

Gajra Gears Private Limited

(i) UNIT PROFILE.

INTRODUCTION

GAJRA GEARS PRIVATE LIMITED was started in 1962 as a small-scale gear manufacturing unit.

It progressed rapidly and is now one of the largest gears manufacturing unit for automobile gears and is the leader in the field in India.

The manufacturing unit of the company is situated in Dewas (Madhya Pradesh) in central part of India.

The Company is equipped with about 250 Nos. machine tools. Many of these machine tools are Automatic/C.N.C. The plant is also equipped with heat treatment facilities.

The range of products includes :

- Transmission Gears.
- Spline Shafts & Axles
- Engine Gears
- Gear Box Assembly
- Planetary Assembly etc.

For Commercial Vehicles, Passenger Cars, Tractors, Engines and Snowmobile.

The R & D activity of the company has resulted in the development of Gear Cutting Tools. The Company has received "**IMPORT SUBSTITUTION AWARD**" for development of Gear Shaving Cutter.

The Company has separate Cutting Tools Manufacturing Division equipped with about 20 Nos. sophisticated machine tools including Optical Profile Grinder, CNC Shaving Cutter Grinder and High Speed Steel Heat Treatment Facility. The cutting tools manufactured in the division include Gear Shaper Cutters, Gear Hobs, Gear Shaving Cutters, Master Gears, Broaches, Spline Milling Cutter etc.

The Company has a full-fledged Tool Room capable of manufacturing precision Jigs, Fixtures and Gauges required for manufacturing of the products.

The Company Is Accredited With Following Certificates.

01:- The Company Have Been Awarded "Import Substitution Award"
By "The Honourable President Of India" For Developing
Shaving Cutter.

02:-Iso-9002 Quality Management System (By B.V.Q.I.) Since
December 1998.

03:-Qs-9000 Quality Certification (By B.V.Q.I.) Since May 2001.

04:-Iso-14001 Enviroiment Management System (By B.V.Q.I.) Since
May 2003.

05:- Ohsas-18001 – Occupational Health & Safety In
2005, (By B.V.Q.I.)

06:- The Company Is On The Way To Get Is/Ts-16949:2002 &Hope Ful To
Get It Within 06 To 08 Months.

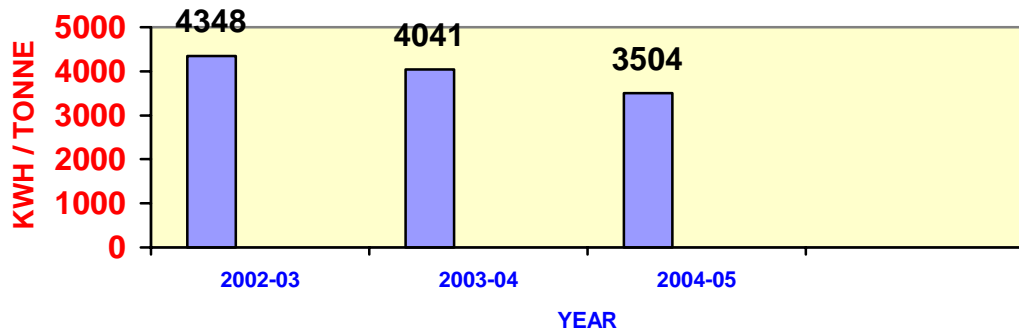
07:-The Company Also Participated In "Cii-Acma Cluster
Programme" For Three Years (From January 2001 To
December 2003)

08:-The Company Is Also Permitted For "Self Certification For Quality
Of Our Products" From Our O.E. Customer

(li) Energy Consumption

(lii) Specific Energy Consumption

SPECIFIC ENERGY CONSUMPTION



Remark :- The Energy Consumption Has Reduced Every Year But Energy Cost As Percentage Of Manufacturing Cost Has Different Figuer Due To Increase In Tariff By M.P.S.E.B. In The Year 2003-04

(lii) 'Energy Convnersation Commitment Policy & Organizational Set Up.'

The Organisation Is Committed To Make Contineous Positive Efforts To Conserve All Type Of Energy (Viz. Electricity / Air / Fuel / Water).

"Organisation`S Energy Conservation Policy"

1:Top Management Committee Fixes "Corporate Objective" Every Year

For Energy By Comparing Performance With "Previous Years' Best

Results" As "Bench Mark" For Next Year, & Targeting For "Higher

Year	Total Energy Consumption Lakhs Kwh	Specific Energy Consumption In (Kwh / Tonne)	Energy Cost As A% Of Manufacturing Cost
2002-03	130.1	4348	27.63 %
2003-04	128.4	4041	28.22 %
2004-05	132.4	3504	22.01 %

Achievement" Next Year.

2:The Main Objective Is To Operate Most "Cost Effevtive" "Energy Efficient" & "Enviornmental Friendly" Plant.

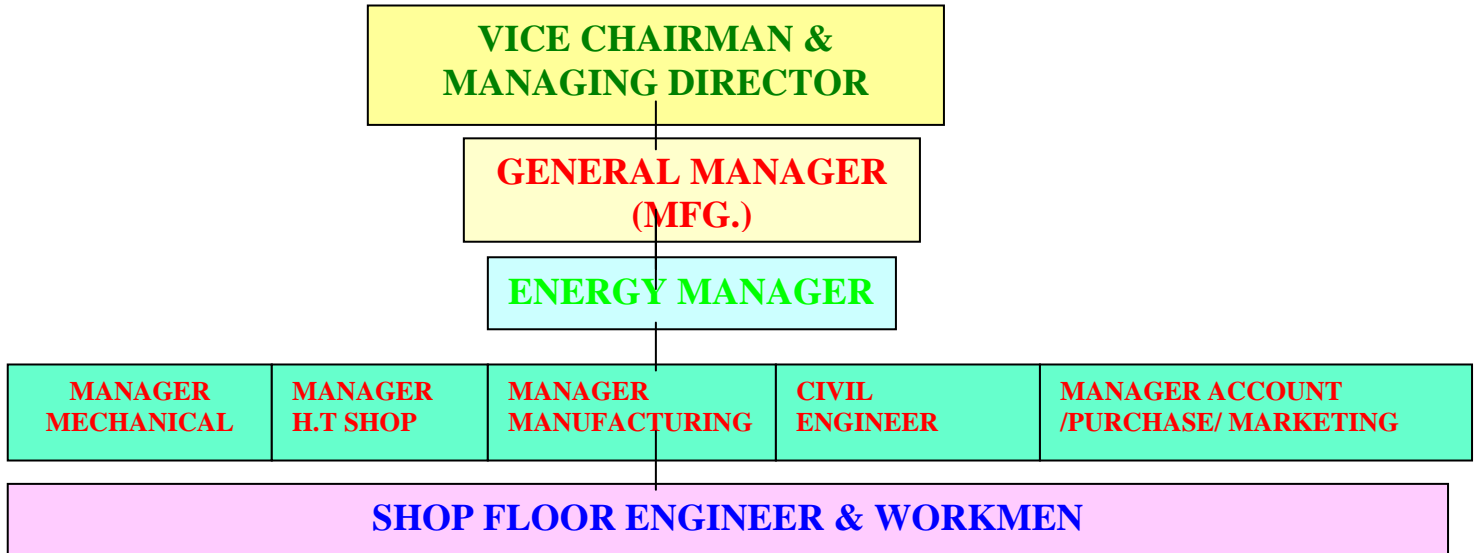
3: Contineous Improvement In Working & Also Close Monitoring Through Energy Management System.

4: Energy Audit & Efeciciency Assessment Is "Built-In Quality",

5: Help From "Environment" And "Tpm " Policy To Be Taken.

6: Awareness Of Energy Conservation At All Levels & Is To Be Reflected & Resulted In Continous Reduction Of Conversion Cost Of The Items Produced Year To Year.

Organization Set Up



(Iv) energy conservation achievement”

Aaa:- due to constant efforts on all front of energy conservation, in a very planned way, we could reduce specific energy consumption by 5 % every year since last 04 years.

Bbb:- even we are maintaining 100 % power factor in last 40 months out of last 41 months (it was 99 % only for one month).

Ccc:-energy conservation projects implemented in 2004-05

As our major power consumption is in our heat-treatment shop, (now shall be referred as h.t. shop), we have decided to concentrate on power saving in h.t.shop. Therefore all energy saving projects taken up last year & even this year, are planned in h.t.shop.

Aa:- project name :-

reduction of power consumption in h.t.shop by using different ways & means.

Bb:- back ground of the project :-

out of total electrical power used in the company, almost 55 % electrical power is used in our heat treatment shop. The reason for 55% power consumption is because all of our furnaces are pit type

furnaces & are with resistance type electrical heaters. (except rotary furnace, which is mounted on floor but it is also using electrical heaters.)

Cc:- observations made:-

the reason for considering / choosing this project as "innovative":- it is because when power consumption in heat treatment is approximately 55 % of total power consumption in company, even a little saving of power consumption in heat treatment shall give us a more & fast financial return.

Dd:- technical & financial analysis:-

“ why-why analysis” for wastage of power in heat treatment:-

in order to under stand the exact reasons, for wastage of power in heattreatment, one task force (now it shall be written as "t.f.") is formed to study all relevant aspects / reasons which are responsible for additional power consumption in heat treatment shop.

this t.f. was having following officials, as team members.

- 01:-general manager mfg.
- 02:-sr.manager, energy & electrical.
- 03:-manager, heat-treatment shop.
- 04:-asst. Manager,electrical maintenance.
- 05:-sr. Supervisor, heat treatment shop.

over & above suggestions were also invited to reduce power consumption in h.t.shop.

The t.f. have studied complete process and all relevant activities of heat treatment & also gone through the suggestions & finally came to conclusion that by taking following steps the power consumption can be reduced.

- 01:- by reducing delay in loading the next charge (after quenching the previous charge.)
- 02:-by loading the full charge quantity in fixture.
- 03:-by reducing frequent switching "on" & "off" of furnaces.
- 04:-the old refractory bricks to be replaced by ceramic bricks with arrangement of either providing heating elements in its groove or by hanging heating elements out side the brick.
- 05:- by using thermal blanket in between outer shell & brick.

Resolution :- in order to implement all above decisions, implementation plan made by t.f. & this plan was put up to management for final approval.

After getting approval from management, the work has been started for implmentation of all above decesions:-

Implementation of these five decisions were devided in two parts.

Part a:- points no. 1/ 2 / /3, where no fund was necessary.

Part b:- points no.4 & 5 where fund was necessary.

As per discussion with management. Looking to financial crises, it was not possible to spare any fund from "working capital". Therefore it was decided first to implement "part a", where we were to get some specific financial saving without any financial investment.

It was also decided that after implementation of "part a" the fund to be created from the saving which the company was to get after implementation of part a.

Part a:-

For implementation of points no. 1 / 2 / 3, no financial fund was necessary but it was necessary to change the present working practice & it was also necessary to change the mind set of working persons. For this we have explained "necessity of power saving" & "technique for getting power saving" to all working persons in heat treatment & also given necessary "on sight training" to them.

01) the term "loading delay" means the difference of time between taking out running charge from furnace for quenching & loading of next charge in furnace for heat treatment. Due to any reason, if the charge is not ready in fixture, then such loading delay occurs. Due to such loading delay the temperature of furnace goes down & extra electrical power is required to make up the temperature. For reducing such loading delay the production schedule is kept under constant watch & efforts made to run only required no. of furnaces (by keeping extra furnaces off) & also working persons are given proper training to keep the "charge for next loading" ready. The end result is that the previous loading delay which was more than 200 hours in a month is reduced to less than 50 hours every month.

Impact-1) benefits after implementation of point no.1:-

Aaa:- $(200-50)*(90+72)/2*0.25*12 = 36450$ kwh every year

Bbb:- the financial saving = $36450*4.58 = \text{rs.}166941/-$ every year.

02) it was always not possible to load the full charge quantity in fixture, because the quantity of components in one batch is always not in multiple of quantity of one charge. This was resulting in to partial loading of fixture. As the weight of fixture / grit / star spacer in a charge remains unaltered, the partial loading of charge was resulting in to excessive consumption of electrical power. The matter was discussed with our r&d people & also with production people & finally it was decided to make a charge from equivalent components (for which the required case depth of carbon penetration is almost equal) this practice had solved the problem of partial loading of charge & thus the energy conservation ensured.

Impact-2) benefits after implementation of point no.2:-

due to this activity the average no.of charges per month is reduced from 938 to 919.



BEFORE

AFTER



Ccc:- the power saving $72*4.5*19*12 = 73872$ kwh every year.

Ddd:- the financial saving = $73872*4.58 = \text{rs.}338334/-$ every year.

03) reducing frequent switching "on" & "off" of furnaces. the flow of our raw material (i.e. Forging) is some times not even & also some time due to any production related problems the material waiting for heat treatment is either excessive or lesser as compared to requirement of material in heat treatment shop.this was resulting in to either "switching on" of additional furnaces, or "switching off" of running furnaces after quenching of running charge.thereafter whenever we need to start spare furnace, it need atleast 10 hours to get preliminary temprature & to creat carbon atmosphere. Fresh charge can be loade only after reaching of preliminary temprature & after creating carbon atmosphere. thus at any time we need to consume (waste) atleast 600 kwh electrical power.

this fact was brought to the notice of management. After a fruitful discussion, the management agreed to stream line the planning of production & also it was decided to minimise such "switchin on" & "switching off" of furnace.now if we need "to switch of" any furnace, then permission from the g.m.mfg. need to be taken before "swithing that furnace on" again.

Impact-3) benefits after implementation of point no.3:-

this revised system resulted in to average reductionof such 09 switching of fornaces every month.

eee:- conservation of electrical power = $600 \times 9 \times 12 = 64800$ kwh every year

fff:- the financial saving = $64800 \times 4.58 = \text{rs.}296784/-$ every year.

Ggg:- total kwh saving after implementation of part a:-
 $36450+73872+64800 = 175122$

Total financial saving after implementation of part a:-

Hhh:- $166941+338334+296784 = \text{rs.}802059/-$

Part b:- for arraging energy conservation against points no. 4 & 5, we need additional funds. These problems are sorted out as under.

After successful implementation of part a,we calculated financial saving which was coming to rs.802059/- every year,was expected after 01 year of its implementation.then the management has agreed to implement part b, in a phased manner.

Part b:- both points were as under.

04 reduction in heat loss due to radiation , by using thermal blanket in between outer shell & brick lining. For this, complete furnace need to be brick lined again.

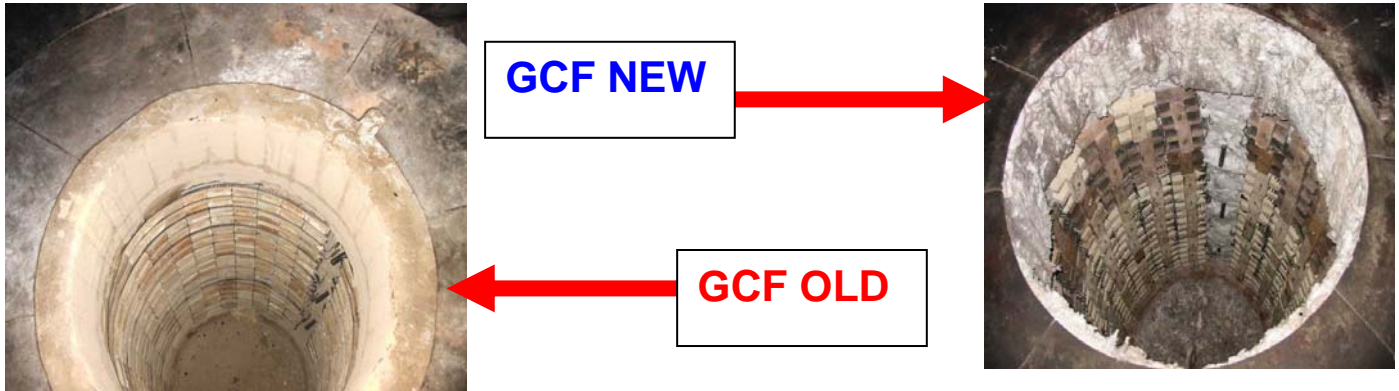
05:-the old refractory bricks to be replaced by ceramic bricks with arrangemet of either providing heating elements in its groove or by hanging heating elements out side the brick. For this activity also, complete furnace need to be brick lined again.

For implementing both these points, over & above to funds, we also need shutdown of furnaces, one by one & that too without effecting day to day production.

In last 01 years, we renoveted / redesigned 04 nos. Of 90 kw (each) furnaces & converted them to 72 kw (each) furnaces. We also redesigned 02 nos. Of 180 kw (each) furnaces & converted them for 167 kw (each) furnaces.

Due to this renovation / redesign we got following benefits.

- aa:-total kw rating of these 6 furnaces, are reduced from 720 kw to 622 kw.
- bb: -heat loss due to radiation decreased.
- cc:- cycle time of furnaces reduced.
- dd: -due to reduction in the temprature of outer wall of furnace, the working environment improved.
- ee:- the life of heating elements improved.
- ff:- overall maintenance on furnace is decreased which again resulted in to additional power & financial saving.



COMBINED IMPACT OF -4&5) THE COMBINED BENEFITS AFTER IMPLEMENTATION OF POINT 4 & 5:-

THIS FURNACE MODIFICATION ACTIVITY RESULTED IN TO AVERAGE REDUCTION OF FURNACE RATING BY 98 KW.

III:- KWH SAVING EVERY TEAR CAME TO $98 \times 10.4 \times 350 = 356720$ KWH

JJJ:- FINANCIAL SAVING EVERY YEAR CAME TO $356720 \times 4.58 = \text{Rs.}1633777/-$

TO CONCLUDE:-

THE BENEFITS AFTER IMPLEMENTATION THIS INOVATIVE PROJECT CAME TO:-

KKK:- AA) KWH SAVING EVERY YEAR = $175122 + 356720 = 531842$ KWH

LLL:- BB) FINANCIAL SAVING EVERY YEAR = $802059 + 1633777 = \text{Rs.}2435836/-$

(V) ENERGY CONSERVATION PLAN & TARGET

PLAN FOR ACHIEVING THE TARGET

01:-THE COMPANY HAD DECIDED BEFORE 04 YEARS TO REDUCE SPECIFIC ENERGY CONSUMPTION BY 25% IN 05 YEARS.

02:-THE SPECIFIC ENERGY CONSUMPTION IS ALREADY REDUCED BY 20% IN LAST 04 YEARS.

03:-FOR ACHIEVING THE BALANCE TARGETS IN YEAR 2005-06 THE COMPANY IS GOING TO TAKE FOLLOWING ACTIONS.

- 1) Company Is Going To Install Voltage Controller For All Machine Shops.
- 2) Converting Of 04 Nos.Of 90 Kw (EACH) Gas Carburising Furnaces(G.C.F.) In To 72 Kw GCF With Ceramic Brick Lining & Thermal Blanket.

- 3) Complete Redesign & Re Arrangement Of Existing 180 KW Rotary Furnace, With An Aim Of Reducing Its Specific Power Consumption By 45%.
- 4) Replacement Of Twin Tube Light Fixtures Having Conventional Copper Choke By Single Tubelight Fixture Having Electronic Ballast (350fixtures.)
- 5) Conversion Of One No.Of Carburising Furnace Of 180 KW In To 167 KW. Energy Efficient Carburising Furnace By Changing Its Design.

AS PREVIOUSLY MENTIONED, THE COMPANY IS TARGETTING 5% IMPROVEMENT EVERY YEAR, & FOR ACHIEVING THIS TARGET, THE COMPANY ALSO DECIDED FOR ADDITIONAL ACTIVITIES, FOR ENERGY CONSERVATION, TO BE TAKEN UP NEXT YEAR BY ADOPTING DIFFERENT ENCON TECHNIQUES.