

---

## **CHAPTER - V**

---

**APPLICATION OF INVENTORY MODELS  
FOR  
AN ENGINEERING INDUSTRY.**

## INTRODUCTION TO AN ENGINEERING INDUSTRY

(Ghatge Patil Industries Ltd., Kolhapur)

The GHATGE PATIL group, situated in Western Maharashtra is one of the largest and the most successful groups, well known for quality and reliability. The group's field of activities cover Transportation, Foundry, Machine Shop, Diversified Agency Division, Printing Construction and manufacturing of Mopeds. The GHATGE PATIL group is one of the largest employer in this area, employing over 5000 people.

GHATGE PATIL INDUSTRIES LIMITED is the largest company in the group founded in the year 1960 by Mr. J. B. Patil and Mr. V. M. Ghatge as co-promoters. From the beginning the company has experienced a remarkable growth. This company has expanded from a small foundry to one of the most modern and integrated engineering complex spread over 10 hectares of land. The company's products have a country wide customer base; distributed, maintained and supported through a network of Dealers and Original Equipment Manufactures.

The company's philosophy to maintain rigid quality and reliability standards has gained its Domestic and international recognition. Some of the countries the company exports its products are U. K. , U. S. A., Germany, France, Singapore, Iran, Canada, Mexico and New Zealand.

The other details of the company are as follows.

1. Date of Incorporation : 2nd July 1960.
2. Number of Employees : 1950 approx.
3. Annual Turnover : Indian Rupees 17 crores.

#### 4. MAIN PRODUCT LINES

##### A) Foundry division :

Graded G. I. Castings : High Pressure Moulding  
line (Imported from Kunkel  
Wagner of West Germany).

S. G. Iron castings : In collaboration with:  
George Fischer Limited  
of Switzerland .

## B). PRODUCT DIVISION :

Mechanical clutches & power : Twin disc incorporated,  
 Take offs USA (Agreement expired in 1975).

Fluid Couplings	: Transfluid srl, Italy.
Electromagnetic clutches	: Zahnradfabrik Friedrichshafen AG of West Germany (Siemens group)
Pneumatic clutches/ Brakes	: Barufaldi Frizioni, SPA, Italy (Siemens group).
Automotive PTOS	: Dana corporation, USA (Agreement expired).
Marine Gearboxes	: Parson Engg. co., U. K. (Agreement expired).
Hydraulic Brake System	: GPI Design.
Automotive clutches for BEML as per Komatsu Design.	

We have mainly two Divisions namely:

a) Foundry Division.

b) Product Division.

**FOUNDRY DIVISION :**

In our foundry division, we manufacture Grey Iron castings for I.S. Grade 20 to 30 (equivalent to G. G. 20 to 26) to the tune of 1400 Tons per month and cater to the requirements of leading original Equipment Manufactuers of commercial Vehicles, Tractors, Diesel Engines etc.

Our Foundry is equipped with fully Automatic High Pressure Moulding line, Synthetic sand pland imported from Kunkel Wagner of West Germany, having box size of 1150 x 750 x 400/ 350 mm and with a capacity of producing more than 2000 tons per months. We also have 4 Induction Furance, 1 Cupola, Continuous shot Blast- ing Machine imported from B. M. D. west Germany, core shotting machines, a well equipped pattern shop consisting of 2 imported Boko pattern Milling Machines with copping attachment and other general purpose machines. We have entered in to Technical col- laboration with M/s. Gorge Fischer Limited of Switzerland for the manufacture of S. G. Iron (High quality ductaile Iron/ Nodular castings).

**PRODUCT DIVISION :**

In our Product Division, we have more than 200 general and special purpose machine tools like turning, milling grinding , drilling machines etc. The machine shop is also equipped with Reishauer Gear Grinding Machine, Maag Gear Testing, Broaching Maching, SIP Jig Boring Machine, Induction Hardening Machine, a well equipped quality control shop with Three way Co-ordinates measuring machine, heat treatment facilities etc. following products are manufactured in our product Division.

**1. MECHANICAL CLUTCHES & PTOs:**

We manufacture these units in size from 3 1/2" to 18" in single, double and tripple plate with maximum capacity of 740 hp. These clutches and PTOs are mainly used for industrial applications covering drilling rings, road rollers, diesel driven compressors/ pumps/generations, construction machinery etc. These products are regularly exported to USA, SPOAIN, WEST GERMANY, ITALY, MEXICO, IRAN, LEBANON MALAYSIA, THAILAND etc.

## 2. AUTOMOTIVE PTO UNITS:

These PTOs are mainly used on mobile equipment or vehicles for giving a drive to auxiliary units such as pumps, generators, compressors etc. The PTOs available are for side mounting directly on vehicle transmission or split shaft arrangement for giving two outputs with one input as used on fire engines.

## 3 FLUID COUPLINGS:

This product is being manufactured by us under technical collaboration from M/s. Transfluid Srl. of Italy. These Fluid Couplings are traction type and are available in sizes from 6 to 24" for maximum capacity upto 400 hp suitable for installation with diesel engines or electric motor. These are used on almost all industrial applications, involving higher inertia such as conveyor equipment, mixers rolling mills, textiles machines etc.

## 4. ELECTROMAGNETIC CLUTCHES & BRAKES:

This product is being manufactured by us under technical

collaboration from M/s. Zahnradfabrik Friedrichshafen of West Germany. These units are multi disc type with slip ring suitable for wet operation and are mostly used in machine tools on a large scale. These come in about 16 sizes with static torque carrying capacity from 7 Nm to 5000 Nm.

#### 5. PNEUMATIC CLUTCHES & BRAKES:

This product is being manufactured by us in technical collaboration with M/s. Baruffaldi Frizioni SPA of Italy. These Clutches are disc type mainly used for press brakes, shears, paper and pulp making machinery etc. These come in about 11 sizes with static torque carrying capacity from 250 Nm to 26500 Nm.

#### 6. MARINE GEARBOXES:

These marine reverse and reduction gearboxes incorporate a wet type disc clutch capable of transmitting full engine torque continuously in forward drive. The gears are of case hardened alloy steel and are ground on involute profiles for giving smooth and quiet running. The gear boxes come in these models covering Horse Power Range upto 165 HP with direct 2:1 , 3:1 and 4:1 reduction ratios.



## 7. MARINE POWER TAKE OFFS:

The marine PTOs specially designed for fishing boats, tugs, cargo boats and barges. It incorporates mechanical dry type clutch unit with moulded asbestos clutch Plates for positive transmission of power. The flexible input coupling eliminates mis-alignment problems. It comes in two models upto 47 HP range maximum.

## HOUSE OF GHATGE PATIL ALSO CONSISTS OF:

### 1. GHATGE PATIL TRANSPORTS PVT. LTD.

They are the largest transport fleet operations in the country with a fleet of more than 400 vehicles with country wide operations covering more than 140 major cities.

### 2. GHATGE PATIL PACK PRINT PVT. LTD.

Engaged in printing and packaging activities.

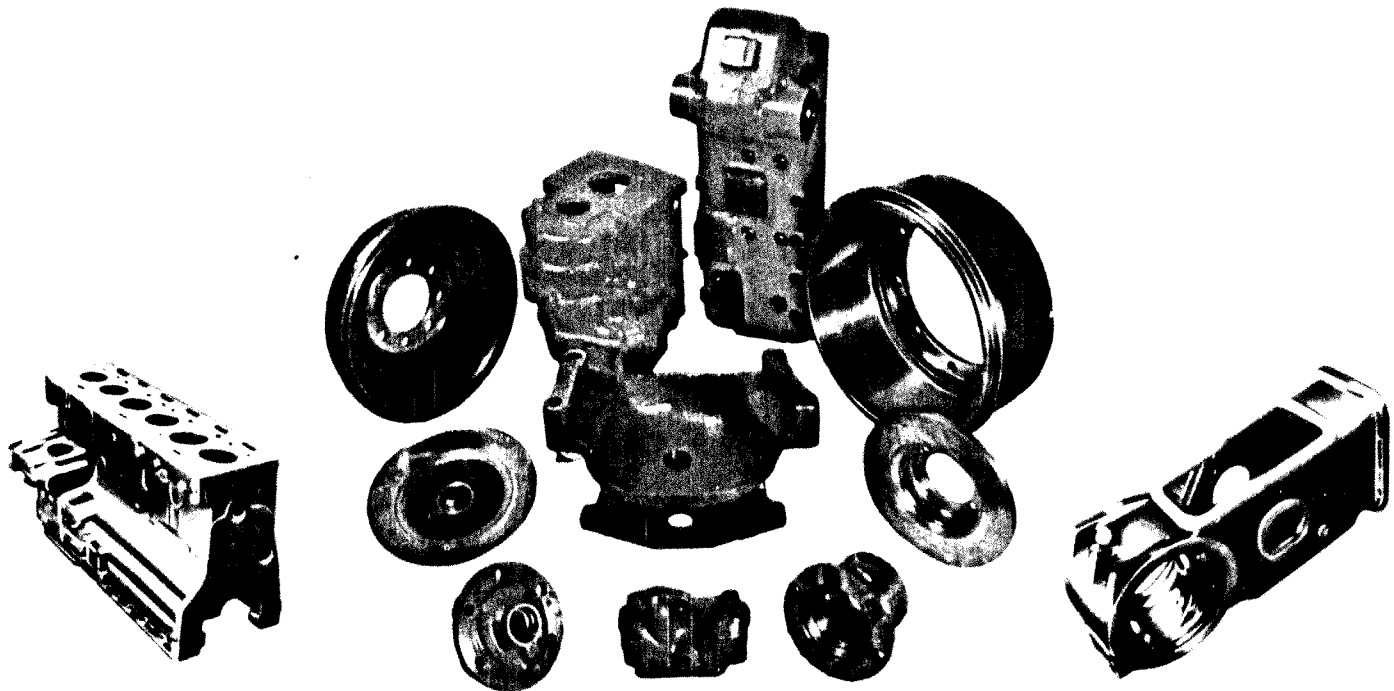
### 3. GHATGE PATIL AUTOMOBILES PVT. LTD.

An Agency division dealing in commercial vehicles, passenger cars, scooters, jeeps and tractors etc.

#### 4. VIPLA CONSTRUCTIONS

Engaged in Civil Construction activities.

Deatils of our product range is given in the subsequent pages.



Our experience and expertise in this field has enabled us to cater to the stringent requirements of all the prominent sectors of the engineering industry, in both the Domestic and the International market.

**Our Product Range:**

- Cylinder Blocks
- Cylinder Heads
- Engine components
- Brake Discs & Drums
- Transmission Casings
- Gearbox Housing
- Hydraulic Valve Bodies

Notre expérience et savoir-faire technique dans ce domaine nous ont permis a prévoir aux exigences rigoureuses de tous les secteurs prééminents de l'industrie d'engineering, tant dans le marché national que celui international.

**Notre Gamme de Produits:**

- Blocs du Cylindre
- Têtes du Cylindre
- Composants moteur
- Disques de frein et tambours de frein
- Boîtes de transmission
- Boîtes de vitesse
- Corps soupapes hydrauliques

Unsere Erfahrung und Knowhow auf diesem Gebiet ermöglicht uns, mit den strengen Anforderungen aus allen Bereichen der Maschinenbauindustrie im Inland und Ausland Schritt zu halten.

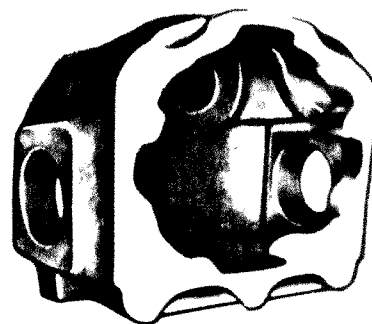
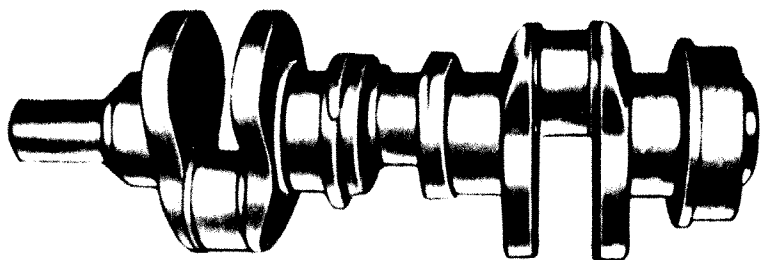
**Unsere Produkte:**

- Zylinderblöcke
- Zylinderdeckel
- Motorenbestandteile
- Bremsscheiben und Bremsstromeln
- Getriebekästen
- Getriebegehäusen
- Hydroventilkörper

## S.G. Iron Cast Components

## Composants Fer Coule S.G.

## S.G. Eisengußteile



We follow the world renowned + GF + (GEORGE FISCHER LIMITED, SWITZERLAND) converter process to manufacture S.G. Iron Components.

### Our Product Range:

- Hubs
- Rear Axle Housings
- Crank Shafts
- Shackles & Brackets

Nous suivons le procédé renommé mondial + GF + (GEORGE FISCHER LIMITED, SUISSE) de conversion pour fabriquer les composants de fer S.G.

### Notre Gamme de Produits:

- Moyeux
- Boîtes du pont arrière
- Vilebrequins
- Eclisses et consoles

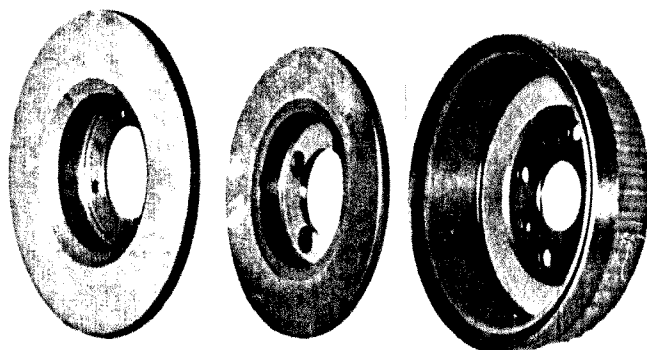
Zur Herstellung von S.G. Eisengußteilen benutzen wir weltberühmtes GF (GEORGE FISCHER LIMITED, SCHWEIZ) Konvertverfahren (converter process)

### Unsere Produkte:

- Naben
- Hinterachsegehäusen
- Kurbelwellen
- Kettenglieder und Stützen

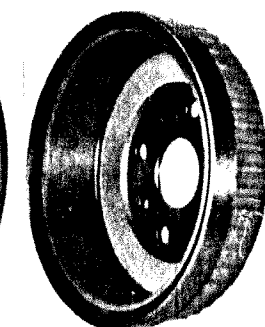
## PRODUCTS

### Brake Drums & Brake Discs:



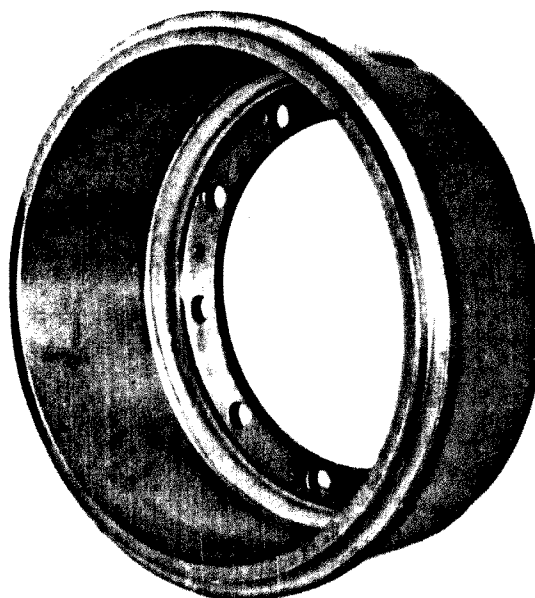
## PRODUITS

### Tambours de frein et Disques de frein:



## PRODUKTE

### Bremstrommeln und Bremsscheiben:



We design and develop Brake Drums and Brake Discs for the application of O.E. manufacturers and the after-sales market. We maintain rigid controls to meet the International quality standards.

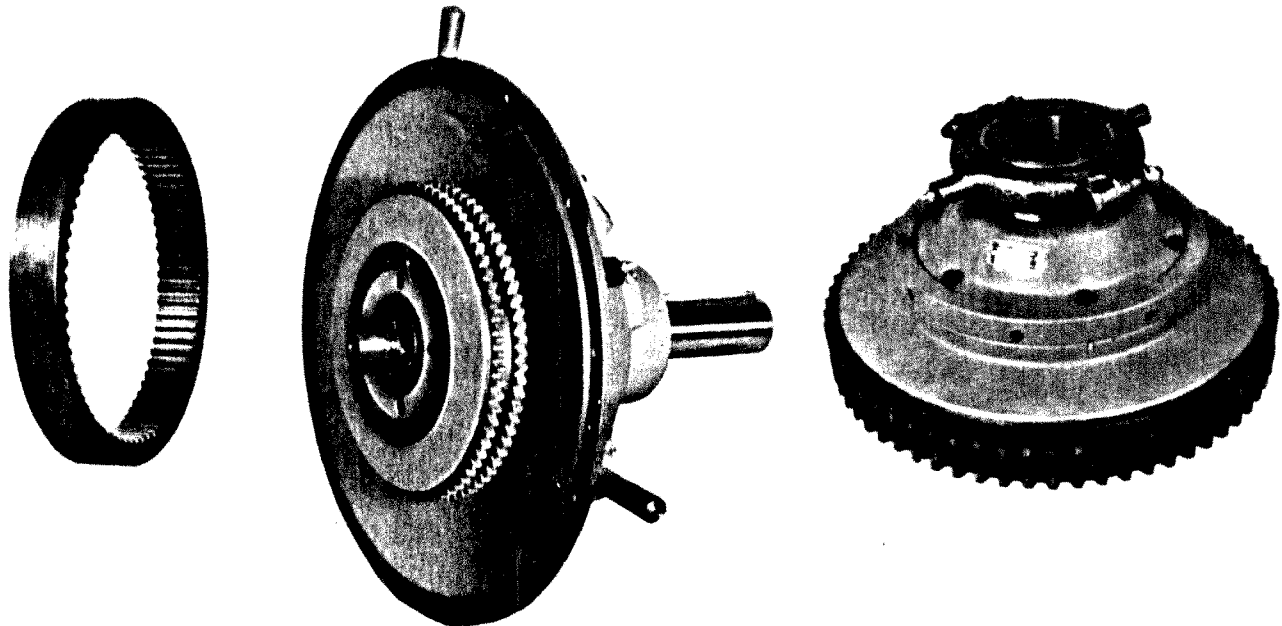
Nous projetons et développons les tambours de frein et les disques de frein pour application chez fabricants O.E. et le marché après vente. Nous maintenons des contrôles rigoureux pour faire face aux normes de qualité internationales.

Wir konstruieren und entwickeln Bremstrommeln und Bremsscheiben zur Anwendung von O.E. Herstellern und für Kundendienst. Um dem internationalen Qualitätsniveau zu entsprechen, führen wir strenge Kontrollen durch.

**Mechanical Clutches & Industrial Power Take Offs:**

**Embrayages mécaniques et Commandes auxiliaires**

**Mechanische Kupplungen & Industrie-Zapfgetriebe**



We manufacture a variety of Mechanical Clutches and Power Take Offs. Originally started in collaboration with a leading American manufacturer, we have further built on this foundation to keep these products on par with International specifications and requirements.

Nous fabriquons une variété d'embrayages mécaniques et commandes auxiliaires. Originellement, commencé en collaboration avec un fabricant important American, nous avons construit ultérieurement sur cette fondation pour offrir des produits d'après les spécifications et les exigences internationales.

Wir stellen verschiedene, mechanische Kupplungen und Zapfgetriebe her. Am Anfang haben wir sie in Zusammenarbeit mit einem führenden amerikanischen Hersteller produziert. Später haben wir die Produkte weiterentwickelt, entsprechend den internationalen Spezifikationen und Anforderungen.

**Range:**

Mechanical Clutches : Max. upto 750 HP  
Power Take Offs : Max. upto 850 HP

**Gamme:**

Embrayages mécaniques : Maximum jusqu'à 750 C.V.  
Commandes auxiliaires : Maximum jusqu'à 850 C.V.

**Bereich:**

Mechanische Kupplungen : max. bis zu 750 PS  
Zapfgetriebe : max. bis zu 850 PS

**Applications:**

- HighSpeedIndustrialEquipment
- Agitators
- Conveyors
- Compressors
- Pumps
- Generators
- Elevators
- Drilling Rigs.

**Applications:**

- Matériel à haute vitesse industriel
- Agitateurs
- Transporteurs
- Compresseurs
- Pompes
- Génératrices
- Elévateurs
- Appareil de perforation de sonde

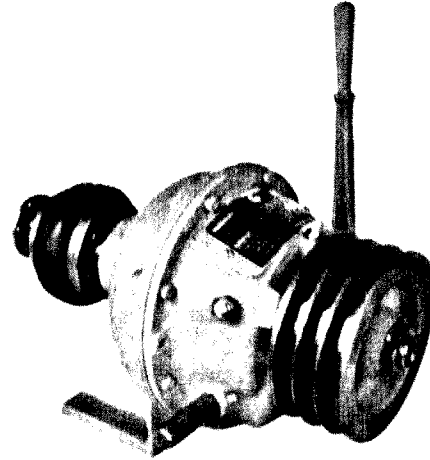
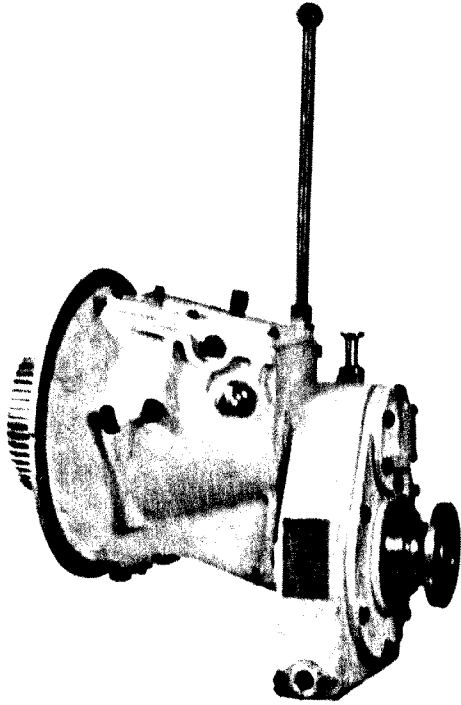
**Anwendungen:**

- Industrieeinrichtungen mit großer Geschwindigkeit
- Rührreinrichtungen
- Förderanlagen
- Kompressoren
- Pumpen
- Generatoren
- Elevatoren
- Bohranlagen

**Marine Gearboxes & Marine Power Take Offs:**

**Boîtes de vitesse Marines et Commandes Auxiliaires Marines:**

**Schiffsgetriebe & Schiffs-Zapfgetriebe:**



Originally manufactured in technical collaboration with leading British and American manufacturers to cater the needs of the Domestic Marine Industry, we have further up-dated our products to meet today's market requirements.

Originairement produites en collaboration technique avec des producteurs importants Britanniques et Americains pour prévoir aux besoins de l'industrie marine nationale, nous avons encore amélioré nos produits pour affronter les nécessités du marché d'aujourd'hui.

Ursprünglich wurden diese Produkte, für die heimische Schiffsinindustrie, in technischer Zusammenarbeit mit führenden englischen und amerikanischen Herstellern hergestellt. Diese Produkte haben wir, entsprechend den heutigen Anforderungen, weiter modernisiert.

**Range:**

Marine Gearboxes : Max. upto 180HP with reduction ratios 2:1, 3:1 & 4:1

Marine Power Take Offs : Max. upto 180 HP

**Gamme:**

Boîtes de vitesse marines : Maximum jusqu'à 180 C.V. avec trois rapports de réduction 2:1, 3:1, 4:1.

Commandes auxiliaires marines : Maximum jusqu'à 180 C.V.

**Bereich:**

Schiffsgetriebe : max. bis zu 180 PS mit drei Reduzierungsmaßstäbe 2:1, 3:1 & 4:1

Schiffs-Zapfgetriebe : max. bis zu 180 PS

**Applications:**

- Fishing Trawlers
- Launches
- Ferry Boats
- Tug Boats

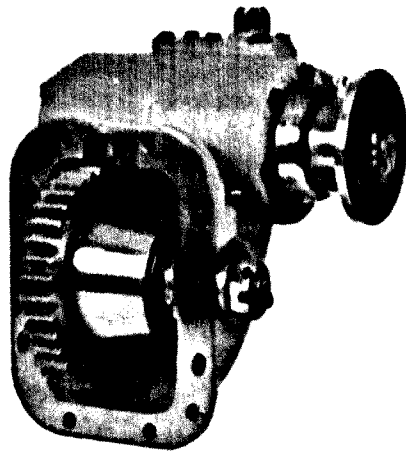
**Applications:**

- Bateaux chalutiers de pêche
- Chaloupes
- Bacs
- Remorqueurs

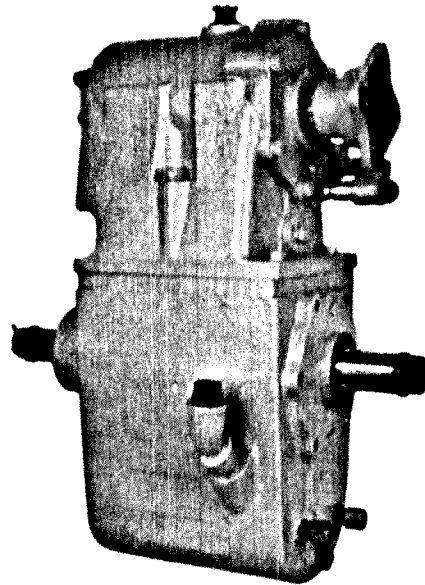
**Anwendungen:**

- Trawlers
- Motorbooten
- Fähren
- Bugsierdampfer

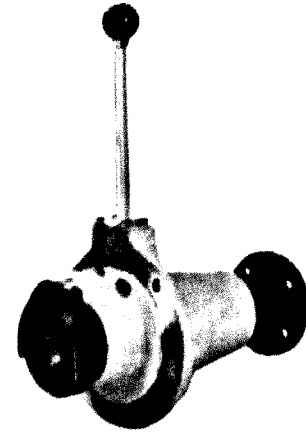
### Automotive Power Take Offs:



### Commandes Auxiliaires automobiles:



### Automotiv-Zapfgetriebe:



Our Automotive Power Take Offs are manufactured to suit the specific needs of our customers

#### Range:

- Max upto 300 Kg m

#### Features:

- Remote Wire Shift Control
- Lever Control
- Pneumatic Control

#### Applications:

- Automotive mounted
- Compressors
- Blowers
- Mixers
- Hydraulic Pumps
- Fire Fighting Equipment
- Winches
- Garbage Compactors
- Earth Moving Equipment

Nos commandes auxiliaires automobiles sont fabriquées pour convenir aux besoins des clients.

#### Gamme:

- Maximum jusqu'à 300 kg/m

#### Caractéristiques:

- Contrôle à distance de changement de fil
- Contrôle à levier
- Contrôle pneumatique

#### Applications:

- Montées à applications automobiles
- Compresseurs
- Souffleries
- Mélangeurs
- Pompes hydrauliques
- Equipement anti-incendie
- Treuils
- Compacteurs des ordures
- Equipment movement de terre

Unsere automotiv Zapfgetriebe werden je nach dem spezifischem Bedarf der Kunden hergestellt.

#### Bereich:

- max bis zu 300 Kg m

#### Eigenschaften:

- ferngesteuerte Drahtverschiebung (remote wire shift control)
- Hebelschaltung
- pneumatische Betätigung

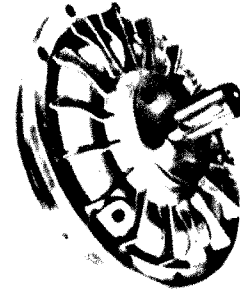
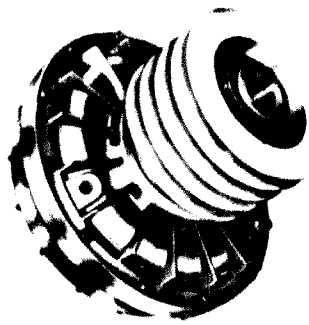
#### Anwendung:

- automotiv montiert
- Kompressoren
- Lufker
- Mischer
- hydraulische Pumpen
- Feuerbekämpfungsanlage
- Kurbel
- MüllpreBanlagen
- Erdbewegungsanlagen

### Couplings:

### Accouplements hydrauliques:

### Flüssigkeitskupplungen:



Manufactured in technical collaboration with TRANSFLUID SRL, ITALY, these Fluid Couplings provide smooth transmission of the starting and braking torque, thus protecting the prime-mover.

Produits en collaboration technique avec la Ste. TRANSFLUID SRL, ITALIE, ces accouplements hydrauliques donnent une transmission douce du moment de torsion de démarrage et de frein, ainsi protégeant le premier moteur.

Werden in technischer Zusammenarbeit mit TRANSFLUID SRL, ITALIEN hergestellt. Diese Flüssigkeitskupplungen ermöglichen stoßfreie Übersetzung (Transmission) des Anlaufs und Bremsmoments. Dies wiederum schützt die Antriebskraft.

#### Range:

Max. upto 400 HP

#### Gamme:

: Maximum jusqu'à 400 C.V.

#### Bereich:

max. bis zu 400 PS

#### Applications:

- Material Handling Equipment
- Wire Drawing Machines
- Textile Machinery
- Ash Handling Plants
- Fork Lifts

#### Applications:

- Equipment de manutention
- Tréfileries
- Machines Textiles
- Installations manutention de cendre
- Elevateurs à fourchette

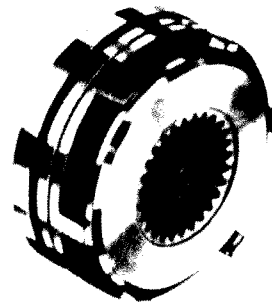
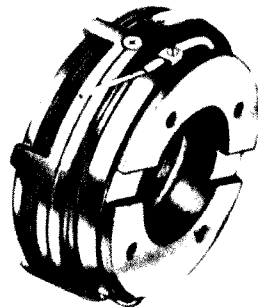
#### Anwendungen:

- Werkstoffordereinrichtungen
- Drahtziehmaschinen
- Textilmaschinen
- Entaschungsanlagen
- Gabelstapler

### Electromagnetic Clutches & Brakes

### Embrayages et Freins Electromagnétiques

### Elektromagnetische Kupplungen und Bremsen



Manufactured in technical collaboration with world renowned manufacturer ZAHNRADFABRIK FRIEDRICHSHAFEN (ZF), WEST GERMANY. We manufacture Multi Disc Slip Ring Clutches and Brakes for wet application.

Produits en collaboration technique avec le fabricant renommé mondial ZAHNRADFABRIK FRIEDRICHSHAFEN (ZF), ALLEMAGNE OCCIDENTALE. Nous fabriquons des embrayages à bague collectrice de disques multiples et des freins pour l'emploi à humide.

Werden in technischer Zusammenarbeit mit dem weltberühmten Hersteller ZAHNRADFABRIK FRIEDRICHSHAFEN (ZF), BRD hergestellt. Zur Naß-Anwendung stellen wir Mehrscheiben (schleifring)-kupplungen und Bremsen her.

#### Range:

1 to 400 Nm operating on 24 Volts dc

#### Gamme:

: De 1 à 400 Nm fonctionnant sur 24 Volts, CD.

#### Bereich:

1 bis 400 Nm betätigt durch den 24 V Gleichstrom

#### Applications:

- Machine Tools
- Elevators

#### Applications:

- Machines Outils
- Elevateurs
- Machines d'ascenseur

#### Anwendungen:

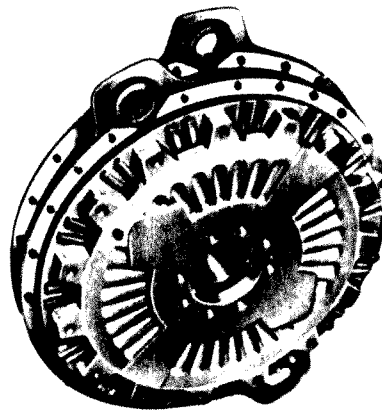
- Werkzeugmaschinen
- Elevatoren



## Pneumatic Clutches & Brakes

## Embrayages et Freins pneumatiques

## Pneumatische Kupplungen und Bremsanlagen



Manufactured in technical collaboration with BARUFFALDI FRIZIONI SPA, ITALY. Our Clutches and Brakes have single disc clutch and spring loaded single disc brake and are used as reliable drive elements.

### Range:

250 to 25600 Nm

### Applications:

- Mechanical Presses
- Punching Machines
- Shearing Machines
- Rolling Mills
- Paper Mills

Produits en collaboration technique avec BARUFFALDI FRIZIONI SPA, ITALIE. Nos embrayages et freins ont un embrayage à simple disque et frein à charge de ressort de simple disque et ils sont utilisés comme des éléments de commande

### Gamme:

De 250 à 25600 Nm

### Applications:

- Presses Mécaniques
- Machines à découper
- Machines à cisailer
- Laminoirs
- Papeteries.

Werden in technischer Zusammenarbeit mit BARUFFALDI FRIZIONI SPA, ITALIEN hergestellt. Unsere Kupplungen und Bremsen haben Einscheibenkupplungen und gefederte Einscheibenbremse und werden als zuverlässiges Antriebselement benutzt.

### Bereich:

250 bis 25600 Nm

### Anwendungen:

- mechanische Pressen
- Stanzmaschinen
- Schermaschinen
- Walzwerke
- Papierfabriken

## High Pressure Moulding Line

## Ligne De Moulage A Haute Pression

## Hochdrucks-Formmaschine

Fully automatic High Pressure Moulding Line synchronised with automatic Sand Plant, supplied by KUNKEL WAGNER, WEST GERMANY for production rate of 40 boxes per hour, with a box size of 1150 x 750 x 400/350 mm. Specific squeeze pressure of max. 14 Kg/cm<sup>2</sup> to produce a dense compact mould to ensure castings with exact weight and high integrity. Weight per piece max. 150 Kg to suit the above box size.

Ligne entièrement automatique moulage à haute pression synchronisée avec installation de sable fournie par la KUNKEL WAGNER, ALLEMAGNE OCCIDENTALE, pour produire 40 boîtes à l'heure, ayant la dimension de 1150 x 750 x 400/350 mm Pression spécifique de maximum de 14 kg/cm<sup>2</sup> pour produire une moule compacte et épaisse pour assurer des coulées avec un poids précis et de haute intégrité. Poids par pièce maximum 150 kg pour convenir à la dimension ci-avant de la boîte.

Vollautomatisierte Hochdruck-Formmaschine, synchronisiert mit automatischer Sandanlage, geliefert von KUNKEL WAGNER, BRD zur Produktion von 40 Kästen pro Stunde. Die Abmessungen der Kästen: 1150 x 750 x 400/350 mm. Spezifischer Druck von max. 14 Kg/cm<sup>2</sup> fabriziert eine dichte PreBform. Diese Form ermöglicht GuBwaren von genauem Gewicht höher Vollständigkeit

Gewicht pro Stück max. 150 Kg passend für die o.g. Kästengrößen.

## SUMMERY OUTPUT

The table showing output of Inventory Model-I

Sr. No.	Name of output	Model No.	EOQ	Total yearly min. cost
1.	Electromagnetic Clutches/Breaks	EK 5DB Break	1	692.8289
		EK 5DB Clutch	0	279.8272
		EK 2D Clutch	2	720.3999
		EK 5DC Clutch	2	1645.434
		EK 10D Clutch	1	1481.438
2.	Mechanical Clutches	SP BRITANIAN Clutch	5	3121.77
		CL 105(B.B.)	1	383.2962
		CL 105(PLAIN)	1	316.0188
3.	Maruti Break Drum	VAN FRONT	54	3000.503
4.	Power Take Off	C107(M) PTO	2	19227.26

The table showing output of Inventory Model-III

Sr. No.	Name of Product	Model No.	EOQ	Total yearly min. cost Rs.
1.	Electromagnetic Clutches/Breaks	EK 5D Break	6.88	153.8937
		EK 5DB Break	51.52	1151.156
2.	Mechanical Clutches	CL 105 (PLAIN)	6.5125	218.34
		CL 105 (B.B.)	6.299	274.6321
3.	Maruti Break	VAN FRONT	35.83	376.74

The table showing output of Probabilistic Model-I

Sr. No.	Name of Product	Model	EOQ
1.	Electromagnetic Clutches/Breaks	EK 5DC Clutch	25
		EK 5DB Break	Do not order

\*\*\*\*\*  
THE INPUT SUPPLIED FOR EMC MODEL EK 5DB BREAK IS AS FOLLOWS  
\*\*\*\*\*

PROCUREMENT COST PER ORDER CP IN Rs. = 5.39

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .22

UNIT PRICE CU IN Rs. = 2530

ANNUAL DEMAND OR CONSUMPTION D = 80

\*\*\*\*\*

\*\*\*\*\*  
THE OUTPUT OF EMC MODEL EK 5DB BREAK IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QUANTITY (EOQ) Q = 1

THE OPTIMAL ORDER CYCLE TIME, T = .0125

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 692.8289

\*\*\*\*\*

\*\*\*\*\*  
THE INPUT SUPPLIED FOR EMC MODEL EK 5DB CLUTCH IS AS FOLLOWS  
\*\*\*\*\*

PROCUREMENT COST PER ORDER CP IN Rs.= 5.39

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .2235

UNIT PRICE CU IN Rs.= 6500

ANNUAL DEMAND OR CONSUMPTION D= 0

\*\*\*\*\*

\*\*\*\*\*  
THE OUTPUT OF EMC MODEL EK 5DB CLUTCH IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QUANTITY (EOQ) Q = 0

THE OPTIMAL ORDER CYCLE TIME T = 1.701412E+38

THE MINIMUM YEARLY TOTAL COST TIC IN Rs.= 0

\*\*\*\*\*

\*\*\*\*\*  
THE INPUT SUPPLIED FOR EMC MODEL EK 2D CLUTCH IS AS FOLLOWS  
\*\*\*\*\*

PROCUREMENT COST PER ORDER CP IN Rs. = 6.12

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .2

UNIT PRICE CU IN Rs. = 2120

ANNUAL DEMAND OR CONSUMPTION D = 100

\*\*\*\*\*

\*\*\*\*\*  
THE OUTPUT OF MODEL I IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QUANTITY (EOQ) Q = 2

THE OPTIMAL ORDER CYCLE TIME T = .01

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 720.3999

\*\*\*\*\*

## INPUT

\*\*\*\*\*  
 THE INPUT SUPPLIED FOR EMC MODEL EK 5DC CLUTCH IS AS FOLLOWS  
 \*\*\*\*\*

PROCUREMENT COST PER ORDER CP IN Rs. = 7.95

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE. I = .33

UNIT PRICE CU IN Rs. = 2580

ANNUAL DEMAND OR CONSUMPTION D= 200

\*\*\*\*\*

## OUTPUT

\*\*\*\*\*  
 THE OUTPUT OF EMC MODEL EK 5DC CLUTCH IS AS FOLLOWS  
 \*\*\*\*\*

ECONOMIC ORDER QUANTITY (EOQ) Q = 2

THE OPTIMAL ORDER CYCLE TIME T = .005

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 1645.434

\*\*\*\*\*



## INPUT

```
*****  
THE INPUT SUPPLIED FOR EMC MODEL EK 10D CLUTCH IS AS FOLLOWS  
*****
```

PROCUREMENT COST PER ORDER CP IN Rs.= 13.78

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .24

UNIT PRICE CU IN Rs.= 5530

ANNUAL DEMAND OR CONSUMPTION D= 60

```
*****
```

## OUTPUT

```
*****  
THE OUTPUT OF EMC MODEL EK 10D CLUTCH IS AS FOLLOWS  
*****
```

ECONOMIC ORDER QUANTITY (EOQ) Q = 1

THE OPTIMAL ORDER CYCLE TIME T = 1.666667E-02

THE MINIMUM YEARLY TOTAL COST TIC IN Rs.= 1481.438

```
*****
```



I  
g

```
*****  
THE INPUT SUPPLIED FOR MC MODEL MARUTI VAN FRONT IS AS FOLLOWS  
*****
```

PROCUREMENT COST PER ORDER CP IN Rs. = 2.25

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .22

UNIT PRICE CU IN Rs. = 252.61

ANNUAL DEMAND OR CONSUMPTION D = 36000

```
*****
```

```
*****  
THE OUTPUT OF MC MODEL MARUTI VAN FRONT IS AS FOLLOWS  
*****
```

ECONOMIC ORDER QUANTITY (EOQ) Q = 54

THE OPTIMAL ORDER CYCLE TIME T = 1.472222E-03

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 3000.503

```
*****
```

\*\*\*\*\*  
THE INPUT SUPPLIED FOR MC MODEL SP BRITUNIAN CLUTCH IS AS FOLLOWS  
\*\*\*\*\*

PROCUREMENT COST PER ORDER CP IN Rs. = 11.75

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .22

UNIT PRICE CU IN Rs. = 2900

ANNUAL DEMAND OR CONSUMPTION D = 650

\*\*\*\*\*

\*\*\*\*\*  
THE OUTPUT OF MC MODEL SP BRITUNIAN CLUTCH IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QUANTITY (EOQ) Q = 5

THE OPTIMAL ORDER CYCLE TIME T = 6.153846E-03

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 3121.77

\*\*\*\*\*

## INPUT

```
*****  
THE INPUT SUPPLIED FOR PTO MODEL C107(M) PTO IS AS FOLLOWS  
*****
```

PROCUREMENT COST PER ORDER CP IN Rs. = 35

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE. I = 1.25

UNIT PRICE CU IN Rs. = 6500

ANNUAL DEMAND OR CONSUMPTION D = 650

```
*****
```

## OUTPUT

```
*****  
THE OUTPUT OF PTO MODEL C107(M) PTO IS AS FOLLOWS  
*****
```

ECONOMIC ORDER QUANTITY (EOQ) Q = 2

THE OPTIMAL ORDER CYCLE TIME T = 3.076923E-03

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 19227.26

```
*****
```

## INPUT

\*\*\*\*\*  
THE INPUT SUPPLIED FOR MC MODEL CL 105 BALL BEARING IS AS FOLLOWS  
\*\*\*\*\*

PROCUREMENT COST PER ORDER CP IN Rs. = 7.42

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE, I = .22

UNIT PRICE CU IN Rs. = 3000

ANNUAL DEMAND OR CONSUMPTION D = 15

\*\*\*\*\*

## OUTPUT

\*\*\*\*\*  
THE OUTPUT OF MC MODEL CL 105 BALL BEARING IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QUANTITY (EOQ) Q = 1

THE OPTIMAL ORDER CYCLE TIME T = 0

THE MINIMUM YEARLY TOTAL COST TIC IN Rs. = 383.2962

\*\*\*\*\*

## INPUT

```
*****  
THE INPUT SUPPLIED FOR MC MODEL CL 105 PLAIN IS AS FOLLOWS  
*****
```

PROCUREMENT COST PER ORDER CP IN Rs.= 5.71

INVENTORY CARRYING COST EXPRESSED IN % OF INVT. VALUE. I = .22

UNIT PRICE CU IN Rs.= 2650

ANNUAL DEMAND OR CONSUMPTION D= 15

```
*****
```

## OUTPUT

```
*****  
THE OUTPUT OF MC MODEL CL 105 PLAIN IS AS FOLLOWS  
*****
```

ECONOMIC ORDER QUANTITY (EOQ) Q = 1

THE OPTIMAL ORDER CYCLE TIME T = 0

THE MINIMUM YEARLY TOTAL COST TIC IN Rs.= 316.0188

```
*****
```

\*\*\*\*\*  
THE INPUT SUPPLIED FOR MARUTI BREAK DRUM -VAN FRONT IS AS BELOW  
\*\*\*\*\*

ANNUAL DEMAND IN UNITS  $D = 3000$

SET UP COST FOR EACH PRODUCTION RUN  $CP = 2.25$

INVENTORY CARRYING COST PER YEAR IN RS.  $10.96$

DAILY RATE OF PRODUCTION  $P = 240$

NO. OF WORKING DAYS PER YEAR =  $307$

\*\*\*\*\*

\*\*\*\*\*  
THE OUTPUT FOR MARUTI BREAK DRUM -VAN FRONT IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QTY (EOQ)  $Q = 35.83341$

PRODUCTION CYCLE TIME (T) IS  $3.666953$  WORKING DAYS

PRODUCTION TIME FOR EACH RUN IS  $.1493059$  WORKING DAYS

THE MINIMUM YEARLY INCREMENTAL COST TIC IN Rs. :  $376.7434$

\*\*\*\*\*

INPUT

\*\*\*\*\*  
THE INPUT SUPPLIED FOR EMC MODEL EK 5DB<sub>1</sub> IS AS BELOW  
\*\*\*\*\*

ANNUAL DEMAND IN UNITS D= 10

SET UP COST FOR EACH PRODUCTION RUN CP = 53

INVENTORY CARRYING COST PER YEAR IN RS. 22.35

DAILY RATE OF PRODUCTION P= 100

NO. OF WORKING DAYS PER YEAR = 307

\*\*\*\*\*

OUTPUT

\*\*\*\*\*  
THE OUTPUT FOR EMC MODEL EK 5DB<sub>1</sub> IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QTY (EOQ) Q= 6.88787

PRODUCTION CYCLE TIME (T ) IS 211.4576 WORKING DAYS

PRODUCTION TIME FOR EACH RUN IS .0688787 WORKING DAYS

THE MINIMUM YEARLY INCREMENTAL COST TIC IN Rs. : 153.8937

\*\*\*\*\*

## INPUT

\*\*\*\*\*  
THE INPUT SUPPLIED FOR EMC MODEL EK 5DB BREAK IS AS BELOW  
\*\*\*\*\*

ANNUAL DEMAND IN UNITS  $D = 80$

SET UP COST FOR EACH PRODUCTION RUN  $CP = 371$

INVENTORY CARRYING COST PER YEAR IN RS. 22.35

DAILY RATE OF PRODUCTION  $P = 225$

NO. OF WORKING DAYS PER YEAR = 307

\*\*\*\*\*

## OUTPUT

\*\*\*\*\*  
THE OUTPUT FOR EMC MODEL EK 5DB BREAK IS AS FOLLOWS  
\*\*\*\*\*

ECONOMIC ORDER QTY (EOQ)  $Q = 51.56557$

PRODUCTION CYCLE TIME (T) IS 197.8829 WORKING DAYS

PRODUCTION TIME FOR EACH RUN IS .2291803 WORKING DAYS

THE MINIMUM YEARLY INCREMENTAL COST TIC IN Rs. : 1151.156

\*\*\*\*\*



## INPUT

\*\*\*\*\*  
 THE INPUT SUPPLIED FOR MC MODEL CL-105 (PLAIN COLLAR) IS AS BELOW  
 \*\*\*\*\*

ANNUAL DEMAND IN UNITS  $D = 15$

SET UP COST FOR EACH PRODUCTION RUN  $CP = 47.4$

INVENTORY CARRYING COST PER YEAR IN RS.  $33.56$

DAILY RATE OF PRODUCTION  $F = 50$

NO. OF WORKING DAYS PER YEAR =  $307$

\*\*\*\*\*

## OUTPUT

\*\*\*\*\*  
 THE OUTPUT FOR MC MODEL CL-105 (PLAIN COLLAR) IS AS FOLLOWS  
 \*\*\*\*\*

ECONOMIC ORDER QTY (EOQ)  $Q = 6.512551$

PRODUCTION CYCLE TIME (T) IS  $133.2902$  WORKING DAYS

PRODUCTION TIME FOR EACH RUN IS  $.130251$  WORKING DAYS

THE MINIMUM YEARLY INCREMENTAL COST TIC IN RS. :  $218.3476$

\*\*\*\*\*

## INPUT

\*\*\*\*\*  
 THE INPUT SUPPLIED FOR MC MODEL CL-105 (B.D. COLLAR) IS AS BELOW  
 \*\*\*\*\*

ANNUAL DEMAND IN UNITS D= 15

SET UP COST FOR EACH PRODUCTION RUN CP = 57.67

INVENTORY CARRYING COST PER YEAR IN RS. 43.63

DAILY RATE OF PRODUCTION P= 60

NO. OF WORKING DAYS PER YEAR = 307

\*\*\*\*\*

## OUTPUT

\*\*\*\*\*  
 THE OUTPUT FOR MC MODEL CL-105 (B.D. COLLAR) IS AS FOLLOWS  
 \*\*\*\*\*

ECONOMIC ORDER QTY (EOQ) Q= 6.299701

PRODUCTION CYCLE TIME (T ) IS 128.9339 WORKING DAYS

PRODUCTION TIME FOR EACH RUN IS .104995 WORKING DAYS

THE MINIMUM YEARLY INCREMENTAL COST TIC IN RS. : 274.6321

\*\*\*\*\*

\*\*\*\*\*

THE DATA SUPPLIED FOR EMC MODEL EK 5DC CLUTCH IS AS FOLLOWS

\*\*\*\*\*

INVT. CARRYING COST PER UNIT IN Rs. = 33

SHORTAGE COST PER UNIT C2 IN Rs. = 48

QTY ON HAND BEFORE AN ORDER IS PLACED I1 = 0

DEMAND	PROBABILITY	CUMM. PROB.
0	.02	.02
5	.05	.07
10	.1	.17
15	.18	.35
20	.2	.55
25	.25	.8
30	.12	.92
35	.07	.99
40	.01	1

\*\*\*\*\*

THE OUTPUT OF EMC MODEL EK 5D BREAK IS AS FOLLOWS

\*\*\*\*\*

OPT. ORDERING POLICY IS TO ORDER 25 UNITS

\*\*\*\*\*

\*\*\*\*\*  
 THE DATA SUPPLIED FOR EMC MODEL EK 5DB BREAK IS AS FOLLOWS

\*\*\*\*\*

INVT. CARRYING COST PER UNIT IN Rs. = 22.35

SHORTAGE COST PER UNIT C2 IN Rs. = 50

QTY ON HAND BEFORE AN ORDER IS PLACED I1 = 10

DEMAND	PROBABILITY	CUMM. PROB.
0	.01	.01
1	.14	.15
2	.2	.35
3	.3	.6500001
4	.25	.9000001
5	.1	1

\*\*\*\*\*  
 THE OUTPUT OF EMC MODEL EK 5D BREAK IS AS FOLLOWS

\*\*\*\*\*

..... DO NOT ORDER .....

\*\*\*\*\*