

**اختبار أساليب تحديد حجم الدفعة المستخدمة  
في نظام MRP II\* دراسة حالة في الشركة العامة  
لصناعة البطاريات معمل بابل 1/**

**المستخلص**

Materials Requirements Planning (MRP)

MRP  
Manufacturing Resources Planning (MRPII)

.MRPII

MRP

MRPII

( )

MRPII

.(1 /

**ABSTRACT**

MRP is a system intended for the batch manufacturing of discrete parts including assemblies and subassemblies that should be stocked to support future manufacturing needs. Due to the useful information provided by MRP it has evolved into a Manufacturing Resources Planning, MRP II, a system that ties the basic MRP system to the other functional areas of the company such as marketing, finance, purchasing, etc. The objective of this research, which was conducted at the State Company for Batteries Manufacturing, is to test the performance of some popular lot-sizing techniques used within MRP II framework. It is hypothesized that the technique which minimizes the total inventory costs does not necessarily minimize the need for resources such as machine capacity and labor force. To achieve this objective a computerized MRP II system was developed and simulated using random master production schedules of the 60A battery. The results of the simulation runs confirmed the hypothesis. This research recommends the use of the computerized MRP II system, developed here, in planning the manufacturing resources at the domain of research.

**المقدمة**

ERP, OPT, JIT, MRP, MRP II -:

MRP

MRP II

MRP II

1/ -

60A

( )

**أولا - منهجية البحث**

-1-1

( )

Lot-Sizing Techniques  
(Items)

MRP II

MRP II

-:



-2-1

-:

MRPII

.1

60

60

MRPII

.2

.3

(Economic- Lot- Size)

.4

.MRP II MRP

.5

MRP II

.6

		-3-1
MRPII		-1
	MRP	
		-2
.MRPII		-3
	MRPII	-4
	MRP	
	MRPII	
		-4-1
		-1
		-2
		-3
		-5-1
-:		-1
MRP II	.Visual Basic	Access
		-2
		-3
	t	-4
		-5
	MRP II	

-6-1

- 60

450000

50000 - 40000

-7-1

2005/4/5 2005/1/5

-:

60

30

ثانياً - نظام تخطيط الاحتياجات من المواد MRP

MRP -1-2

( IBM )

)

MRP

.(52-51 1990

Martinich

Nickels et al. .(Martinich, 1997, 719)

.(Nickels et al., 2002, 276)

/ MRP

.(369 2004 )  
MRP

-:

MRP -2-2

-: MRP

Master Production Schedule (MPS) ☒

MRP

( )

(MPS)

.(Slack et al., 1998, 519)

(MRP) (MPS)

(MRP)

.(Adam & Ebert, 1996, 524) Subassemblies

Bill of Materials (BOM) ☒

BOM

.(Heizer & Render , 2001, 577)

Process Flow

.(Adam & Ebert, 1996, 525)

Inventory File (IF) ☒

MRP Inventory File)

(Adam&Ebert,1996,526)

MRP

.(Russell ,et al., 2000, 662)

	.MRP	
Lead Times (LT)	( MRP )	☒
	( Waller,1999,369 )	Work Center
	.(187 1995 )	
<b>Output of MRP</b>		<b>-3-2</b>
	MRP	
	(Teplitz,1978,21)	
:	MRP	
	Primary Reports :	○
	-:	
	- Planned Ordered Release	.1
	.(Dilworth, 1992, 421)	
	- Changes Reports	.2
	. (Stevenson, 1999, 633)	
	.(Martinich,1997,728)	.3
MRP	: Secondary Reports	○
	:	
	- Performance Control Reports	-1
	. (Davis, et al., 2003, 648)	
	- Planning Reports	-2
	.(Stevenson, 1999, 633)	
	-Exceptional Reports	-3
	.(Lambert & Stock, 1999, 474)	

ثالثا:- نظام تخطيط موارد التصنيع MRP II  
MRP II -1-3

(Krajewski&Ritzman,1999,683) MRP

( )

MRP  
(Vonderembse&White,1991,456)

MRPII

(Daivs, et al., 2003, 654) (Chase, et al., 2001, 567)  
MRP MRPII

MRP

(CRP)

MRP

Rough-Cut Capacity Planning (RCCP)

(Browne, et al., 1996, 130) Production Activity Control (PAC)  
MRPII . MRPII (Subset) MRP

(1-3) . (Russell & Taylor III , 2000 , 653)

(MRPII)

(MRP)

MRPII

MRP

MRPII

MRPII

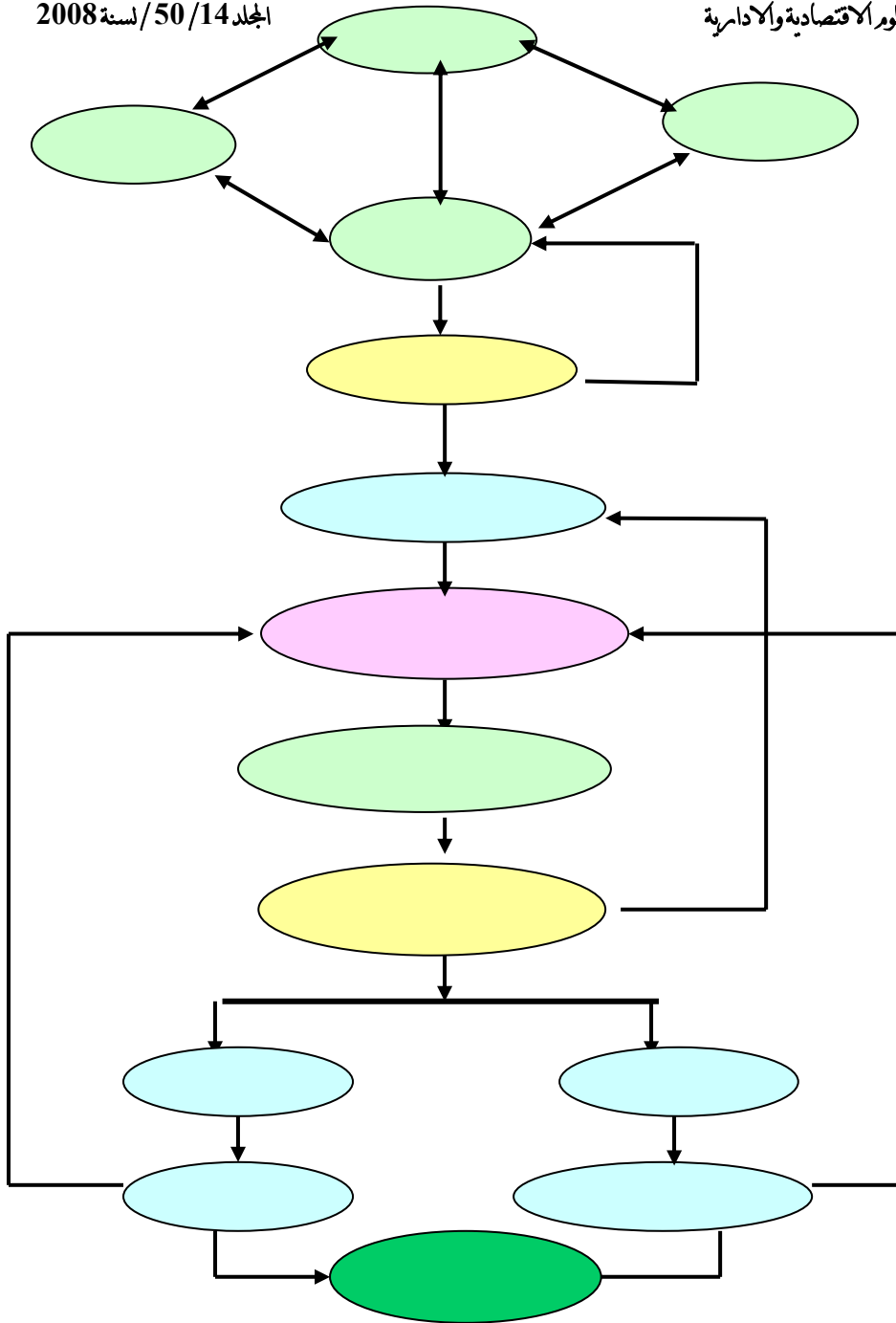
(Adam&Ebert)

(Nahmias ) .(Adam&Ebert,1996,543)  
(MRPII)

:  
(Krajewski & Ritzman) .(Nahmias,1997,365)







Source: Russell, Roberta S., & Taylor III, Bernard W., "Operations Management Multimedia Version", 3<sup>rd</sup> ed., Prentice – Hall, Inc., U.S.A., 2000, P677.

MRPII

(2-3)

	<b>MRP II</b>	<b>-2-3</b>
	<b>MRPII</b>	
	-:(Waller, 1999, 376) (Shonberger & Knod, 1994, 330-331)	
	" "	.1
	95% MRP,MRPII	
		.2
		.3
	.(CRP) MRPII	
		.4
		.5
	<b>MRP II</b>	<b>-3-3</b>
	<b>MRPII</b>	
	-:	
		.1
		.2
	. (Evans,1997,679)	
	<b>MRPII</b>	.3
	.(Krajewski&Ritzman,1998,696)	
	) - ) ( -	.4
	.(	.5
	.( 598 2001 )	
	<b>MRP II</b>	<b>-4-3</b>
<b>MRP</b>	<b>MRPII</b>	
<b>MRPII</b>	<b>MRPII</b>	
	-:	
		.1
	. (Nahmias,1997,365-366)	

	MRPII	.2
( MRPII MRP)		
	. (Cheng,1997,11)	
	-:	.3
	. (Waller, 1999, 376)	
	MRPII	
	(MPS)	
(1-3)	.(Naylor,1996,316)	
	. MRP II MRP	
Lot –Sizing Techniques		-3-3
MRP II MRP	MRPII	
(2-3)		
Setup		
	(	)
	(2-3)	
(312-249 1990	) (403-369 2004	)
Krajewski & Ritzman ,1999, 671-714 )	(Reid & Sanders, 2002, 451-479)	
	.(Slack et al., 2004, 485-505 )	

رابعاً - الجانب العملي

- 1-4

1975			
135	90	60	55)
		(R-20,R-14,R-6)	
		.(81)	
:		(	
		(IEC-95)	
		1	
		.1	
		2	
		.2	
		.	
		.3	
		.	
		.4	
		-:	
		.	
		.1	
		.	
		.2	
		.	
		.3	
		.	
		.4	

(1-3)

MRPII MRP

MRPII	MRP
MRP .1	.1 (Subset) MRPII
MRP .	.2
.2	.2
.3	.3 MRP
.4	.4
MRP .5	.5
.6	.6
.6	.7

-:

(2-3)

\*

<b>Lot- for- Lot</b>	<b>LFL</b>		<b>.1</b>
<b>Economic Order Quantity</b>	<b>EOQ</b>		<b>.2</b>
<b>Fixer Order Quantity</b>	<b>FOQ</b>		<b>.3</b>
<b>Fixed Period Requirement</b>	<b>FPR</b>		<b>.4</b>
<b>Period Order Quantity</b>	<b>POQ</b>		<b>.5</b>
<b>Least Unit Cost</b>	<b>LUC</b>		<b>.6</b>
<b>Least Total Cost</b>	<b>LTC</b>		<b>.7</b>
<b>Part Period Balancing</b>	<b>PPB</b>	-	<b>.8</b>
<b>Wegner- Whittin Algorithm</b>	<b>W-W</b>	-	<b>.9</b>
<b>Silver-Meal Algorithm</b>	<b>S-M</b>	-	<b>.10</b>

\*

- :





(1-4)

60

/			60	0
kg 0.087	1:30			1
kg 0.075	1:30			1
kg 0.032	1:6			1
kg 0.032	1:6			1
kg 0.094	1:2			1
kg 0.041	1:1			1
kg 0.032	1:1			1
kg 0.049	1:5			1
kg 0.049	1:5			1
kg 0.034	1:2			1
kg 0.650	1:1			1
kg 0.187	1:1			1
kg 0.003	1:6			1
kg 0.002	1:2			1
kg 0.021	1:2			1
kg 0.021	1:1			1
kg 0.011	1:54			1
1	1:1			1
1	1:1			1

-:

**خامسا - تصميم نظام تخطيط موارد التصنيع****-1-5**

(LFL , EOQ , POQ , FOQ , PPB , FBR , LUC , LTC , SM , WW)

				<b>-2-5</b>
	(Visual Basic)	(Access)		:
				.1
				.2
				.3
Macro	Forms	Queries	Tables	
		( Visual Basic	)	
				:
(Requirements Plan)			(prog1)	-1
			Prog11—Prog2	-2
			(2-3)	
			PROG66	-3
				:
			14	
			(1-5)	

سادسا - محاكاة نظام تخطيط الموارد الصناعية

30

Monte Carlo

--:

(Heizer&Render,2001,851-853).

(1-4 )

(6 )

(4 )

(3 )

(5 )

Access

(AM)

.AM

(1-7)

:

Excel

30

:

30

:(Pritsker & Pegden, 1979 , 565)

$$RAND = B + ( A - B ) * R \dots\dots\dots(7-1)$$

:

RAND

(.5 )

(9805)

A

(.5 )

(3922)

B

(0 ≤ R ≤ 1)

1

R

:

30

(n=30) 30

(1-7)

(2-7)

FOQ

(3-7)

MRPII

(2-7)



(1-5)

ID	W-SR	SR	Beg Inv	LEAD TIME	WI	LEVEL	Ratio	Belongs to	FELLOW TO 1	NAME	P-NAME	ID
0.00	0	0.00	0.00		1.00	0	1			بطارية ٦٠ امبير		A
0.00	0	0.00	432000.00		2.00	1	30	A		لوح رصاصين مو		B
0.00	0	0.00	384000.00		2.00	1	30	A		بطارية ٦٠ امبير		C
0.00	0	0.00	30000.00		1.00	1	6	A		بطارية ٦٠ امبير		D
0.00	0	0.00	30000.00		1.00	1	6	A		جسر موجب		E
0.00	0	0.00	30000.00		1.00	1	6	A		جسر سالب		F
0.00	0	0.00	30000.00		1.00	1	2	A		بطارية ٦٠ امبير		G
0.00	0	0.00	30000.00		1.00	1	1	A		بطارية ٦٠ امبير		H
0.00	0	0.00	30000.00		1.00	1	1	A		بطارية ٦٠ امبير		I
0.00	0	0.00	281500.00		1.00	1	5	A		بطارية ٦٠ امبير		J
0.00	0	0.00	281500.00		1.00	1	5	A		بطارية ٦٠ امبير		K
0.00	0	0.00	120000.00		1.00	1	2	A		بطارية ٦٠ امبير		L
0.00	0	0.00	13200.00		1.00	1	1	A		بطارية ٦٠ امبير		M
0.00	0	0.00	13200.00		1.00	1	1	A		بطارية ٦٠ امبير		N
0.00	0	0.00	171360.00		1.00	1	6	A		بطارية ٦٠ امبير		O
0.00	0	0.00	43320.00		1.00	1	2	A		بطارية ٦٠ امبير		P
0.00	0	0.00	36000.00		1.00	1	2	A		بطارية ٦٠ امبير		Q
0.00	0	0.00	14280.00		1.00	1	1	A		بطارية ٦٠ امبير		R
0.00	0	0.00	212400.00		1.00	1	54	A		بطارية ٦٠ امبير		S
0.00	0	0.00	500000.00		2.00	1	1	A		بطارية ٦٠ امبير		T
0.00	0	0.00	500000.00		2.00	1	1	A		بطارية ٦٠ امبير		T
0.00	0	0.00	0.00		0.00	0	1	A		بطارية ٦٠ امبير		T

(1-7)  
AM





سابعاً - اختبار الفرضيات

\_\_\_\_\_:

- ∴
1.  $(LFL) \quad (2-7) \quad ( \quad + \quad ) \quad - \quad .1$
  2.  $(2-7) \quad ( \quad + \quad ) \quad - \quad 60 \quad .2$   
 $(LTC)$   
 $(POQ)$
  3.  $(2-7) \quad ( \quad + \quad ) \quad - \quad .3$   
 $(LTC)$   
 $(POQ)$   
 $(LFL)$
- \_\_\_\_\_:

$$t \quad ( \quad ) \quad t \quad (58=2-30+30) \quad 58 \quad n=30 \quad 0.05 = \alpha$$

$$(4-7) \quad . (\pm 1.67)$$

\_\_\_\_\_:

$$(POQ) \quad (5-7) \quad (3-7)$$

$$(FOQ) \quad (5-7) \quad (POQ)$$

∴



## (3-7)

LFL	LUC	FOQ	EOQ	POQ	FPR	LTC	الطاقة المستغلة للماكنة	
0.42	0.41	0.42	0.41	0.40	0.41	0.41	الوسط الحسابي	ماكنة 1
0.02	0.019	0.02	0.019	0.02	0.02	0.02	الانحراف المعياري	
0.50	0.49	0.51	0.50	0.48	0.49	0.49	الوسط الحسابي	ماكنة 2
0.02	0.023	0.02	0.02	0.04	0.02	0.02	الانحراف المعياري	
0.14	0.135	0.14	0.14	0.13	0.132	0.131	الوسط الحسابي	ماكنة 3
0.007	0.006	0.007	0.006	0.009	0.007	0.006	الانحراف المعياري	
0.13	0.13	0.13	0.13	0.127	0.129	0.13	الوسط الحسابي	ماكنة 4
0.006	0.006	0.007	0.006	0.008	0.007	0.006	الانحراف المعياري	

-





## ثامنا:- الاستنتاجات والتوصيات

-1-8

.1

.2

%10

.3

.4

-2-8

MRP

EOQ

.1

LFL

.2

(WW,LTC,LUC,SM)

.3

( )

.4

LFL)

.5

(LTC)  
(POQ)  
(LFL)

.6

(POQ)  
(FOQ)

	(FOQ)	(POQ)	.7
(LFL)			
(FPR)		(POQ)	.8
		(LFL)	
	(POQ)		.9
		(LTC,FPR,POQ,LUC,LFL)	
( )			.10
			-3-8
			.1
	/		
/			.2
			.3
	)	(	
			.4
			.5

.6

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2. " / " .1990
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