ANNEXURE -I

SYSTEM STUDY OF TLT PRODUCTION PROCESSES

1. One particular project conforms to one compatible set of design of towers named A, B, C, D. (Some name it as P, Q, R, S) A being the lightest and D being the heaviest. Each type of tower has extension in 3m/6m/9m length. Each type of tower has a foundation kit (to be placed within RCC concrete) comprising of Stubs, Cleats, Earthing strips. Each type of tower may need 1 or more Template structure for proper location of foundation bots etc.

2. Some other attributes of the project are
    1. Flow of current - AC/DC
    2. Voltage in KV e.g. 132/220 KV.
    3. Single Circuit/Double Circuit

3. A project could be Supply only, or Supply cum Erection basis.

4. A Contract is signed for total no. of towers. Release Order is given for part of the total contract. One Release order is further divided into various destinations (Store/site office) at the time of inspection.

5. One Tower is divided into various parts through Bill of Material (BOM). A tower may have 100 to 400 fabricated parts and other fasteners (Bought out items). The fabricated parts are mostly of mild steel (some times of high tensile steel).

   Mostly angles of various sizes and thickness are the main raw material and MS plates are the next major section. Other sections such as Flats, Channels are also used though much less in quantity. Angles may vary in size from 40x40x4 to 200x200x12.

   The **Bill 0f Material** table has following structure

Mark No.	Section	Length	Unit wt per Wt	Qty per piece	Total tower	Weight

6. The Mark no is extremely vital. Each fabricated part is stamped with the specified Mark No. for accurate identification at manufacturing, galvanizing, inspection, despatch, storage, erection, shortage rejection, rework processes. The Mark no. is divided into 3 parts
    a) Project & Type of tower e.g. M28CK
    b) Part No. 1 to 400
    c) A 1 character long suffix (L-Left, R-Right, X-Extra, etc)

   Thus a typical Mark No is M28CK-42X, having attibutes as
   Section : L75x75x6
   Length - 6016 MM
   Section Weight 6.8 kg/m
   Weight per piece : 40.91 kg
   2 Nos per tower and 81.82 Kg weight per tower.

7. Each fabricated part is made of a steel section. Steel procurement is done project – Release Order- wise. Based on the steel section details, BOM is summarised into the section wise weight requirement per tower and multiplied by number of towers planned to be produced to arrive at steel procurement requirement.

   The steel procurement is done in Random/ Fixed length. Fixed length also has tolerance in ±50MM.

8. Another vital aspect of TLT manufacturing is to minimize wastage. A prime material of Rs.19, 000/- to 20,000/- MT is converted into Rs. 6,000/- MT. scrap

   In order to optimise the steel usage, we may stack the angle length wise in a range of 100 mm, that is 11.000 m, 11.100 m and so on and work out a plan of cutting schedule of parts of various lengths of a same section such that wastage (left over lengths) is minimized.

9. The production process may involve following operations.

   1. Straightening (STT) All parts go through
   2. Cutting (CUT) All parts go through
   3. Stamping (STM) All parts go through
   4. Punching (PUC) All parts go through
   5. Drilling (DRL) Some parts go through this process
   6. Bending (BEN) Some parts go through this process
   7. Punch After Bending (PAB) Some parts go through this process
   8. Drill after Bending (DAB) Some parts go through this process
   9. Notching (NOC) Some parts go through this process
   10. Heel Grinding(HGR) Some parts go through this process
   11. Welding (WLD) Some parts go through this process
   12. Grinding (GRD) Some parts go through this process
   13. Galvanizing (GAL) All parts go through this process
   14. Offered for Inspection (INO) All parts go through this process
   15. Approved After Inspection (INA) All parts go through this process

   Computerised Numerically Controlled CNC machines, which gives multiple operations (stamping, punching and cutting) in one go. Some production is routed. Through non-automatic machines. Angle/Plates having thickness above 12-15 mm are gas cut and drilled.

   A Route Card is prepared for each item. There are 2 Bays – Fabrication & Galvanizing. The finished black part is sent to Galvanizing in a batch. Galvanized items are bundled together for ease of transport.

10. The inspection by client or client's authorised agency is a vital link in the whole chain. All material is offered for inspection and material is dispatched only after the material is approved by the inspection agency.

11. The steel section (RM) is inspected at Rolling mill itself by Power Grid Corporation themselves for their projects; whereas for other projects inspection is done by Hyundai Unitech. Hence a different colour coding is done for following combinations.

    a) Power Grid – MS
    b) Power Grid – HT
    c) Non Power Grid – MS
    d) Non Power Grid - HT.

OBJECTIVES OF THE SOFTWARE

To input BOM received from Design department.
To prepare steel procurement plan for a Release Order.
To explode BOM into total no. of parts to be dispatched for a Release Order.
To input Purchase Order on various suppliers linking Project No.
To make & print MRN with Qty sent, Qty received and Qty Accepted details and to update Purchase Order for pending P.O. status.
To release material from Yard for production as per cutting schedule.
To input consumption of main section and production of part in 3 stages :

1. as Cut to size
2. as Finished (black).
3. as Galvanized.

Inspection Note :
After Completion of all production processes, the material is offered to the inspecting agency for Inspection.
This utility is to give :

1. Details of Material Ready for Inspection.
2. Details of Material Offered for Inspection.
3. Details of Material Approved after Inspection.

To split the exploded Release Order into smaller Release Order destination wise as per the instructions received from customer at the time of inspection

To prepare Excise Gate Pass, and Packing Slip and update the Release Order to know pending Release Order position.

Packing Slip & Excise Invoice :
Data Entry and Printing of Packing Slip with prescribed format.
Packing slip is to incorporate:

1. Mark No.
2. Section
3. Length
4. Unit wt
5. Qty Being sent
6. Cumulative quantity sent
7. Qty Balance to be sent

Packing Slip will also give reference of Party's Order No. and Inspection Note.

To incorporate rework, rejection and scrap generation.

Stores/Bought out Components Inventory:

1. Opening stock of Bought out Components in Nos. in Item Master.
2. Data Entry of Bought out Components Purchased.
3. To Input Consumption of Bought out components in Finished Structure.
4. To input quantity received back from site and returned to supplier.
5. To Maintain On Line Stock.
6. To do valuation of Stock of Components.

MIS REPORTS:

Shop Load:

Operation wise mix of load available in the prescribed format

Production:

1. Balance material to be cut Contract wise/ Tower wise.
2. Balance to be fabricated and Galvanized.
3. Details of Work Orders already under execution WIP.
4. Month/year wise Total Re-Fabrication and Re-Galvanizing.
5. Section wise requirement of steel (Tower wise/Contract wise).
6. Raw material (STEEL) position in Store at any point of time.
7. Daily Cutting report Item wise.
8. Generation and issue of usable cut lengths.
9. Daily Production (Fabrication & Galvanizing)
10. Re-Fabrication Due to Error /Shortage (daily), Re-Galvanizing (daily)

Order Details:

1. Pending order position.
2. Order wise Production details.
3. Party Wise Pending Order.

Inventory:

1. On line Stock of Stores According to :
   Opening Qty + Qty. Purchase – Qty. Issued + Qty. Scrap
   a) Steel.
   b) Brought out Components.
   c) Other Accessories.
2. Daily Issue and Receipt of Steel & Brought out Components.
3. Stock position of Sp. date/ Sp. Month/ Sp. Year is possible.
4. Item to Reorder, Item below reorder level, Item above reorder level.
5. Item-Party wise / Item-Structure wise / Item-Party-Structure wise Details.
6. Total surface area of material under each work Order/Tower wise for calculation of zinc Consumption.

Dispatch:

1. Inspection List/ Packing list for Dispatch.
2. Balance Material to be inspected/ Balance material to be dispatched.
3. Re-Conciliation statement of Quantity ordered, dispatched and received with SRN/MRN references.
   1. No of tower supplied to party.
   2. Daily Dispatches made destination wise.
   3. Replacement of shortages/damages.

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