109 6:00	149 B:00		147 8:00	127 8:00	138 8;00	108 8:00	132 8:00	136 8:00	145 8:00	128 8:00	142 B;00	123 8:00	148 8:00	141 8:00	119 8,001	123 8:00	8:00
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