PROJECT PROFILES

PRODUCT : GOLD PLATING ON JEWELLERY AND OPTICAL FRAMES

PRODUCT CODE : 344021009

QUALITY STANDARD : AS PER CUSTOMERS’ SPECIFICATIONS

PRODUCTION CAPACITY : QUANTITY

(PER ANNUM) OPTICAL FRAMES - 2 LACS NOS.

JEWELLERY - 600 SQ. MTRS.

VALUE (RS.)

OPTICAL FRAMES - 40 LACS

JEWELLERY - 36 LACS

MONTH & YEAR : 15TH FEBRUARY, 2011

PREPARED BY : MSME-DEVELOPMENT INSTITUTE

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Website: www.msmediaahmedabad.gov.in
1. **INTRODUCTION:**

The Gold is a relatively scarce yellow metal. Often found in the native State, which is the most malleable of all metals. It is extremely corrosion resistant but it may be desolved by aqua-regia, potassium cyanide solution and in aquos solution of the halogens bromine and Iodine. The metal does not form a coherent oxide film on its surface even at very high temperature and therefore it has a very low contact resistant.

Electroplating of Gold is mostly carried out to obtain long lasting decorative finishes and in some cases to improve electric contact and conductivity.

It is deposited from alkaline or acidic solutions. The metal concentration is low because of the high price of gold. The Electrolytes are heated to 50° to 70° to obtain a reasonable speed of deposition. The cathode efficiency depend upon the metal concentration and the temperature. The colour of gold deposits depends upon the operating temperature, current density and metal concentration and also on the composition of the electrolyte. Light yellowish coatings are obtained at low current density, low temperature and high metal concentration. A light colour is also obtained by adding nickel salts while red gold is deposited from baths containing copper. The anode are composed of very pure gold sheet or sometimes insoluble carbon. In the later case the concentration must be maintained by adding metal salt.

2. **MARKET POTENTIAL:**

There are a large number of application are available for electroplating units. These are:

a) **DECORATIVE**

The important uses are in the jewellery cutlery and allied trades, fancy goods such as hand bag optical frames & costumes, jewellery. Thin deposit of pure gold may be applied over bright nickel and this can be more economic where wear resistance is required watch cases, pen cases, plumbing fixtures and door handles and hinges. In all these decorative uses, the colour of the gold is a very important feature ranging from white gold, yellow to rose, red to green gold, many of these colours are subject of strict requirements such swiss watch cases colour standards.
b) **INDUSTRIAL USES**

The most important industrial use of electroplated gold is in the electronic industries which have grown in the last few years. Because of its unique properties it has become a valuable element in the fabrication of micro-electronics & electronic devices such as Calculators, Transistors & Diodes. Larger items such as heat sinks, heater, springs, wires connectors printed circuits often use gold to form protected tracks.

Gold electroplating is also being used in many other engineering, aerospace and scientific applications e.g. reflector material in lasers and where the infra red reflectivity is required. Hence, the good market is available for this unit.

3. **BASIS & PRESUMPTION:**

   (i) The efficiency of the unit is calculated at 70% of the total production capacity. The unit will work 25 days in a month on single shift basis and 300 days in a year.

   (ii) The time period for achieving the full envisaged capacity utilization is six months.

   (iii) The labour wages are as per the prevailing rates in the market.

   (iv) The rate of interest for fixed and working capital is taken as 14 percent.

   (v) The margin money requirement for this project is 30 percent.

   (vi) The pay back period of this project is 5 years.

4. **IMPLEMENTATION SCHEDULE:**

   The time requirement for preparation of Project Report : Two months
   Time requirement for selection of site : One month
   Time required for registration as small scale unit : One week
   Time required for acquiring the loan, machinery procurement, erection and commissioning : Three months
   Recruitment of labourers etc. : One month
   Trial Runs : One month
5. **TECHNICAL ASPECTS:**

**PROCESS OF MANUFACTURE**

The gold is mainly electro deposited from potassium gold cyanide solution which contains a certain minimum quantity of gold. The articles which are to be plated first perfectly cleaned in a suitable hot alkaline soak cleaner and rinsed well. Then pickled and etched the article in the chromic sulphuric acid for 1 to 2 minutes approximately at temperature of 60° to 70°C. Then swill and dry the article. Then polished the article if required and again soak article in hot clean and swill well.

6. **PROCESS FLOW CHART:**

Process flow chart is as under:

```
Article

Hot Clean

Swill

Dry

Polished

Aqous Cleaning

Hot Cleaning Cathadic

Swill

Acid Dip if required
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Gold Plating Process

The articles are hanged on the cathode bar of the plating bath where the plating is done. Anode is made of the pure gold metal (electrode). Then D.C. current between anode and cathode is passed and thereby the plating process is starts. The time of plating depends upon the thickness of the coating required. After being nickel plated the article drag out, water swill and the article should be moped out with suitable mop.

Preparation of Bath

To prepare the gold plating bath first clean the PVC lined plating tank with hot die acid and washed out and filled it to one third of its capacity with distilled water. The temperature of the water is raised to 60°C and the required weight of potassium gold cyanide caustic potash and potassium sulphite is slowly added. The mixture being agitated well stirred until all the salts are dissolved. Now the bath can be filled up to the required final level and the solution must be purified to remove the traces of the metallic impurities.
Many formulations have been prepared so far for the gold plating. However, a typical formulation and operation conditions are given below:

- Potassium Cyanide - 12 Grms.
- Potassium gold cyanide - 18 Grms.
- Caustic Potash - 12 Grms.
- Potassium Sulphite - 5 Grms.
- One litre distilled water
- Temperature - 120°F to 180°F
- Current density - 2 - 6 Amps/Sq. Ft.
- Volt - 1.5 – 2 Volts

Now a days a readymade gold plating salt are available in the market in which the required proportion of the chemical are mixed. Therefore, this salt can also be utilized for the purpose.

7. QUALITY SPECIFICATION : As per customer’s specification.

8. PRODUCTION CAPACITY (Per Annum)

(a) Quantity - 600 Sq. Meters Gold Jewellery
               2.0 Lacs Nos. of Optical Frames

(b) Value (Rs.) - 36 Lacs Gold Jewellery
                 - 40 Lacs Optical Frames
                 --------
                 Total : 76 Lacs
                 --------

9. MOTIVE POWER REQUIREMENT : 7 K.W.

10. POLLUTION CONTROL:

    The unit has been identified the pollution making industry. Hence, the No Objection Certificate (NOC) has to be taken from the State Pollution Control Board before starting the unit.

11. ENERGY CONSERVATION:

    The proper planning to take out the batch and the proper utilization of the machineries may save the energy.
12. **FINANCIAL ASPECTS:**

(i) **FIXED CAPITAL**

<table>
<thead>
<tr>
<th>Land &amp; Building</th>
<th>Area Sq. Mtrs.</th>
<th>Rate Rs./Sq. Mtr.</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>100</td>
<td>2000</td>
<td>2,00,000/-</td>
</tr>
<tr>
<td>Built up area</td>
<td>75</td>
<td>5000</td>
<td>3,75,000/-</td>
</tr>
</tbody>
</table>

Total cost of land & building : 5,75,000/-

(ii) **MACHINERY & EQUIPMENT**

(a) Production Unit

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Description of Machines</th>
<th>Qty. (Nos.)</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Rectifier single phase DC Output, 200 Amp 6 Volt complete with meter panel etc.</td>
<td>1</td>
<td>75,000/-</td>
</tr>
<tr>
<td>(ii)</td>
<td>Cleaning/Swilling tank MS Cap 2” x 2” x 2”</td>
<td>2</td>
<td>10,000/-</td>
</tr>
<tr>
<td>(iii)</td>
<td>Nickel plating tank Size 3” x 3” x 3” MS PVC with electrode pipe &amp; immersion heater</td>
<td>1</td>
<td>30,000/-</td>
</tr>
<tr>
<td>(iv)</td>
<td>Etching Tank 2” x 2” x 2” MSRL with Lipduct and blower arrangement</td>
<td>1</td>
<td>20,000/-</td>
</tr>
<tr>
<td>(v)</td>
<td>Gold plating tank 3”x3”x3” MS PVC with Lipduct and blower arrangement</td>
<td>1</td>
<td>25,000/-</td>
</tr>
<tr>
<td>(vi)</td>
<td>Buffing Machine single phase 220 to 240 volt, RPM 1440 with accessories</td>
<td>1</td>
<td>10,000/-</td>
</tr>
<tr>
<td>(vii)</td>
<td>Miscellaneous machines PP Tubes, Jigs etc. L.S.</td>
<td>L.S.</td>
<td>35,000/-</td>
</tr>
<tr>
<td>(viii)</td>
<td>Pollution control equipment exhaust system etc. L.S.</td>
<td>L.S.</td>
<td>1,00,000/-</td>
</tr>
</tbody>
</table>

(b) Testing Equipment

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15,000/-</td>
</tr>
</tbody>
</table>

(c) Electrification and Installation charges @ 10% of cost of Machinery and Equipment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30,000/-</td>
</tr>
</tbody>
</table>

(d) Total cost of Machinery and equipment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3,25,000/-</td>
</tr>
</tbody>
</table>

(e) Total cost of Machinery and equipment

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50,000/-</td>
</tr>
</tbody>
</table>

Total : 4,00,000/-
13. **WORKING CAPITAL (Per Month)**

**A. Staff and Labour**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Nos.</th>
<th>Salary (Rs.)</th>
<th>Total (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemist/Production Manager</td>
<td>1</td>
<td>10,000/-</td>
<td>10,000/-</td>
</tr>
<tr>
<td>Supervisor</td>
<td>1</td>
<td>7,000/-</td>
<td>7,000/-</td>
</tr>
<tr>
<td>Clerk-cum-Typist</td>
<td>1</td>
<td>5,000/-</td>
<td>5,000/-</td>
</tr>
<tr>
<td>Accountant</td>
<td>1</td>
<td>3,500/-</td>
<td>3,500/-</td>
</tr>
<tr>
<td>Skilled Worker</td>
<td>1</td>
<td>3,000/-</td>
<td>3,000/-</td>
</tr>
<tr>
<td>Unskilled Worker</td>
<td>2</td>
<td>3,000/-</td>
<td>6,000/-</td>
</tr>
<tr>
<td>Peon-cum-Watchman</td>
<td>1</td>
<td>3,000/-</td>
<td>3,000/-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>37,500/-</strong></td>
<td></td>
</tr>
<tr>
<td>Perquisites @ 15% of salary</td>
<td></td>
<td><strong>5,625/-</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>43,125/-</strong></td>
<td></td>
</tr>
<tr>
<td>Or say</td>
<td></td>
<td><strong>43,000/-</strong></td>
<td></td>
</tr>
</tbody>
</table>

**B. Raw Material**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Qty.</th>
<th>Rate/kg. (Rs.)</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pure Gold (22 carat)</td>
<td>200 Gms.</td>
<td>20 Lacs</td>
<td>4,00,000/-</td>
</tr>
<tr>
<td>2.</td>
<td>Potassium Cyanide</td>
<td>7 Kgs.</td>
<td>650/-</td>
<td>4,550/-</td>
</tr>
<tr>
<td>3.</td>
<td>Caustic Potash</td>
<td>10 Kgs.</td>
<td>150/-</td>
<td>1,500/-</td>
</tr>
<tr>
<td>4.</td>
<td>Potassium Sulphate</td>
<td>1 Kg.</td>
<td>200/-</td>
<td>200/-</td>
</tr>
<tr>
<td>5.</td>
<td>Miscellaneous Chemicals</td>
<td>L.S.</td>
<td></td>
<td>15,000/-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>4,21,250/-</strong></td>
</tr>
<tr>
<td>Or say</td>
<td></td>
<td></td>
<td></td>
<td><strong>4,21,000/-</strong></td>
</tr>
</tbody>
</table>

**C. Utilities**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Rate/unit</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>15 KW @ Rs. 5.00/unit</td>
<td>15,000/-</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>2,000/-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>17,000/-</td>
</tr>
</tbody>
</table>
### D. Other Contingent Expenses

<table>
<thead>
<tr>
<th>Expense</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postage &amp; Stationery</td>
<td>2,000/-</td>
</tr>
<tr>
<td>Telephone</td>
<td>2,000/-</td>
</tr>
<tr>
<td>Consumable Store</td>
<td>5,000/-</td>
</tr>
<tr>
<td>Repair &amp; Maintenance</td>
<td>10,000/-</td>
</tr>
<tr>
<td>Transportation charges</td>
<td>5,000/-</td>
</tr>
<tr>
<td>Advertisement &amp; Publicity</td>
<td>5,000/-</td>
</tr>
<tr>
<td>Insurance</td>
<td>3,000/-</td>
</tr>
<tr>
<td>Miscellaneous Expenses</td>
<td>1,000/-</td>
</tr>
</tbody>
</table>

**Total:** 33,000/-

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### 14. TOTAL WORKING CAPITAL (Per Month)

\[
= (A + B + C + D)
\]

\[
= 43000 + 421000 + 17000 + 33000
\]

\[
= 5,14,000
\]

### 15. TOTAL CAPITAL INVESTMENT

**Fixed Capital** = (i+ii)

\[
= 575000 + 400000
\]

\[
= \text{Rs. } 9,75,000/-
\]

**Working Capital for 3 months**

\[
= \text{Rs. } 5,14,000/- \times 3
\]

\[
\text{Total } = \text{Rs. } 15,42,000/-
\]

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### 16. FINANCIAL ANALYSIS:

<table>
<thead>
<tr>
<th>Expense</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of production (Per Year)</td>
<td></td>
</tr>
<tr>
<td>- Total recurring cost per year</td>
<td>61,68,000/-</td>
</tr>
<tr>
<td>- Depreciation on building @ 5%</td>
<td>18,750/-</td>
</tr>
<tr>
<td>- Depreciation on machinery @ 10%</td>
<td>35,500/-</td>
</tr>
<tr>
<td>- Depreciation on Office Equipment @ 20%</td>
<td>10,000/-</td>
</tr>
<tr>
<td>- Interest on total capital investment @ 14%</td>
<td>2,15,880/-</td>
</tr>
</tbody>
</table>

\[
\text{Total Cost of Production } = \text{Rs. } 64,48,050/-
\]

Or say \[
\text{Rs. } 64,48,000/-
\]
Sales/Turnover (Per Year)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Rate (Rs.)</th>
<th>Value (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Plating</td>
<td>600 Sq. meters</td>
<td>6000/-</td>
<td>36,00,000/-</td>
</tr>
<tr>
<td>Gold plated Jewellery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Lacs No. Optical Frames</td>
<td>20/-</td>
<td>40,00,000/-</td>
<td></td>
</tr>
</tbody>
</table>

Net Profit (Per Year)

<table>
<thead>
<tr>
<th>Turnover</th>
<th>Cost of Production</th>
<th>Profit (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>76,00,000/-</td>
<td>64,48,000/-</td>
<td>11,52,000/-</td>
</tr>
</tbody>
</table>

Net Profit Ratio = \( \frac{\text{Net Profit} \times 100}{\text{Turnover}} \)

\[
\frac{11,52,000 \times 100}{76,00,000} = 15.15\%
\]

Rate of return = \( \frac{\text{Net Profit per year} \times 100}{\text{Total Investment}} \)

\[
\frac{11,52,000 \times 100}{15,42,000} = 74.7\%
\]

Break even point (% of total production envisaged)

Fixed Cost

(a) Depreciation of machineries & equipment = 35,500/-
(b) Depreciation of office equipment = 10,000/-
(c) Depreciation on building = 18,750/-
(d) Interest on total capital investment = 2,15,880/-
(e) Insurance = 36,000/-
(f) 40% of salary and wages = 1,80,000/-
(g) 40% of other contingent expenses = 1,58,400/-

Total Fixed Cost (FC) = 6,44,530/-
B.E.P. = \frac{\text{Fixed Cost} \times 100}{\text{Fixed Cost} + \text{Net Profit}}

= \frac{644530 \times 100}{644530 + 1152000}

= 35.87\%

LIST OF CHEMICALS AND RAW MATERIALS SUPPLIERS:

1. M/s. Mahavir Chemicals Industries
   Mahavir Estate
   Behind Shah Chambers
   Nr. C.T.M. Cross Lane, Amraiwadi,
   Ahmedabad.

2. M/s. Manish Sales Corporation
   178, Chetan Cloth Market
   Sarangpur Gate
   Ahmedabad-380 001.

3. M/s. Delta Chemicals
   6, Delta House
   J-1, Cama-Zone, Goregaon (E)
   Bombay-400 063.

4. M/s. Komal Agencies
   4, Shairaji Colony
   Near Darpan Cinema
   Andheri (East), Mombay-400 099.

5. M/s. Platewel Processes & Chemicals Ltd.
   Padra Road, Atladra
   P.B. No. 70
   Baroda-390 012.
LIST OF MACHINERY SUPPLIERS:

1. M/s. Graller Weil (India) Ltd.
   Sukh Sagar, 6th Floor
   N.S. Patkar Marg, Choupahg
   Mumbai-400 007.

   Eucharstic Congress Building III
   5, Convent Street
   Mumbai – 400 039

3. M/s. Transcrafts
   11, Umbergaon Industrial Estate
   Valsad.

4. M/s. Mr. Mistry & Co.,
   97, Amrut Industrial Estate
   Dudheshwar Road, Ahmedabad.

5. M/s. Kajal Electricals
   14/B, Thakkar Estate
   Nr. Nageshwar Estate, Jawahar Nagar
   Amraiwadi, Ahmedabad.

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