IŞIK UNIVERSITY

Faculty of Engineering

Department of Industrial Engineering

MRP Production Control Systems (Flashlight)

Project Report

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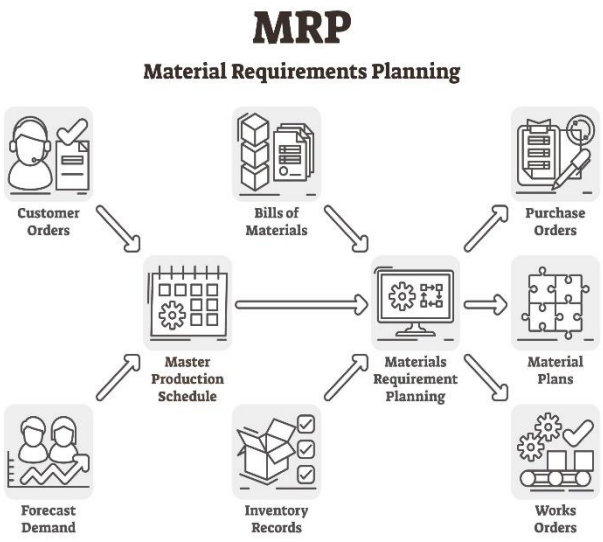
1.INTRODUCTION:

Meeting demand and managing inventory effectively are pivotal to our company's success as well as providing immediate client response and efficient business procedures. A flashlight MRP report is a comprehensive document detailing the production and inventory strategies for a company engaged in flashlight manufacturing. Our objective from This comprehensive report is outlining our strategic initiative to enhance ordering accuracy in response to challenges coming from insufficient communication between departments and insufficient training for staff.



1.1 REPUTATION IN MARKET:

Black Diamond Flashlights has earned a stellar reputation in the market, distinguishing itself as a leading provider of high-quality and reliable illumination solutions. Renowned for their commitment to innovation, Black Diamond Flashlights consistently delivers cutting-edge products that showcase advanced technology and durability. Customers applaud the company for its attention to detail, superior craftsmanship, and a diverse range of flashlight models catering to various needs

The brand has become synonymous with excellence, known for producing flashlights that outshine competitors in terms of brightness, energy efficiency, and overall performance. Black Diamond Flashlights has successfully built a loyal customer base by consistently exceeding expectations and adapting to emerging trends in the flashlight industry

1.2 HISTORY:

Material Requirements Planning (MRP) originated in the 1960s, attributed to Joseph Orlicky, as a solution to the complexities of managing materials in manufacturing. Initially implemented in aerospace and defense industries, MRP systems gained traction by the late 1960s. The 1970s saw the evolution and wider adoption of MRP in various sectors like automotive and electronics, with dedicated software development. In the 1980s, MRP evolved into Manufacturing Resource Planning (MRP II), broadening its scope to encompass additional aspects of production planning and control. The 1990s witnessed the dominance of Enterprise Resource Planning (ERP), where MRP became an integral part. Today, MRP remains a crucial element within ERP systems, utilizing advanced technologies to optimize material planning, inventory management, and production processes in the ever-evolving landscape of global manufacturing

1.3 METHODOLGY

Using Material Requirements Planning (MRP) is a strategic process crucial for efficient manufacturing, it involves determining the necessary quantities of raw materials and components, such as led casings, and batteries, based on the demand. As a push system, MRP generates production schedules at every level by estimating end-product sales. Subassemblies are pushed to the next level whether or not they are required, making it a push system. In tandem with overseeing production, the MRP system actively monitors inventory levels. This ensures that there are sufficient raw materials and components in stock to meet production needs. If inventory levels dip too low, the system triggers the generation of purchase orders to replenish materials swiftly.MRP streamlines the entire production process by aligning it with demand forecasts, optimizing resource allocation, and maintaining vigilant oversight of production and inventory levels.This system enhances efficiency, minimizes delays, and contributes to the overall success of manufacturing operations for flashligh

Advantages:

maintaining optimal inventory: MRP ensures the maintenance of ideal inventory levels by guaranteeing the availability of the appropriate materials when needed. This prevents both excess stock and shortages, resulting in decreased carrying costs and a reduced likelihood of production delay

Disadvantages:

Complexity:

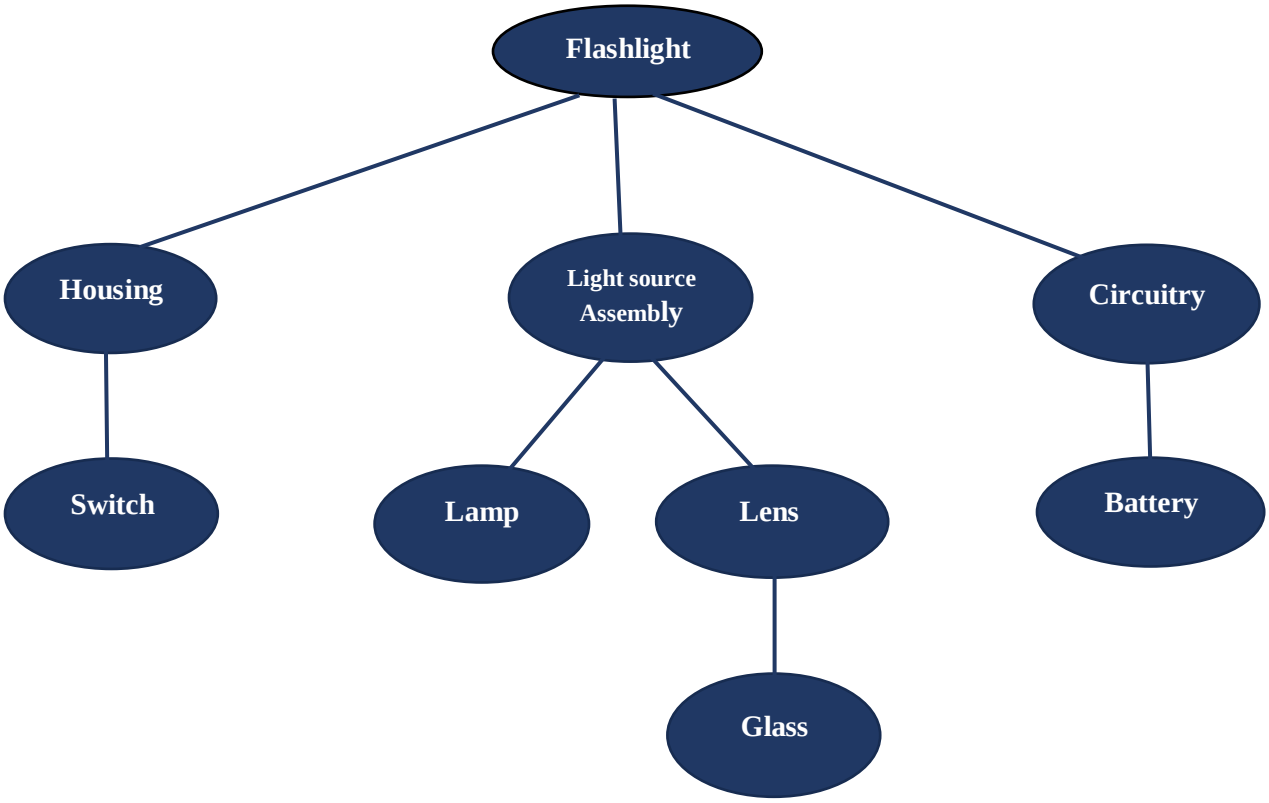
Implementing an MRP system can be complex and requires significant time and resources. Data accuracy and system integration are critical, and the transition to an MRP system may disrupt existing workflows.

High initial costs:

The initial investment in MRP software, hardware, and employee training can be substantial. Small and medium-sized enterprises may find the upfront costs prohibitive. implementation can be difficult and time- and resource-consuming**.**

Analysis and discussion of results

Product structure diagram:



Level 0: **Flashlight (end product)**

Level 1: **Housing, Light source Assembly, Circuitry.**

Level 2: **switch, Lamp, Lens, Battery.**

Level 3: **Glass**

MPS: with setup cost of $100 and holding cost of $0.2.

item	Flashlight	Housing	Light source Assembly	Circuitry	switch	Lamp	Lens	Battery	Glass
Demand/week									
1	660								
2	522								
3	700								
4	820								
5	620								
6	840								
On hand inv.	800	400	450	500	400	800	750	1500	120
Lead Time.	1	1	1	1	1	1	1	1	1
Lot size rule		LFL	LFL	LFL	LFL	LFL	LFL	LFL	LFL

MRP report for 6 weeks period

Level 0:

Lead time = 1 Lot Size = LFL	1	**Flashlight** **2**	**Level = 0** **3**	4	5	6
Projected requirement	660	522	700	820	620	840
Scheduled Receipts	-	382	700	820	620	840
On hand inventory = 800	140	-	-	-	-	-
Planned order release	382	700	820	620	840	-

LFL = 140(0.2) + 5(100) = 528 $

“EOQ = Squt((2 * 100 * 693)/0.2) = 832 unit”

Lead time = 1 Lot Size = EOQ	1	**Flashlight** **2**	**Level = 0** **3**	4	5	6
Projected requirement	660	522	700	820	620	840
Scheduled Receipts	-	832	832	832	832	832
On hand inventory = 800	140	450	582	594	806	798
Planned order release	832	832	832	832	832	-

EOQ = 3370(0.2) + 5(100) = 1174 $

“POQ = 832 /693 = 1.2 ~1 week

Lead time = 1 Lot Size = POQ = 1	1	**Flashlight** **2**	**Level = 0** **3**	4	5	6
Projected requirement	660	522	700	820	620	840
Scheduled Receipts	-	382	700	820	620	840
On hand inventory = 800	140	-	-	-	-	-
Planned order release	382	700	820	620	840	-

POQ = 140(0.2) + 5(100) = 528 $

Lead time = 1 Lot Size = PPB	1	**Flashlight** **2**	**Level = 0** **3**	4	5	6
Projected requirement	660	522	700	820	620	840
Scheduled Receipts	382	-	700	1440	-	840
On hand inventory = 800	522	-	-	620	-	-
Planned order release	-	700	1440	-	840	-

PPB = 1140 (0.2) + 4(100) = 628 $

- We've evaluated lot sizing methods (LFL, EOQ, POQ, and PPB) for the ending item (level 0), and we did some calculations to compare between themes, our analysis indicates that both LFL and POQ result in the lowest total costs, while they have the same total cost, So we have decided to choose the LFL planned order release to find the demands for the next levels**.**

Level 1:

Lead time = 1 Lot Size = LFL	1	**Housing (1)** **2**	**Level = 1** **3**	4	5	6
Projected requirement	382	700	820	620	840	-
Scheduled Receipts	-	682	820	620	840	-
On hand inventory = 400	18	-	-	-	-	-
Planned order release	682	820	620	840	-	-

Lead time = 1 Lot Size = LFL	1	**Light source Assembly (1)** **2**	**Level = 1** **3**	4	5	6
Projected requirement	382	700	820	620	840	-
Scheduled Receipts	-	632	820	620	840	-
On hand inventory = 450	68	-	-	-	-	-
Planned order release	632	820	620	840	-	-

Lead time = 1 Lot Size = LFL	1	**Circuitry (1)** **2**	**Level = 1** **3**	4	5	6
Projected requirement	382	700	820	620	840	-
Scheduled Receipts	-	582	820	620	840	-
On hand inventory = 500	118	-	-	-	-	-
Planned order release	582	820	620	840	-	-

Level 2:

Lead time = 1 Lot Size = LFL	1	**Switch (1)** **2**	**Level = 2** **3**	4	5	6
Projected requirement	682	820	620	840	-	-
Scheduled Receipts	282	820	620	840	-	-
On hand inventory = 400	-	-	-	-	-	-
Planned order release	820	620	840	-	-	-

Lead time = 1 Lot Size = LFL	1	**Lamp (1)** **2**	**Level = 2** **3**	4	5	6
Projected requirement	632	820	620	840	-	-
Scheduled Receipts		652	620	840	-	-
On hand inventory = 800	168	-	-	-	-	-
Planned order release	652	620	840	-	-	-

Lead time = 1 Lot Size = LFL	1	**Lens (4)** **2**	**Level = 2** **3**	4	5	6
Projected requirement	632	820	620	840	-	-
Scheduled Receipts	-	702	620	840	-	-
On hand inventory = 750	118	-	-	-	-	-
Planned order release	702	620	840	-	-	-

Lead time = 1 Lot Size = LFL	1	**Battery (4)** **2**	**Level = 2** **3**	4	5	6
Projected requirement	2328	3280	2480	3360	-	-
Scheduled Receipts	828	3280	2480	3360	-	-
On hand inventory = 1500	-	-	-	-	-	-
Planned order release	3280	2480	3360	-	-	-

Level 3:

Lead time = 1 Lot Size = LFL	1	**Glass (1)** **2**	**Level = 3** **3**	4	5	6
Projected requirement	702	620	840	-	-	-
Scheduled Receipts	582	620	840	-	-	-
On hand inventory = 120	-	-	-	-	-	-
Planned order release	620	840	-	-	-	-

Conclusion:

In conclusion, our project aims to achieve the right balance, minimizing losses, ensuring timely order execution, and enhancing order accuracy after using more than one MRP method, we can say that the LFL and POQ are the best suited models for this problem which they will cost us 528$ only while the EOQ method will cost us 1174$ and PPB will cost us 628$. Lot-For-Lot (LFL) is a lot sizing strategy aimed at precisely aligning order quantities with net requirements for specific time periods. The key principle is to avoid excess inventory by ordering only what is needed to meet demand within each designated period. In practical terms, this translates to ordering 382 units in the second week, utilizing the 140 units held from the first week. Subsequent orders are determined based on the previous week's demand, with 700 units in the third week, 820 units in the fourth week, 620 units in the fifth week, and 840 units in the last week. This approach ensures efficient inventory management while meeting demand without unnecessary surplus.