



# Preparation of Assembly Chart, Product structure and Dispatch List

**Aim:** To prepare an assembly chart and product structure for the given hand drill. Also prepare MRP records based on the manufacturing environment specified and develop a dispatch list for the items.

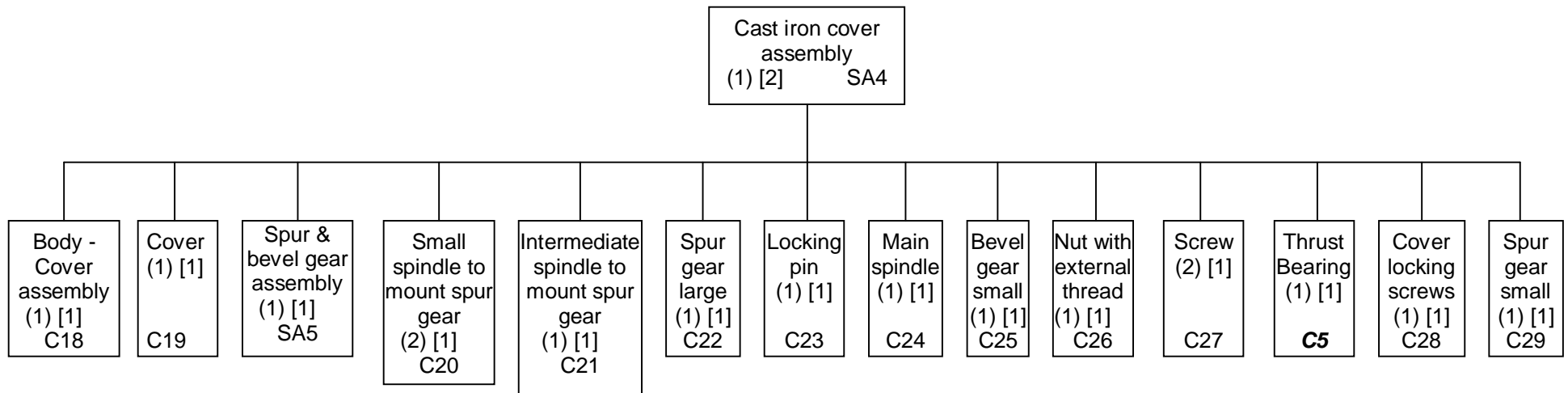
**Equipments:** Hand drill, Screw Driver, Pliers, etc

## **Theory:**

**Assembly Chart:** A schematic model that define how parts go together, the order of assembly, and the overall structure of the product. This chart is ideal for getting a bird's-eye view of the process for producing most assembled products. It lists all major materials and components, subassembly operations, inspections and assembly operations. This chart is sometimes called *gozinto* chart.

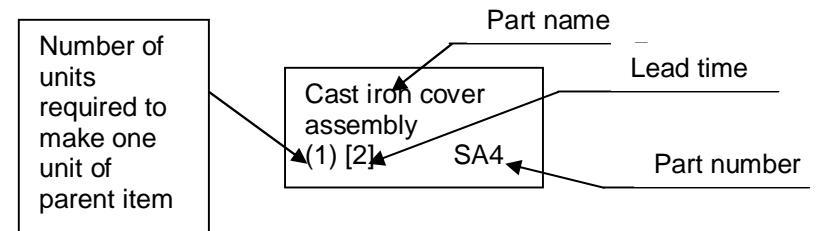
**Product Structure Diagram:** It includes all of the information typically included in the parts list as well as information concerning the structure of the product. This diagram provides the details on the components and assemblies required for making the product. It may also be known as *bill of material*. It contains the information such as, in what sequence these items (An item may be component, subassembly or final assembly.) are required, and how many units of components are required to produce the parent item together with the lead-time. Product structure is an input for several planning function especially for Material Requirements Planning (MRP). Product structure is a level by level representation. Parts used to make items in a level are represented in a lower level. Higher level is represented with a lower number. The level by level representation shows a parent-child relationship. The end item is represented at level zero.

**Procedure:** Disassemble the given product (Hand drill). (The disassembling operation may be carried out to the extent possible. It may not be possible for you to completely disassemble the product.) Identify various subassemblies required to make the product. You may get an idea about the subassemblies, from the details provided for preparation of dispatch list given below, to make the end product. Identify the component parts or/ subassemblies required to make each of the subassemblies required. The parts required for a subassembly can be represented in a product structure form (Single level product



**Fig. 1 Single level bill of material of cast iron cover assembly**

**LEGEND**





structure). As an example, the immediate children required for the cast iron cover assembly is given in figure 1. It can be seen from figure 1 that to prepare the cast iron cover assembly, a subassembly called 'spur and bevel gear assembly' is required. When the immediate children required for every subassembly is prepared, the product structure of the end item will be obtained by combining all these parent-child relationship. The various items required to make the product are given in fig. 2. To represent the lead time in the product structure, the information provided for preparation of dispatch list given below can be used.

Assembly chart of a caster is given as an example. Go through this chart before preparing the assembly chart for the hand drill. Items C14 and C9 are machined to get C2 and C3 respectively. Usually the machining operation is not represented in an assembly chart and hence the items C14 and C9 will not be represented in the assembly chart. Remaining items of the part list will appear in the assembly chart. A guideline for preparation of assembly chart is start with the lowest level of the product structure.

Sl. No.	Item	Item Code
1	End Product (Hand Drill)	F1
2	Drill Body Assembly	SA1
3	Column Locking Nut	C1
4	Drill Column	C2
5	Handle Assembly	SA2
6	Base Plate	C3
7	Locking Knob	C4
8	Grease Nipple Assembly	SA3
9	Thrust Bearing	C5
10	Hand wheel	C6
11	Cast Iron Cover Assembly	SA4
12	Hand Wheel Locking Knob	C7
13	Drill Body Locking Handle	C8
14	Steel Rod	C9
15	Handle Body	C10
16	Wooden Handle	C11
17	Handle Rod	C12
18	Lock Nut	C13
19	Raw Material (Casted plate)	C14
20	Grease Nipple Bolt	C15
21	Grease Nipple Body	C16
22	Grease Nipple Cover	C17
23	Cover Assembly Body	C18
24	Cover	C19
25	Spur and Bevel Gear Assembly	SA5



26	Small Spindle to mount spur gear	C20
27	Intermediate Spindle to Hold Intermediate Gear	C21
28	Spur Gear Large	C22
29	Locking Pin	C23
30	Main Spindle	C24
31	Bevel Gear Small	C25
32	Nut with External Thread	C26
33	Screw	C27
34	Cover Locking Screws	C28
35	Spur Gear Small	C29
36	Bevel Gear Large	C30
37	Spur Gear With Extension	C31

**Fig. 2 Part list of Hand Drill**

### **Details for preparation of Dispatch List**

The Hand Drill is a product of XYZ Company and they have a demand forecast of 30 units for this item for second week of December 20XX. Determine the material requirement plan of dependent items of hand drill. Purchasing lead-time is one week and the time for assembly of various items (30 units to make) are as follows:

Final assembly – 2 weeks

Drill body assembly – 2 weeks

Cast Iron Cover assembly which house gears – 2 weeks

Spur and bevel gear assembly – 2 days

Handle Assembly – 1.5 weeks

Grease nipple assembly – 2 days

Prepare the material requirement plan on weekly basis. If any lead time is not an integer, round to the nearest higher integer. Initial inventory is zero for all items. The drill column is manufactured within the company from a steel rod of required diameter and the base plate (to support the drill column) is machined in the company. The manufacturing time required for each of these items is one week. All the basic items are purchased.

Prepare the MRP record for each item and consolidate all the planned order release of the item into single record as shown in the format of Table 1 given below.

### **Further details about the system the company followed**

The XYZ company is following a two-bin system of inventory control for all items except SA1, C2, SA2, C3, SA4, C5, C6, C9, C14, C18, C19 and SA5. The item for which two-bin system is not followed is planned using MRP method. Hence the despatch list



has to be prepared for these items only. Thus, to prepare the dispatch list and MRP records of these items, a simplified product structure consisting of these items has to be prepared.

**Table: 1 Dispatch List (Planned order release dates)**

Name of item	Periods (weeks)							
	1	2	3	4	5	6	7	8

Note: Specify the weeks in calendar terms

**Note: Production calendar for the year 2007 is as follows**

Week-1: 30-09-2007 to 06-10-2007	Week-7: 11-11-2007 to 17-11-2007
Week-2: 07-10-2007 to 13-10-2007	Week-8: 18-11-2007 to 24-11-2007
Week-3: 14-10-2007 to 20-10-2007	Week-9: 25-11-2007 to 01-12-2007
Week-4: 21-10-2007 to 27-10-2007	Week-10: 02-12-2007 to 08-12-2007
Week-5: 28-10-2007 to 03-11-2007	Week-11: 09-12-2007 to 15-12-2007
Week-6: 04-11-2007 to 10-11-2007	Week-12: 16-12-2007 to 22-12-2007

### Preparation of MRP Record

Follow the note on MRP to get an idea about MRP records and the planning procedure. As per the data given for the preparation of dispatch list, the demand for hand drill is in week 11 of production calendar. Therefore, the gross requirement of end item (F1) in week 11 is 30 units. As per the current system prevailing in the company and the simplified product structure, to assemble the item, F1, the parts to be planned to procure or make are SA1, C2, SA2 and C3 only. So, we have to develop the MRP records of these items. Since the manufacturing lead time of F1 is 2 weeks, the gross requirement for SA1, C2, SA2 and C3 will be in week 9. The gross requirement for these items in week 9 is 30 units. These details have to be recorded in MRP record of these items. As an example a MRP record of item SA1 is shown below.



<u>DRILL BODY ASSEMBLY</u>					Lead Time- 2 wk, Qty-1							
SA1	October				November				December			
	1	2	3	4	5	6	7	8	9	10	11	12
Gross Requirement									30			
Scheduled Receipts												
Projected Available Balance									0	0	0	0
Planned Order Releases							30					

**Fig. 3 MRP Record of part SA1**

Similarly prepare the MRP record of other items also. Note that the item C5 is appearing in two levels and hence the MRP record of this item is prepared as per the low level code of the item.

### Low-Level Coding

It is particularly suitable when common parts exist at different levels. Low-level coding helps to accumulate all gross requirements of the common part and after that, to start the record processing. If an item is used in multiple levels, the low-level code of the item is the lowest level number. The low-level code assigned to any part number is based on the part's usage in all products. Once low-level codes are established, MRP record processing proceeds from one level code to the next, starting at level 0. Within a level, the MRP record processing is typically done in part number sequence.