

# Pistons & Rings Management System

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**Abstract** - The rapid growth of human-computer interaction efforts resulted, more and more useful softwares to reduce human efforts. The item inventory system automated inventory system, instead of manually, manage inventory of a Shri Ram Pistons and Rings, meanwhile it is able to generate sales report, inventory report, etc, which all require rigorous human efforts previously. This item inventory system will reduce possible human errors and provide accurate information of inventory at any point of time at minimum clicks.

**Keywords** : automated system, piston & rings, item inventory

## INTRODUCTION

Nowadays, more and more companies irrespective of number of employees and annual turn out tend to use computer software to maintain inventory details over a long term (Laudon *et al* 2009). The item inventory management system designed with features that help to improve data consistency as well as maintain necessary inventory level (Yeo, 2002). Major concern of the firm is to reflect inventory level as quick as possible, since the sales of items occupy a large proportion as compared to the daily fabrications of the pistons and rings. Therefore, item inventory level changes continuously. In order to monitor these changes over short as well as long periods, the automated inventory management system can efficiently and accurately accomplish it while provides other details to the managers such as recording daily inventory of pistons and rings.

To users, the system can provide instant information about all inventory items. Therefore stock officer who manage stock level can immediately solve any shortage problems, since the system provides easy-to-use interface for users to see inventory levels (Arnold, 2007). By recording daily sales, the system updates inventory constantly with the help of database management system running as the back end.

The necessary requirements of the firm have been thoroughly understood during the designing phase of item inventory system (Mills & Mercke, 2002). Consequently, more and more desirable services are added to the item inventory system to provide better management solutions. By separating different user's privilege, the system can assure different level of security to the inventory information (Svorons & Zipkin, 1988). For example, manager's privileges are added to the system when non-operation errors occur. After log in to the system with uniquely assigned password, administrator will be able to monitor all the lists of orders which have been processed and stored (Kang & Gershwin, 2005). The system not only provides static services to the firm, but initializes dynamic extensible inventory lists. The software is implemented in client-server architecture mode.

Piston ring is the one of the most replaceable part of the diesel/petrol engines. It has great demand in the replaceable market as well as in new engines market (Sharma, 2008). For the last few years there is noticeable increase in the automobile industry, which has the vast market for it. Piston rings are not only used in the automobile industry but also used in Railway Engines, Compressors, Steam Hammers, Cars, Retaining Rings, Pumps, Industrial Applications, Cranes, Gear boxes etc.

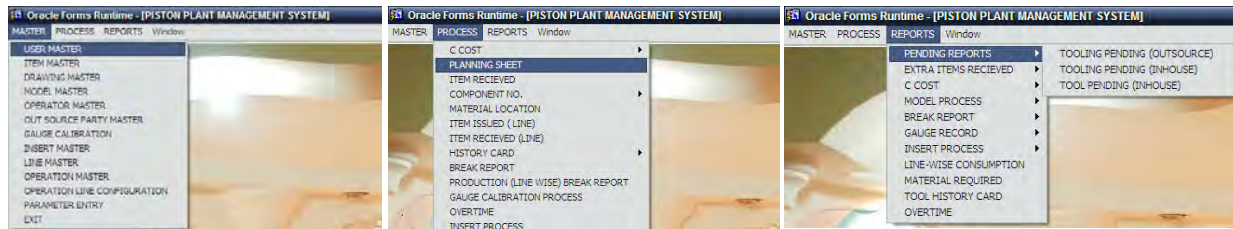
## METHOD AND MATERIALS

The item Inventory Management System is implemented with the Oracle 8.0 and developer 2000 with an easy layout to use and eliminate much of the tedious codes (Bayross, 2008). The Developer 2000 is a new generation of Oracle development tools that enable designer to deploy new and existing applications on either on an intranet, or on the Internet. The Developer 2000 takes advantage of the ease and accessibility of the intranet, and elevates it from a static information-publishing mechanism to an environment capable of supporting complex, dynamic applications (Bayross, 2005).

In most client-server implementations, running applications is a highly client-intensive process. Though data is extracted from a remote database server, applications run on client machines, which often have limited processing power and memory capacity. The Developer 2000 supports a three-tiered architecture that delivers the benefits of both client/server and the intranet in a single application. In intranet implementation, application logic and processing are focused on a middle tier of application servers instead of on desktop client machines.

## RESULTS AND DISCUSSION

The details of master, process and reports are reflected by snapshots of the system output for completeness. The oracle forms runtime for master listed fields namely user master to parameter entry totaling to twelve items as covering most of the desired details of piston plant management system. Further the process form expressed total thirteen fields starting from C cost to insert process. More over the detailed reports had generated from pending reports to overtime details to cover broadly all types of reports required for the firm for efficient piston management system.

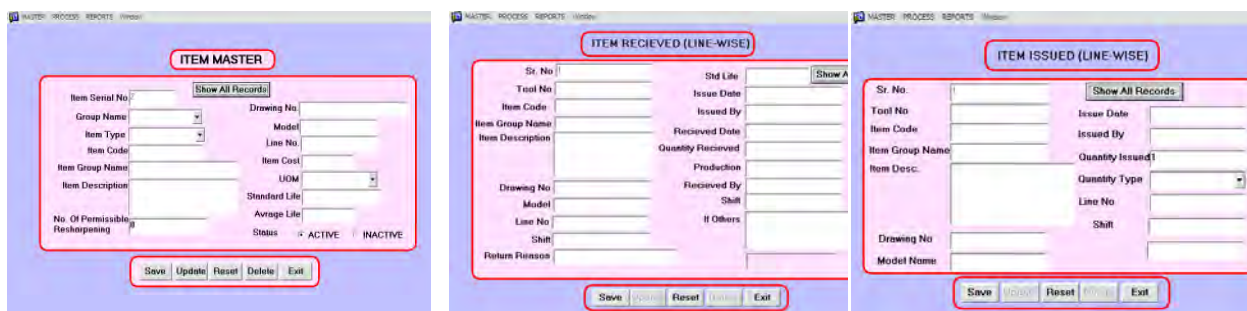


The item master form has options to store details of item serial number to average life of item. Additionally the scroll and button type controls depending upon type of information needs to be stored for particular type of fields. The item description field had allocated more storage space as compared to other fields to cater the item descriptions for future use. The entered details saved in the system by just clicking on save button with additional options to update already entered records even to delete the records, if any.

The reports discussed here are actual outcomes of the developed software. At a time very large numbers of machines are in working conditions to full fill the anticipated demands on daily basis. More over the machines have arranged in lines to keep production records of tools produced by machines line wise. This type of supervision creates a kind of competition among workers to produce maximum number of tools.

Queries are responsive to the selection of specific fields as per user convenience and reports are produced to the raised particular query. The production of different parts and assembling of parts into tools work simultaneously in the firm. The details of item received and item issued line wise cross check the production of parts and tools to maintain the inventory system efficiently. The efficiency of workers can be maintained by this type of production in cyclic manner.

The item master and transactions based on daily basis are reflected below.



The source code of SQL queries developed in developer 2000 (reports 6i) for total number of tools received by the tool room from outsource party for the requested date as specified by the user. The details of tables used for this query are MST\_Item\_Master, Planning\_Sheet and Item\_Received with relations are on the basis of Item\_code, model\_name, drawing no. and line number.

Tooling toolroom (outsources)

```
SELECT PS.ITEM_CODE,PS.DRAWING_NO, PS.MODEL_NAME, PS.LINE_NO,
IM.ITEM_DESC, P.REQ_DATE,PS.T_SIZE,
(NVL(PS.QTY,0)) - (NVL(IR.QTY,0)) QTY
```

```
FROM MST_ITEM_MASTER IM,
```

```
(SELECT DRAWING_NO, MODEL_NAME, REQ_DATE FROM PLANNING_SHEET
```

```
WHERE ROWID IN (SELECT MAX(ROWID) FROM PLANNING_SHEET GROUP BY DRAWING_NO,
MODEL_NAME, ITEM_CODE) )P,
```

```
(SELECT ITEM_CODE, DRAWING_NO, MODEL_NAME, LINE_NO, T_SIZE,
```

```

SUM(QTY) QTY
FROM PLANNING_SHEET
WHERE F_NAME = 'TOOLING OUT SOURCE'
AND CATEGORY = :CATEGORY
AND SOURCE = :SOURCE
AND ITEM_TYPE = :ITEM_TYPE
AND TO_DATE(REQ_DATE,'DD/MM/YY') BETWEEN TO_DATE(:SDATE, 'DD/MM/YY') AND
TO_DATE(:ENDDATE, 'DD/MM/YY')
GROUP BY DRAWING_NO, MODEL_NAME, LINE_NO,
ITEM_CODE, T_SIZE) PS,
(SELECT ITEM_CODE, DRAWING_NO, MODEL_NAME,
LINE_NO, T_SIZE,
SUM(QTY) QTY
FROM ITEM_RECIEVED
WHERE F_NAME = 'TOOLING OUT SOURCE'
GROUP BY DRAWING_NO, MODEL_NAME, LINE_NO,
ITEM_CODE,T_SIZE) IR
WHERE PS.ITEM_CODE = IM.ITEM_CODE
AND PS.DRAWING_NO = IR.DRAWING_NO(+)
AND PS.MODEL_NAME = IR.MODEL_NAME(+)
AND PS.DRAWING_NO = P.DRAWING_NO
AND PS.MODEL_NAME = P.MODEL_NAME
GROUP BY PS.ITEM_CODE, PS.DRAWING_NO, PS.MODEL_NAME, IM.ITEM_DESC, REQ_DATE,
PS.T_SIZE, PS.LINE_NO, PS.QTY, IR.QTY
HAVING ( NVL(PS.QTY,0) - (NVL(IR.QTY,0)) ) < 0
ORDER BY REQ_DATE

```



The source code of SQL queries for total number of tools generated by the tool room as per the requested date as specified by the user. The details of tables used for this query are MST\_Item\_Master , Planning\_Sheet and Item\_Received with relations are on the basis of Item\_code, model\_name, drawing no. and line number.

Tooling toolroom (inhouse)

```

SELECT PS.ITEM_CODE,PS.DRAWING_NO, PS.MODEL_NAME, PS.LINE_NO,
IM.ITEM_DESC, P.REQ_DATE,PS.T_SIZE,
(NVL(PS.QTY,0)) - (NVL(IR.QTY,0)) QTY
FROM MST_ITEM_MASTER IM,
(SELECT DRAWING_NO, MODEL_NAME, REQ_DATE FROM PLANNING_SHEET
WHERE ROWID IN (SELECT MAX(ROWID) FROM PLANNING_SHEET GROUP BY DRAWING_NO,
MODEL_NAME , ITEM_CODE) )P,
(SELECT ITEM_CODE, DRAWING_NO, MODEL_NAME, LINE_NO, T_SIZE,
SUM(QTY) QTY
FROM PLANNING_SHEET
WHERE F_NAME = 'TOOLING TOOL ROOM'

```

```

AND CATEGORY = :CATEGORY
AND SOURCE = :SOURCE
AND ITEM_TYPE = :ITEM_TYPE
AND TO_DATE(REQ_DATE,'DD/MM/YY') BETWEEN TO_DATE(:SDATE, 'DD/MM/YY') AND
TO_DATE(:ENDDATE, 'DD/MM/YY')
GROUP BY DRAWING_NO, MODEL_NAME, LINE_NO,
ITEM_CODE, T_SIZE) PS,
(SELECT ITEM_CODE, DRAWING_NO, MODEL_NAME,
LINE_NO, T_SIZE,
SUM(QTY) QTY
FROM ITEM_RECIEVED
WHERE F_NAME = 'TOOLING OUT SOURCE'
GROUP BY DRAWING_NO, MODEL_NAME, LINE_NO,
ITEM_CODE,T_SIZE) IR
WHERE PS.ITEM_CODE = IM.ITEM_CODE
AND PS.DRAWING_NO = IR.DRAWING_NO(+)
AND PS.MODEL_NAME = IR.MODEL_NAME(+)
AND PS.DRAWING_NO = P.DRAWING_NO
AND PS.MODEL_NAME = P.MODEL_NAME
GROUP BY PS.ITEM_CODE, PS.DRAWING_NO, PS.MODEL_NAME, IM.ITEM_DESC, REQ_DATE,
PS.T_SIZE, PS.LINE_NO, PS.QTY, IR.QTY
HAVING ( NVL(PS.QTY,0) - (NVL(IR.QTY,0) )) < 0
ORDER BY REQ_DATE

```

The details of SQL tables' description with data fields and data types

SQL> DESC ITEMMASTER; (Description of item master)

| Name      | Null? | Type          |
|-----------|-------|---------------|
| SRNO      |       | NUMBER(10)    |
| ITEM_CODE |       | VARCHAR2(9)   |
| ITEM_DESC |       | VARCHAR2(100) |
| UOM       |       | VARCHAR2(15)  |
| COST      |       | NUMBER(20,5)  |

SQL> DESC ITEM\_RECIEVED; (Description of Items received from Inhouse/ outhouse)

| Name        | Null? | Type          |
|-------------|-------|---------------|
| SRNO        |       | NUMBER(10)    |
| ITEM_CODE   |       | VARCHAR2(25)  |
| DRAWING_NO  |       | VARCHAR2(70)  |
| MODEL_NAME  |       | VARCHAR2(50)  |
| QTY         |       | NUMBER(5)     |
| LINE_NO     |       | VARCHAR2(10)  |
| C_DATE      |       | DATE          |
| SOURCE      |       | VARCHAR2(30)  |
| BATCH_NO    |       | VARCHAR2(20)  |
| F_NAME      |       | VARCHAR2(20)  |
| T_SIZE      |       | VARCHAR2(30)  |
| ITEM_DESC   |       | VARCHAR2(100) |
| TOOL_G_NAME |       | VARCHAR2(50)  |

```

SEC_NAME          VARCHAR2(30)
SQL> DESC ITEM_MASTER; (Description of Item master)

```

```

Name              Null?   Type
-----
ITEM_CODE         VARCHAR2(25)
ITEM_DESC         VARCHAR2(100)
UOM               VARCHAR2(15)
COST              NUMBER(20,5)
SRNO              NUMBER(10)

```

```

SQL> DESC ITEM_TOOL_NO; (Description of Item tool)

```

```

Name              Null?   Type
-----
SRNO              NUMBER(10)
ITEM_CODE         VARCHAR2(25)
REC_DATE          DATE
TOOL_G_NAME       VARCHAR2(50)
STATUS            CHAR(1)
TOOL_NO           VARCHAR2(25)
SHIFT             VARCHAR2(10)
MFNAME            VARCHAR2(50)

```

Since the data confidentiality of the firm is main aspect for the inventory management system and firm is not ready to share this information by publication. The outputs of the system are presented without data records as per agreement with the firm before designing the inventory management system.

### CONCLUSIONS

The Pistons and rings management system designed as per the requirement of the client firm which had been utilized by the firm to maintain the every detail needed for efficient management and retrieving reports covering user details to reports for total number of tools received from outsource as well as produced by tool room. The developed system provides online updating which will make the transaction effectively faster and accurate. The process of automatic updating of items issued will relive the storekeeper to maintain records in register. Every process will become fast and accurate and end user can get updated information about items issued, items returned, bill generation etc.

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