

PROJECT REPORT

OF

CALCULATOR MANUFACTURING

UNIT

PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding Calculator manufacturing unit.

The objective of the pre-feasibility report is primarily to facilitate potential entrepreneurs in project identification for investment and in order to serve his objective; the document covers various aspects of the project concept development, start-up, marketing, finance and management.

[We can modify the project capacity and project cost as per your requirement. We can also prepare project report on any subject as per your requirement.]



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PROJECT AT GLANCE

1 Name of Proprietor/Director	XXXXXXXXXX
2 Firm Name	XXXXXXXXXX
3 Registered Address	XXXXXXXXXX
4 Nature of Activity	XXXXXXXXXX
5 Category of Applicant	XXXXXXXXXX
6 Location of Unit	XXXXXXXXXX
7 Cost of Project	19.00 Rs. In Lakhs
8 Means of Finance	
i) Own Contribution	1.90 Rs. In Lakhs
ii) Term Loan	12.60 Rs. In Lakhs
iii) Working Capital	4.50 Rs. In Lakhs
9 Debt Service Coverage Ratio	2.32
10 Break Even Point	0.40
11 Power Requirement	20 KW
12 Employment	9 Persons
13 Major Raw Materials	Plastic,Electrical components and other components.

14 Details of Cost of Project & Means of Finance

<u>Cost of Project</u>	<u>Amount in Lacs</u>
Particulars	Amount
Land	Owned/Leased
Building & Civil Work	Owned/Leased
Plant & Machinery	12.50
Furniture & Fixture	0.50
Other Misc Assets	1.00
Working Capital Requirement	5.00
Total	19.00

<u>Means of Finance</u>	<u>Amount</u>
Particulars	Amount
Own Contribution	1.90
Term Loan	12.60
Working capital Loan	4.50
Total	19.00

1. INTRODUCTION

A calculator is typically a portable electronic device used to perform calculations, ranging from basic arithmetic to complex mathematics. Calculators are extensively used in offices, banks, shops, departmental stores & various other establishments. Scientific calculators are used by students & research workers. These calculators use on an integrated circuit. Generally, these calculators could be placed in the following categories: 1. Pocket calculators 2. Desk Top calculators 3. Desktop-type with the printer. These categories could be further subdivided based on no. of digits, type of display i.e. LCD/Fluorescent, etc., by memory function, power i.e. Single/Dual/Triple power operated, etc. Calculators contain a keyboard with buttons for digits and arithmetical operations; some even contain "00" and "000" buttons to make larger or smaller numbers easier to enter. Most basic calculators assign only one digit or operation on each button; however, in more specific calculators, a button can perform multi-function working with key combinations. Calculators usually have liquid-crystal displays (LCD) as output in place of historical light-emitting diode (LED) displays and vacuum fluorescent displays (VFD). Calculators also can store numbers in computer memory. Basic calculators usually store only one number at a time; more specific types can store many numbers represented in variables.



2. PRODUCT DESCRIPTION

2.1 PRODUCT USES

Electronic calculators are extensively used in offices, Banks, shops, Departmental stores, Students, Educational bodies and various other establishments. Scientific calculators are used by students and research workers.

2.2 RAW MATERIAL REQUIREMENT

2.2.1 Plastic: Plastic granules can be used to form an enclosure shell/case for an electronic calculator. Most PP or PVC granules can be used to form a case for this product. Because of its rigidity, melting temperature point and other characteristics are suitable for forming cases for the product.



2.2.2 Electrical components: Controller IC, Diodes, Memory chips, Sensors, Customized circuit board, LCD, Battery, Connectors, etc. Circuit board will come with printed contact points on it. An LCD is used to display output or for showing you the numbers you type in and the results of your calculations. Memory chips are used to store previous outputs. Lithium cell or AA battery, the type of [batteries](#) used depends on the calculator's features.



2.2.3 **Other:** Silicone rubber Keypad, Screws, Soldering flux, Solder wire and paste, Battery contacts, Wires, etc.

Pressing a button on a silicone rubber keypad forces the webbing material to deform, at which point the switch's conductive contact touches the PCB contact. When this occurs, the silicone rubber keypad identifies and registers this action as a button press.



2.3 MANUFACTURING PROCESS

This process can be broken down into the following steps:

1. Raw material procurement
2. Injection molding- Plastic molding
3. PCB assembly
4. Assembly

5. Testing

Raw material procurement

To ensure complete quality control, all raw materials will be checked strictly as per established quality standards and requirements. Sorting of raw material will be done. In the sorting procedure, the different types of materials or parts will be sorted out like plastic, electrical components, etc. It will be separated and the material will be stored; dust free, neat, and clean environment is a must, for which an air handling unit is required, and later on, it will dispatch to the assembly line.

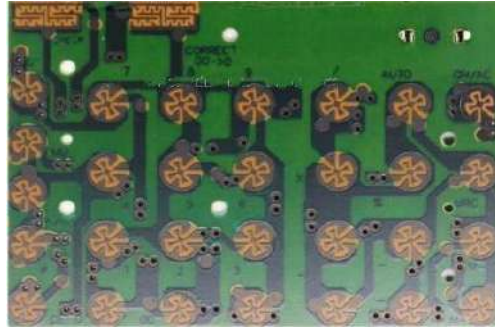
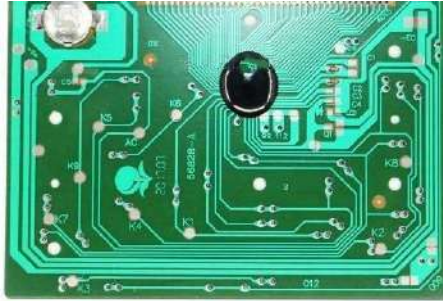
Injection molding- Plastic molding

Plastic molding is done by using an injection molding machine. The plastic casing/cabinet used for calculator construction is typically injection molded using plastic granules. In this process; Firstly granules are fed via a hopper into a heated barrel. Where the plastic will be melted at the set temperature. The melted plastic is then injected through a nozzle into a mold cavity where it cools and hardens to the configuration of the cavity and the formed plastic parts will be ejected out. The plastic case is used to provide a covering for the electric components of the calculator for protection and safe handling. This molded case will be a rigid, strong, insulated housing in which the other components will be mounted later. Enclosure cases, buttons, etc. required parts will be formed using the plastic molding process. Attention to detail and design results in a more refined finished product and also user satisfaction. The design of the keys is like a concave surface; to fit the curvature of fingers. This shape of the keys makes a considerable difference in comfort and results in a more positive user experience. Later on, using pad printing machine numbers or signs will be printed on plastic keys (buttons).



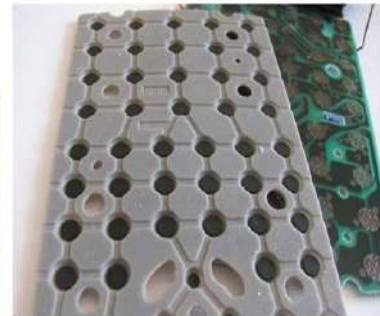
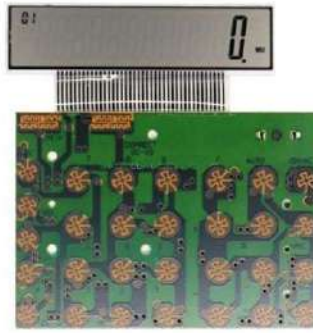
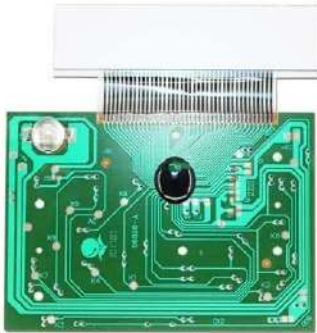
PCB assembly

Assembly for calculator PCB will be done in the PCB assembly unit. The circuit board has a two-layer board with a green solder mask and one side has a contact point printed on it. The PCB is comprised entirely of surface-mount components and some of them appear to be hand-placed. Firstly on customized bare board solder paste will be applied using a printer. Here stencil is used which is a thin piece of stainless steel with cut holes. It helps to solder paste to go on the pads, where the components are going to be soldered down. To get the right amount of solder paste in all the places solder paste inspection machine is used. This machine checks whether the solid paste printed by the printing machine meets the IPC standards. It will check the thickness and amount of solder paste, and may lead to defective products. The inspection systems within solder paste printers use 2D technology while devoted SPI machines utilize 3D technology to enable a more thorough inspection including solder paste volume per pad and not simply print region. When the printed PCB has been affirmed to have the right amount of solder paste applied it moves into the next part of the manufacturing process which is component placement. Pick and place machine is used for component placement. Each component will be picked from its packaging using either a vacuum or gripper nozzle, checked by the vision system, and placed in the programmed location at high speed. Following the component placement process, it is important to verify that no mistakes have been made and that all parts have been correctly placed before reflow soldering. The most ideal method of doing this is by utilizing an AOI machine to make checks like component presence, type/value, and polarity. After pre reflow automated optical inspection reflow process will be done; reflow soldering is a process in which a board will be heated to attach electrical components to contact pads. Further Post-Reflow Automated Optical Inspection (AOI) will be done, where the surface mount assembly process is to again check that no mistakes have been made by using an AOI machine to check solder joint quality. Some components will be placed and soldered manually. Assembled PCB will dispatch for testing and later it will be used in the final product assembly. Components and the size of the PCB can be varied as per product quality and by manufacturers. Later after the final assembly, PCB will be soldered with a power source and this soldering process will be done manually.



Assembly

Molded plastic parts and assembled PCB with other require components will be collected at the assembly line. Buttons will be placed with an attached keypad rubber membrane in key slots. The membrane will be placed in such a manner that it will make contact with the circuit board contact point. Mounting of PCBs in the cabinet along with the LCD will be done. PCB will be screwed with the plastic case. Connection for the same will be made using connectors. The display will be connected to the circuit board using an elastomeric connector wire. And this display system and PCB will be covered with a cover. Battery contacts and cell will be fixed. And a connection for the power source to the PCB will be made by soldering wire.





Testing

- Endurance test, Durability test
- Response time, Accuracy, Keys On-off testing.
- PCB testing- ICT and Functional Test- to determine board's final pass/fail status.



3. PROJECT COMPONENTS

3.1 Land /Civil Work

The land require for this manufacturing unit will be approx. around 2000-2500 square feet.

We have not considered the cost of Land purchase & Building Civil work in the project. It is assumed that land & building will be on rent & approx. rental of the same will be Rs.20000-25000 per month.

3.2 Plant & Machinery

- **Injection molding machine**

The calculator case/housing is being made from plastic granules. Firstly granules are fed via a hopper into a heated barrel. Where the plastic will be melted at the set temperature. The melted plastic is then injected through a nozzle into a mold cavity where it cools and hardens to the configuration of the cavity and the formed plastic parts for the calculator will be ejected out.



- **Solder Paste printer**

The Solder Paste printing process is the common way of applying solder paste onto a PCB, which is performed by printing solder paste through apertures in a stencil.



- **Pick and place machine**

Pick and place machines used for placing surface mount components as accurately and quickly as possible.



- **Reflow machine**

Reflow soldering is a process in which a solder paste will be heated and electrical components will be attached to contact pads.



- **SPI machine**

Solder Paste Inspection is a key technique used in the manufacture and test of PCBs. SPI machine enables fast and accurate inspection of the solder paste on PCBs to ensure that the quality of paste on PCB is printed correctly and without manufacturing faults.



- **AOI machine- Automated optical inspection**

The use of an AOI machine is to make checks such as component presence, type/value, and polarity while PCB assembly.



- **Temperature-controlled soldering station**

Soldering iron is a hand tool used to solder components on PCB. Here it can be used to solder battery contacts points with PCB.



- **Printing machines**

Pad printing machines can be used to print signs on plastic keys. Laser printing machines can be used to print the production company logo and other related information on the product.



- **Testing Equipment's**

- i. **Oscilloscope**- This equipment is used to test and display voltage signals as waveforms, visual representations of the variation of voltage over time.



- ii. **DC power supply** - DC power supplies are power supplies that produce an output DC voltage.



- iii. **Multimeter** - A multimeter is mainly used to measure electrical characteristics of voltage, current, and resistance. It can also be used to test continuity between two points in an electrical circuit.



- **Tools:** While assembling the product these tools will be required- Screwdriver, Tweezers, Wirecutter, Wire strippers,

4. LICENSE & APPROVALS

- GST
- NOC from Fire Department.
- NOC From Pollution Department (if applicable)
- Udyam Registration is required.
- BIS certification
- Trademark (optional)

PROJECTED BALANCE SHEET

(in Lacs)

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
<u>Liabilities</u>					
Capital					
Opening Balance		2.95	4.53	7.02	9.68
Add:- Own Capital	1.90				
Add:- Retained Profit	2.80	3.83	5.49	6.66	7.53
Less:- Drawings	1.75	2.25	3.00	4.00	5.00
Closing Balance	<u>2.95</u>	<u>4.53</u>	<u>7.02</u>	<u>9.68</u>	<u>12.21</u>
Term Loan	11.20	8.40	5.60	2.80	-
Working Capital Limit	4.50	4.50	4.50	4.50	4.50
Sundry Creditors	1.77	2.32	2.61	3.11	3.45
Provisions & Other Liabilities	0.50	0.75	0.90	1.08	1.30
TOTAL :	20.92	20.50	20.63	21.17	21.46
<u>Assets</u>					
Fixed Assets (Gross)	14.00	14.00	14.00	14.00	14.00
Gross Depreciation	2.08	3.84	5.34	6.62	7.71
Net Fixed Assets	11.93	10.16	8.66	7.38	6.29
Current Assets					
Sundry Debtors	1.54	1.56	2.04	2.60	2.87
Stock in Hand	5.34	6.23	6.99	7.79	8.62
Cash and Bank	1.62	1.81	2.04	2.41	2.43
Loans and advances/other current assets	0.50	0.75	0.90	1.00	1.25
TOTAL :	20.92	20.50	20.63	21.17	21.46

PROJECTED PROFITABILITY STATEMENT					(in Lacs)
PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Capacity Utilisation %	50%	55%	60%	65%	70%
SALES					
CALCULATOR	65.84	78.05	87.55	97.44	107.72
Total	65.84	78.05	87.55	97.44	107.72
COST OF SALES					
Raw material cost	40.92	46.46	52.27	58.34	64.68
Electricity Expenses	3.36	3.70	4.07	4.47	4.92
Depreciation	2.08	1.77	1.50	1.28	1.09
Wages & labour	6.24	6.86	7.55	8.31	9.14
Repair & maintenance	0.33	0.78	1.05	0.97	1.08
Consumables	0.99	1.17	1.31	1.46	1.62
Packaging cost	1.65	1.17	0.88	0.97	1.08
Cost of Production	55.56	61.91	68.63	75.81	83.60
Add: Opening Stock	-	3.29	3.90	4.38	4.87
Less: Closing Stock	3.29	3.90	4.38	4.87	5.39
Cost of Sales	52.27	61.30	68.16	75.32	83.08
GROSS PROFIT	13.57	16.75	19.39	22.12	24.64
GROSS PROFIT RATIO	20.61%	21.46%	22.15%	22.70%	22.87%
Salary to Staff	4.44	5.11	5.87	6.75	7.77
Interest on Term Loan	1.24	2.00	0.78	0.47	0.17
Interest on working Capital	0.50	0.50	0.50	0.50	0.50
Rent	3.00	3.30	3.63	3.99	4.39
Selling & Administration Expenses	1.58	1.95	2.85	3.17	3.50
TOTAL	10.75	12.85	13.62	14.88	16.32
NET PROFIT	2.82	3.90	5.76	7.24	8.32
Taxation	0.02	0.07	0.28	0.57	0.79
PROFIT (After Tax)	2.80	3.83	5.49	6.66	7.53
NET PROFIT RATIO	4.28%	5.00%	6.58%	7.43%	7.72%

PROJECTED CASH FLOW STATEMENT					(in Lacs)
PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
<u>SOURCES OF FUND</u>					
Own Margin	1.90				
Net Profit	2.82	3.90	5.76	7.24	8.32
Depriciation & Exp. W/off	2.08	1.77	1.50	1.28	1.09
Increase in Cash Credit	4.50	-	-	-	-
Increase In Term Loan	12.60	-	-	-	-
Increase in Creditors	1.77	0.55	0.29	0.50	0.34
Increase in Provisions & Other liabilities	0.50	0.25	0.15	0.18	0.22
TOTAL :	26.16	6.47	7.71	9.19	9.96
<u>APPLICATION OF FUND</u>					
Increase in Fixed Assets	14.00				
Increase in Stock	5.34	0.89	0.77	0.80	0.83
Increase in Debtors	1.54	0.02	0.48	0.56	0.27
Increase in loans and advances	0.50	0.25	0.15	0.10	0.25
Repayment of Term Loan	1.40	2.80	2.80	2.80	2.80
Drawings	1.75	2.25	3.00	4.00	5.00
Taxation	0.02	0.07	0.28	0.57	0.79
TOTAL :	24.54	6.28	7.47	8.83	9.94
Opening Cash & Bank Balance	-	1.62	1.81	2.04	2.41
Add : Surplus	1.62	0.18	0.23	0.37	0.02
Closing Cash & Bank Balance	1.62	1.81	2.04	2.41	2.43

CALCULATION OF D.S.C.R

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
CASH ACCRUALS	4.87	5.60	6.99	7.94	8.62
Interest on Term Loan	1.24	2.00	0.78	0.47	0.17
Total	6.11	7.59	7.77	8.42	8.79
REPAYMENT					
Instalment of Term Loan	1.40	2.80	2.80	2.80	2.80
Interest on Term Loan	1.24	2.00	0.78	0.47	0.17
Total	2.64	4.80	3.58	3.27	2.97
DEBT SERVICE COVERAGE RATIO	2.32	1.58	2.17	2.57	2.96
AVERAGE D.S.C.R.					2.32

REPAYMENT SCHEDULE OF TERM LOAN								
							Interest	11.00%
Year	Particulars	Amount	Addition	Total	Interest	Repayment	Closing Balance	
1st	Opening Balance	-						
	1st month		12.60	12.60	-	-	12.60	
	2nd month	12.60	-	12.60	0.12	-	12.60	
	3rd month	12.60	-	12.60	0.12	-	12.60	
	4th month	12.60	-	12.60	0.12	-	12.60	
	5th month	12.60	-	12.60	0.12	-	12.60	
	6th month	12.60	-	12.60	0.12	-	12.60	
	7th month	12.60	-	12.60	0.12	0.23	12.37	
	8th month	12.37	-	12.37	0.11	0.23	12.13	
	9th month	12.13	-	12.13	0.11	0.23	11.90	
	10th month	11.90	-	11.90	0.11	0.23	11.67	
	11th month	11.67	-	11.67	0.11	0.23	11.43	
	12th month	11.43	-	11.43	0.10	0.23	11.20	
					1.24	1.40		
2nd	Opening Balance							
	1st month	11.20	-	11.20	0.10	0.23	10.97	
	2nd month	10.97	-	10.97	0.10	0.23	10.73	
	3rd month	10.73	-	10.73	0.10	0.23	10.50	
	4th month	10.50	-	10.50	0.10	0.23	10.27	
	5th month	10.27	-	10.27	0.09	0.23	10.03	
	6th month	10.03	-	10.03	1.00	0.23	9.80	
	7th month	9.80	-	9.80	0.09	0.23	9.57	
	8th month	9.57	-	9.57	0.09	0.23	9.33	
	9th month	9.33	-	9.33	0.09	0.23	9.10	
	10th month	9.10	-	9.10	0.08	0.23	8.87	
	11th month	8.87	-	8.87	0.08	0.23	8.63	
	12th month	8.63	-	8.63	0.08	0.23	8.40	
					2.00	2.80		
3rd	Opening Balance							
	1st month	8.40	-	8.40	0.08	0.23	8.17	
	2nd month	8.17	-	8.17	0.07	0.23	7.93	
	3rd month	7.93	-	7.93	0.07	0.23	7.70	
	4th month	7.70	-	7.70	0.07	0.23	7.47	
	5th month	7.47	-	7.47	0.07	0.23	7.23	
	6th month	7.23	-	7.23	0.07	0.23	7.00	
	7th month	7.00	-	7.00	0.06	0.23	6.77	
	8th month	6.77	-	6.77	0.06	0.23	6.53	
	9th month	6.53	-	6.53	0.06	0.23	6.30	
	10th month	6.30	-	6.30	0.06	0.23	6.07	
	11th month	6.07	-	6.07	0.06	0.23	5.83	
	12th month	5.83	-	5.83	0.05	0.23	5.60	
					0.78	2.80		

4th	Opening Balance						
	1st month	5.60	-	5.60	0.05	0.23	5.37
	2nd month	5.37	-	5.37	0.05	0.23	5.13
	3rd month	5.13	-	5.13	0.05	0.23	4.90
	4th month	4.90	-	4.90	0.04	0.23	4.67
	5th month	4.67	-	4.67	0.04	0.23	4.43
	6th month	4.43	-	4.43	0.04	0.23	4.20
	7th month	4.20	-	4.20	0.04	0.23	3.97
	8th month	3.97	-	3.97	0.04	0.23	3.73
	9th month	3.73	-	3.73	0.03	0.23	3.50
	10th month	3.50	-	3.50	0.03	0.23	3.27
	11th month	3.27	-	3.27	0.03	0.23	3.03
	12th month	3.03	-	3.03	0.03	0.23	2.80
					0.47	2.80	
5th	Opening Balance						
	1st month	2.80	-	2.80	0.03	0.23	2.57
	2nd month	2.57	-	2.57	0.02	0.23	2.33
	3rd month	2.33	-	2.33	0.02	0.23	2.10
	4th month	2.10	-	2.10	0.02	0.23	1.87
	5th month	1.87	-	1.87	0.02	0.23	1.63
	6th month	1.63	-	1.63	0.01	0.23	1.40
	7th month	1.40	-	1.40	0.01	0.23	1.17
	8th month	1.17	-	1.17	0.01	0.23	0.93
	9th month	0.93	-	0.93	0.01	0.23	0.70
	10th month	0.70	-	0.70	0.01	0.23	0.47
	11th month	0.47	-	0.47	0.00	0.23	0.23
	12th month	0.23	-	0.23	0.00	0.23	-
					0.17	2.80	
	DOOR TO DOOR	60	MONTHS				
	MORATORIUM PERIOD	6	MONTHS				
	REPAYMENT PERIOD	54	MONTHS				

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