

DIESEL GENERATING SETS

1. INTRODUCTION:

A diesel generator is the combination of a diesel engine with an electric generator called alternator, coupled together to generate electrical energy. The diesel compression-ignition engine is usually designed to run on diesel fuel, but some types are adapted for other liquid fuels or natural gas. These D G sets are essential for various critical industrial, civilian and defense activities.

2. PRODUCT & ITS APPLICATION:

Diesel generating sets are used in places without connection to a power grid, or as emergency power-supply if the grid fails. Sometimes it is also used for peak-loading, grid support and export to the power grid.

The packaged combination of a diesel engine, a generator and various ancillary devices (such as base frame, canopy, sound attenuation, control systems, circuit breakers, jacket water heaters and starting system etc. is referred to as a the “generating set” or a “gen-set” for short.

Gen-Set sizes range from 8 to 30 kW (also 8 to 30 kVA single phase) for homes, small shops and offices with the larger industrial generators from 8 kW (11 kVA) up to 2,000 kW (2,500 kVA three phase) used for large office complexes, factories. A 2,000 kW set can be housed in a 40 ft. (12 m) ISO container with fuel tank, controls, power distribution equipment and all other equipment needed to operate as a standalone power station or as a standby backup to grid power. Proper sizing of diesel generators is critical to avoid low-load or a shortage of power. Sizing is complicated by the characteristics of modern electronics, specifically due to harmonics and non-linear loads.

Diesel gen sets are now available with lot of automation and instrumentation features that make it suitable for emergency operations in most areas where power interruptions are frequent. Some of the places it is mandatory and advisable to

have DG set installed viz. Large Hotels, Hospitals, continuous process industries, critical operations of furnaces etc. These are designed for stationary as well as trailer mounted designs for disaster management, construction work in remote areas with no power, road construction etc.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Preferably Mechanical/ electrical or Automobile engineers with power generation experience.

4. INDUSTRY OUTLOOK/TREND

India has surplus power generation capacity but lacks adequate infrastructure for supplying electricity to all needy people. The utility electricity sector in India has one National Grid with an installed capacity of 330.86 GW as on 31 December 2017. Renewable power plants constituted 31.7% of total installed capacity.

However there is lack of adequate electricity supply infrastructure for all the regions and to all people in several regions in the country. Government of India launched a scheme called "Power for All". This scheme will ensure continuous and uninterrupted electricity supply by March 2019, to all households, industries and commercial establishments by creating and improving necessary infrastructure.

Despite rapid strides in utility sector, there is need for Power generating sets to meet the emergency power needs in industry and commercial sectors. India's Gen sets market landscape includes more than 150 assemblers and suppliers of gen sets, mostly in smaller capacity range. Small capacity gen sets engines are made in Rajkot Agra and Coimbatore while medium range is offered by well-known players offering Gen sets and engines for assemblers are Caterpillar, Cummins, Kirloskar, Wartsilla, Mahindra & Mahindra, Ashok Leyland, Escort, Generac, Greaves Cotton, Honda Siel Power Product, Kohler, Sonalika etc. Large Engines for gensets above 1000 KVA are still imported from Europe.

5. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:

The Gen sets market in India is estimated to surpass USD 2.1 billion in 2015 and likely to grow at 12% per year during 2015-2019, as per one report. Demand is mainly due to rapidly growing industrial and commercial sector demand. There are many DG set in demand with sound proof canopy, skid mounted units and with auto start and stop systems in critical applications to meet the uninterrupted power needs.

Considering the wide range of applications of generating from industry to commercial housing, hotels and hospitals etc. and remote area construction work, defense, disaster management and even in marine applications, offshore oil and gas drilling etc., there is good demand for various capacities of DG sets.

In addition to domestic markets, there is very good export potential for small capacity generators to large DG sets in developing countries where power generation and transmission is inadequate.

6. RAW MATERIAL REQUIREMENTS:

The Diesel engines and electrical alternators of are procured as per need. The makes and capacity are decided with selection options like fuel to be used, duty conditions viz - continuous or intermittent use, etc. Other materials like coupling, control panel instruments viz Ampere meter voltmeter, RPM sensor and meter, power factor meter and relays for fault and damage prevention etc. are also procured as per need and engine alternator specs. Most of these are available in domestic market.

7. MANUFACTURING PROCESS:

This is an integration / assembly activity, hence the process is mainly of assembly of engine and alternator on a base frame, alignment of main equipment, installation of Engine and electrical panel with reading meters, control relays and emergency start / shutoff control.

The panel stands and electrical power panels may also be self-assembled or procured from sub-contractors/ suppliers.

These sets require various mechanical and electrical testing of assembled set to ensure performance as per specifications agreed upon with customer. The DG sets are tested as per respective standards and reports are usually submitted to customers. For the purpose a comprehensive test bed is a must.

The tested and certified set is of stationary then packed and dispatched as per the transport conditions along with engine and generator panels, spares and operating/maintenance manuals. For Mobile gen sets the complete assembly with base frame may have to be mounted either in container frame, trolley or skid as per requirement.

8. MANPOWER REQUIREMENT:

The unit shall require highly skilled service persons. The unit can start from 8 employees initially and increase to 23 or more depending on business volume.

Sr No	Type of Employees	Monthly Salary	No of Employees				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Skilled Operators	18000	2	2	2	3	3
2	Semi-Skilled/Helpers	7000	2	4	6	8	10
3	Supervisor/Manager	30000	1	1	1	1	1
4	Accounts/Marketing	16000	1	1	1	1	1
5	Other Staff	7000	1	1	1	2	2
	TOTAL		7	9	11	15	17

9. IMPLEMENTATION SCHEDULE:

The unit can be implemented within 4 months from the serious initiation of project work.

Sr. No	Activities	Time Required in Months
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1	Acquisition of Premises	-
2	Construction (if Applicable)	-
3	Procurement and Installation of Plant and Machinery	2
4	Arrangement of Finance	2
5	Manpower Recruitment and start up	2
	Total Time Required (Some Activities run concurrently)	4

10. COST OF PROJECT:

The unit will require total project cost of Rs 77.04 lakhs as shown below:

Sr. No	Particulars	In Lakhs
1	Land	0.00
2	Building	0.00
3	Plant and Machinery	37.20
4	Fixtures and Electrical Installation	1.85
5	Other Assets/ Preliminary and Preoperative Expenses	1.50
6	Margin for working Capital	36.49
	TOTAL PROJECT COST	77.04

11. MEANS OF FINANCE:

The project will require promoter to invest about Rs 46.63 lakhs and seek bank loans of Rs 30.41 lakhs based on 70% loan on fixed assets.

Sr. No	Particulars	In Lakhs
1	Promoters Contribution	46.63
2	Loan Finance	30.41
	TOTAL:	77.04

12. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr. No	Particulars	Gross	Margin %	Margin	Bank
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		Amount		Amount	Finance
1	Inventories	37.94	40	15.18	22.76
2	Receivables	21.67	50	10.83	10.83
3	Overheads	2.90	100	2.90	0.00
4	Creditors	18.97	40	7.59	11.38
	TOTAL	81.47		36.49	44.98

13. LIST OF MACHINERY REQUIRED:

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Engine Test Equipment with computer software etc.	Nos	1	1800000	1800000
2	Electrical Test Panel	Nos	1	600000	600000
3	E O T Crane	Nos	1	500000	500000
4	Jib Crane	Nos	1	250000	250000
5	Tool Boxes, Torque Wrenches etc.	Nos	3	60000	180000
6	Lathe Machine	Nos	1	70000	70000
7	Drilling Machine	Nos	1	30000	30000
8	Bench Grinder and Misc. tools	Nos	1	60000	60000
9	Welding Sets	Nos	1	45000	45000
10	Hand Tools for Bolting/ Drilling/ Threading/ slotting	Nos	2	35000	70000
11	Electrical Meters viz Megger etc.	Nos	1	30000	30000
	subtotal :				3635000
	Tools and Ancillaries				
1	Misc. equipment trolleys etc.	LS	1	60000	60000
2	Tools and gauges	LS	1	25000	25000
Sr. No	Particulars	UOM	Quantity	Rate	Total Value
	subtotal :				85000
	Fixtures and Elect Installation				
	Storage and transport bins and trolleys	LS	1	60000	60000
	Office Furniture	LS	1	20000	20000
	Telephones/ Computer	LS	1	30000	30000

	Electrical Installation	LS	1	75000	75000
	subtotal :				185000
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	150000	150000
	TOTAL PLANT MACHINERY COST				4055000

All the equipments and tooling are available from local manufacturers. The entrepreneur needs to ensure proper selection of equipments and tooling. It may be worthwhile to look at reconditioned /used equipments and toolings. Some of the machinery, test systems and toolings suppliers are listed here below:

1. Machineries and Spares
Ranjit Chawla (Director)201, Karmastambh, LBS Marg, Vikhroli West
Mumbai - 400083, Maharashtra, India
2. Pacific Engineering Corporation
A-297, MIDC-Mahape, Near Mahape Bus Depot,
Anthony Garage, Thane-Belapur Road, Mahape Midc,
Navi Mumbai-400710, Maharashtra, India
3. Consolidated Engineering Services
No-47-A, Sowri Street, Alandur,
Chennai-600016, Tamil Nadu, India
4. Scientico
71, Industrial Estate, HSIDC Industrial Estate,
Ambala - 133006, Haryana, India

14. PROFITABILITY CALCULATIONS:

Sr. No	Particulars	UOM	Year Wise estimates				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	25	40	50	60	75
2	Sales	Rs Lakhs	520.00	832.00	1040.00	1248.00	1560.00
					0	0	0

3	Raw Materials & Other Direct Inputs	Rs Lakhs	455.27	728.43	910.54	1092.65	1365.81
4	Gross Margin	Rs Lakhs	64.73	103.57	129.46	155.35	194.19
5	Overheads Except Interest	Rs Lakhs	13.12	13.12	13.12	13.12	13.12
6	Interest	Rs Lakhs	4.26	4.26	4.26	4.26	4.26
7	Depreciation	Rs Lakhs	4.06	4.06	4.06	4.06	4.06
8	Net Profit Before Tax	Rs Lakhs	43.29	82.13	108.02	133.91	172.75

The basis of profitability calculation:

The Unit has can have product mix for gen sets of different ranges up to 750 KVA and production capacity / supply vary depending on the ratings The unit can offer 1000 nos of sets up to 50 KVA and 150 nos of higher ratings up to 750 KVA per year. The sale price for small gen sets ranges from Rs 1.5 Lakhs to Rs 20 Lakhs and Higher capacity Gen Set prices range from 15 lakhs to Rs75 lakhs, depending in configuration, automation and instrumentation. Since engine, coupling and Generators, electric control panels etc are bought out, the prices are at market rate of OEM supplies, however there is a margin of approx 10% or more on these components.

The material requirements are against order with advance payment and supply credits for which the cost is always charged. The assembly repair also generates little wastage/ scrap that is sold at @ Rs 20 ~ 80 per Kg depending on type. The income of same is added. Consumables costs also considered based on prevailing rate.

Energy Costs are considered at Rs 7 per Kwh. The depreciation of plant is taken at 10 % and Interest costs are taken at 14 -15 % depending on type of industry.

15. BREAK EVEN ANALYSIS

The project can reach break-even capacity at 8.28 % of the installed capacity as depicted here below:

Sr. No	Particulars	UOM	Value
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1	Sales at Full Capacity	Rs Lakhs	2080.00
2	Variable Costs	Rs Lakhs	1821.08
3	Fixed Cost incl. Interest	Rs Lakhs	21.44
4	Break Even Capacity	% of Inst Capacity	8.28

16. STATUTORY/ GOVERNMENT APPROVALS

The unit may obtain industry unit registration from District Industry center and establishment registration from local municipality etc. No other registrations are involved. Before starting the unit will also need GST registration for procurement of spares etc materials as also for sale of goods and services. As such there is no pollution control registration requirements, however the unit will have to ensure safe environment with chimney for test rig, fire safety for fuel storage and Solid waste disposal shall have to meet the required norms.

17. BACKWARD AND FORWARD INTEGRATION

The machines and equipment offer scope for diversification in to servicing other consumer and industries. As such there is not much scope for organic backward or forward integration. The gen set business needs building up reputation, ensuring reliability and quality of services rendered. Also personal rapport of key persons can generate good business volumes from corporate sectors and authorized Genset service station franchise. The location with good catchment area ensures good market potential to new business units.

18. TRAINING CENTERS/COURSES

There are no specific training centers for Gen set assembly and testing. Most of the training is given by Engine/ auto / electrical equipment manufacturers upon getting authorized service buyer/supplier of their products or through apprenticeship with experienced Genset suppliers.

Udyamimitra portal (link: www.udyamimitra.in) can also be accessed for hand-holding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc. Entrepreneurship program helps to run business successfully is also available from

Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates all over India.

Disclaimer:

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.

Source:- Udyami Mitra/Sidbi