

**M/S GADGIL AND COMPANY
KAMLASHANKAR INDUSTRIAL COMPLEX
SHED NO A-6, PIRANGUT, TAL.MULSHI,
DIST.PUNE, MAHARASHTRA,INDIA
PH: 9922752760**

***PROJECT
REPORT
FOR
1000
MTPA
PLANT***

October 7

2014

***ENCLOSED HEREWITH IS A ILLUSTRATION OF PROBABLE COSTS
INVOLVED IN SETUP AND RUNNING OIL RECYCLING UNIT.THE COST
WILL VARY WITH LOCATION TO LOCATION,OIL QUALITY AND THE
ELECTRICITY CHARGES INCURRED FOR PROCESSING.***

***USED OIL
RECYCLING
120 LPH
MACHINE***

Products to be manufactured:

Following products shall be manufactured from used oil

- 1) Base oil
- 2) Fuel oil
- 3) Rubber processing oil

C) Market Potential:

The potential buyers shall be as under:

- Oil blenders
- Indian oil corporation
- Establishment with furnaces

D) Licenses for manufacture, storage and sale:

License required for manufacture of base oil.

- Noc from local authority
- Fire department NOC
- SSI registration with DIC
- Pollution control board consent needs to be obtained to certify that all parameters of operation are in specified limit.
- Lubricating oil grease license
- NOC from PESCO

E) Production Capacity:

Daily 2400 liter used oil shall be processed per day in 2 shifts of 10 hours. On and average, 2020 liters of base oil is obtained, taking 7 % as acceptable water content.

F) Raw Materials:

The raw materials include following:

- 1) Used oil

G) The Oil Standards:

The base oils manufactured by processing of used oil will comply with any statutory requirements or standards anywhere in the world. The key indicators include flash point, viscosity, density etc. are within specified standards for base oil. The requisite standards applicable are attached for reference.

THE BELOW MENTIONED ARE THE PRODUCT AND BYPRODUCT MANUFACTURED BY ANY USED OIL RECYCLING PLANT IN ANY COUNTRY AND ITS INTERNATIONALLY ACCEPTABLE INPUT USED OIL SPECIFICATION AND RECYCLED BASE OIL SPECIFICATIONS WITH DEVIATIONS AS PER END CUSTOMER REQUIREMENT. SPECIFICATION ARE FOR REFERENCE ONLY AND WILL DEVIATE WITH EVERY BATCH.

	USED OIL
COLOUR	8.0
DENSITY AT 15 [^] C,KG/L	0.8977
FLASH POINT (COC) [^] c	>110
POUR POINT	-30
WATER	NIL

RECYCLED BASE OIL	SN 150	SN500	SN700
COLOUR	2.3	2.6	2.8
DENSITY AT 15 [^] C,KG/L	0.865	0.865	0.865
KINEMATIC VISCOSITY @100 [^] C	3.30	13.0	21.0
KINEMATIC VISCOSITY @40 [^] C	32.00	91.0	141.4
VISCOSITY INDEX	96	141	173
FLASH POINT (COC) [^] c	210	210	210
POUR POINT	-9	-9	-9

BYPRODUCTS RECOVERED

RECYCLED BASE OIL	FURNACE OIL	RUBBER PROCESSING OIL
VISCOSITY	100	40-48
FLASH POINT	>110	220 MIN
POUR POINT	-6	24-29 MAX
WATER CONTENT	0.1	300 PPM MAX
ANALINE POINT		30 C

UNFORTUNATELY IN INDIA AS IMPORTS OF USED OIL ARE BANNED SO WE HAVE TO MAKE THIS SAME OUTPUT AND BYPRODUCTS WITH WHAT MAY BE AVAILABLE LOCALLY, PURCHASING OIL WITH SPECIFICATION AS CLOSE TO INTERNATIONAL QUALITY USED OIL AS POSSIBLE. THE SPECIFICATION LAID DOWN BY POLLUTION CONTROL BOARD IN INDIA FOR USED OIL INPUT TO OIL PROCESSORS IS GIVEN BELOW.

CHARACTERISTICS	INPUT USED OIL
COLOUR AS PER ASTM D1500	8
WATER	15%
DENSITY	0.85 TO 0.95
KINEMATIC VISCOSITY Cst at 100°C	1 to 32
DILUTENTS	15% VOL
NEUTRALISATION NUMBER	3.5 mg KOH/g
SAPHONIFICATION NUMBER	18 mg KOH/g
TOTAL HALOGENS	4000 ppm
POLYCHLORINATED BYPNENYLES	BELOW DETECTION LIMIT
LEAD	100 PPM
ARSENIC	5 PPM
CADMIUM+NICKEL+CHROMIUM	500 PPM
POLYAROMATIC HYDROCARBONS	6%

OUTPUT SPECIFICATION SPECIFIED UNDER LUBRICATING OIL GREASE ORDER FOR OUTPUT OIL SALE TO BLENDING UNITS:

SR.NO	ISI SPECIFICATION AS SPECIFIED
1	IS 9048:1982 SPECIFICATION OF RE-REFINED AUTOMOTIVE INTERNAL COMBUSTION ENGINE LUBRICATING OIL (FIRST REVISION)
2	IS 13656 : 1993 INTERNAL COMBUSTION ENGINE CRANKCASE OILS (GASOLINE AND DIESEL)
3	PLEASE REFER ATTACHED ECOMARK SPECIFICATION DOCUMENTS FOR OTHER OIL SPECIFICATION

As you can see from above specification due to huge deviations in viscosity and other parameters and intense competition among refiners for quality oil many have specialized in purchasing only specific oils. And as there capacities are huge they need a minimum quantity of 10000 liters per day for startup and even a small deviation in input oil specification can hamper output product. To overcome these difficulties we have introduced our online short path thin film evaporators with capacities ranging from 60 LPH,120LPH,210LPH which in 20 hrs working processes 1200 Litres,2400 Litres and 4000 Litres of oil per day. But as it is online process with no storage of oil of more then 200 litres/hour at any moment any deviations can be controlled and there is no need of getting entire batch of oil ,entire plant can process even a single drum with marginal increase in processing cost. Plus the refiner has the facility of processing cheaply available multiple oils which can be processed to coolant mfg, grease mfg specification and plant does not remain idle.

Given below are the illustration for a two 60 lph plant with 18 kwh power it may vary from plant to plant based on input oil specification ,the specification of unit processing cost are given below are for the oil mentioned in specification with input and output and percentage recovery, they are for illustrative purpose for giving a better understanding of plant to user and not for any calculation or legal purposes.

KWH	PER KWH TAKEN AS 10 RS/UNIT	TOTAL OUTPUT OIL TAKEN AT 82 %	COST OF PROCESSED OIL RS/LITRE
11.69	117	39	3.0
10.41	104	34	3.05
9.64	96.4	38	2.53
9.8	98	55	1.78
9.75	97.5	40	2.43
9.22	92.2	14	6..58

KWH	PER KWH TAKEN AS 10 RS/UNIT	TOTAL OUTPUT OIL TAKEN AT 65 %	COST OF PROCESSED OIL RS/LITRE
8.7	87	26	3.34
8.7	87	27	3.22
9	90	25	3.6
8.4	84	21	4.0

As you can see even if total power is 18 kw, only 9 to 10 kw is used which is 50 to 60 % of total with average processing cost of Rs 3.5/litre with unit rate at 10 rs/unit. No clay or other additives are used in the process; process is simply based on evaporation.

CHARACTERISTIC OIL SPECIFICATION OF INPUT AND OUTPUT OIL FOR WHICH ABOVE PROCESSING COST WAS OBTAINED WITHOUT SOLVENT TREATMENT

<u>TESTS</u>	<u>USED DEHYDRATED OIL</u>	<u>OUTPUT OIL</u>
<u>COLOUR</u>	<u>8</u>	<u>2-2.5</u>
<u>SP.GRAVITY</u>	<u>0.88</u>	<u>0.87</u>
<u>KINEMATIC VISCOSITY AT 40[^]C</u>	<u>36.8</u>	<u>28.4</u>
<u>FLASH POINT</u>	<u>210</u>	<u>200</u>
<u>RECOVERY RATE</u>		<u>82 % SINGLE PASS</u>

I) Technology and manufacturing process:

Manufacturing of base oil from used oil is a tertiary or feedstock recycling method

Process involves:

- Dehydration: In this process the input oil is heated to remove any water content and light ends from oil and preparing it for further distillation.
- Fractional distillation under vacuum to deliver light oil, base oil, rubber processing oil.

All costs given below are illustrations for a 120 LPH plant

K) Building (Shed):

1000 Sq.ft.

Cost of shed = 1000 X Rs. 2200 = Rs.22,00,000/-

Qty	Description and Specifications
1	USED OIL PLANT SKID MOUNTED
1	Cooling tower: 100TR
2	STORAGE TANK :5000 LTR
1	WATER STORAGE TANK 15000 LITRE
1 set	Pipe fittings, process pumps and electrical fittings with control panel
1 set	Laboratory glassware and equipments
1 set	Scrubbing system(thermal oxidizer)
<i>Cost of machinery Rs. 30,00,000/-</i>	

Note: Taxes as applicable extra

M) R. & D. AND Quality Control Laboratory Equipments:

1. Specific gravity apparatus
2. Kinematic viscosity bath
3. Flash point apparatus
4. Color comparator
5. Pour point

N) Production cost for base oil

Production cost per liter of base oil:

Raw material:42680 ltr. Used oil @ Rs. 35 per ltr.	1493800
Chemicals /catalyst cost	1,000
Processing cost (electrical)(14226 x 10)	142260
Fuel cost	
Total Production cost for Input oil 42680 liters (m/c processing cost per liter is 3.35 rs/liter of input)	38.35
Administrative cost + salaries	76000
Total administrative cost for 42680 liters	1.78
Production cost per liter of input oil	40.1
Interest on capital investment / liter at 15 % (8945960 x 15 %)=13,41,894/yr =1,11,824/month=4301/day=1.94rs/litre	2
Production cost per liter of fuel	42.1

O) Project cost:

Products to be manufactured

1) base oil 39192 liters per month or 4,70,304 liters per year

Sr. No.	PARTICULARS	Rs.	Rs.	Rs.
A	FIXED ASSETS			
1	Machinery + Pipe fittings + Installation etc.(As per list enclosed in K above)		30,00,000	
2	Land (10000 sq.ft.)		NIL	
3	Factory shed (1000 sq.FTs @ Rs. 2200/- per sq FT)		22,00,000	
4	Lab. Equipments, Furniture & Fixtures		25,000	
	Total Fixed assets:		52,25,000	52,25,000
B.	One month's production expenses			
1	Raw Materials			
	Waste/used oil 45552 x 35	15,94,320		
	Water and chemicals disposal to hazardous waste	30,000	16,24,320	
2	Electrical expenses (16016x10)	1,60,160	1,60,160	
3	Packing cost	NIL		NIL
4	Salaries		61,000	
a)	Production Supervisor 2 x Rs. 12500 pm	25,000		
b)	Helpers 4 x Rs.9,000/- p.m.	36,000		
5	Administrative Cost: Office expenses, transportation telephone etc.	15000	15000	
	Total one month's recurring expenses			18,60,480
	Two month's working capital	37,20,960		37,20,960
	Total Capital Investment			89,45,960
	Total Project Cost In lacs) (round up)			89.5
6	Cost of production per month (Rs. 42.1 X 42600 Liters)			17,93,460
7	Monthly receipts: Base oil =39192 x 51			19,98,792
8	Gross Profit per month			2,05,332
	Gross profit per year			24,63,984

$$\text{Rate of return} = (\text{Profit per annum} / \text{Total capital investment}) \times 100$$

$$= (24,63,984 / 89,00,000) \times 100 = 27.68 \%$$

P) Profitability analysis:

FIXED EXPENSES IRRESPECTIVE OF OUTPUT	At 31.5% output 12339 liters working only 6.3 hours	At 50 % output 19596 liters working only 10 hours	At 100 % output 39192 liters working for 20 hours
Salaries	30500	30500	61000
Bank emi on fixed assets on 89,00,000 for 25 years at 15 % interest	111824	111824	111824
Administrative expenses	15000	15000	15000
Total fixed expenses	157324/12339= 12.75 rs/liter	157324/19596 =8.02 rs/liter	187824/3919 2=4.79 rs/liter
Add processing cost rs 3.25/liter	3.25	3.25 rs/liter	3.25 rs/liter
Total breakeven cost not considering input oil cost	16 rs/liter	11.27 rs/liter	8.04 rs/liter
Profit taken at rs 16/liter	0 rs/liter (0%) break even	4.73 rs/liter (29.5%)	7.95 rs/liter (49.6%)

Comparison of our technology with other contemporaries:

- No use of any chemicals or clay in the process
- Occupies very less space as compared to others, mounted on castor wheels.
- Less installation time can be installed in few hours if electrical supply and water supply are available.
- Uses latest technology with thermal oxidizers etc to contain emissions.
- Technology upgraded every two years with latest instrumentation to minimize human interface and to keep customer update with latest trends and help him to process the new oils with additives.
- In comparison to processing cost provided by leading refiner in 2004 in a presentation to government he had claimed it at 3.5 to 5 rs/liter. After 10 years we are still processing at same cost by technology up gradation.
- The capital investment is less.
- Can handle small to large quantity of oil. Refiner can choose different oil to process.
- We also operate on same profit margins of 16 rs/liter as other large scale refiners and with same processing costs.
- Myths of profitability of large scale production are busted, big capacity project report look good on paper but no adequate attention is given to scarcity of quality raw material, making our proposed plant the only feasible alternative with practical costs and profitability projections.
- Government has provided 80 % depreciation for pollution control equipment which makes it almost tax free rate of return on investment.

For seeing live demonstration of plant working at refiner site please visit YouTube link <http://youtu.be/rQSpHjKCEtk>

Factors affecting profitability:

- Oil being a commodity is subject to cyclic fluctuations, role of our plant is limited to processing costs and capital investments, the customer has to take care that he doesn't indulge in high value purchase of raw material over and above market rate to maintain profitability.