



We are trusted supporter

2-Heating surface area Super Concentrator and Flue gas waste heat capturing

**(Fuel feed and residue management
in recovery boiler)**

Utilization of Patent No.....11001601

**By Henchmen Engineering Consultant Private
Limited (HECPL), Yamuna Nagar, Haryana**

Why important (USP):

S.NO.	Particulars	UOM	Before	After	Remarks
1.	Fuel and Energy Expenses	% Revenue	12	9	
2.	Firing Solids%	%	66	80	
3.	Recovery Boiler Energy Contribution	%	40	55%	
4.	Impact on Main steam pressure	Bar	65	110	Can be Designed
5.	Specific HP steam Ratio	Mt/Mt Solids	3.1	4.0	
6.	Recovery Boiler efficiency	%	60	75	
7.	SPM in Exit flue gas	PPM	100	20	

Why important (USP):

S.NO .	Particulars	UOM	Before	After	Remarks
8.	Steam Economy of MEE	Mt/Mt	6.2	8	
9.	Low TDS water generation	Mt/Mt	0	3	Flue gas mass
10.	Pulp Shrinkage	%	2	0.5%	
11.	Bleaching Chemical Cost Reduction	Rs/Mt Pulp	X	(X-200)	
12.	Carbon Credit	Mt/Mt Pulp	X	+Ve	
13.	Humidity of exhaust gas	%	2	50	
14.	Ground water Extraction	%	X	0.5 X	

MP Steam

WBL @85 deg C In

WBL @ 125 deg C out to MEE

Vapor to Next preheater
or heat exchanger

**Fuel feed
Management**

Two heating surface area
super concentrator

From SBL tank @ 55-70% solids & 90 deg C

WBL @85 deg C In

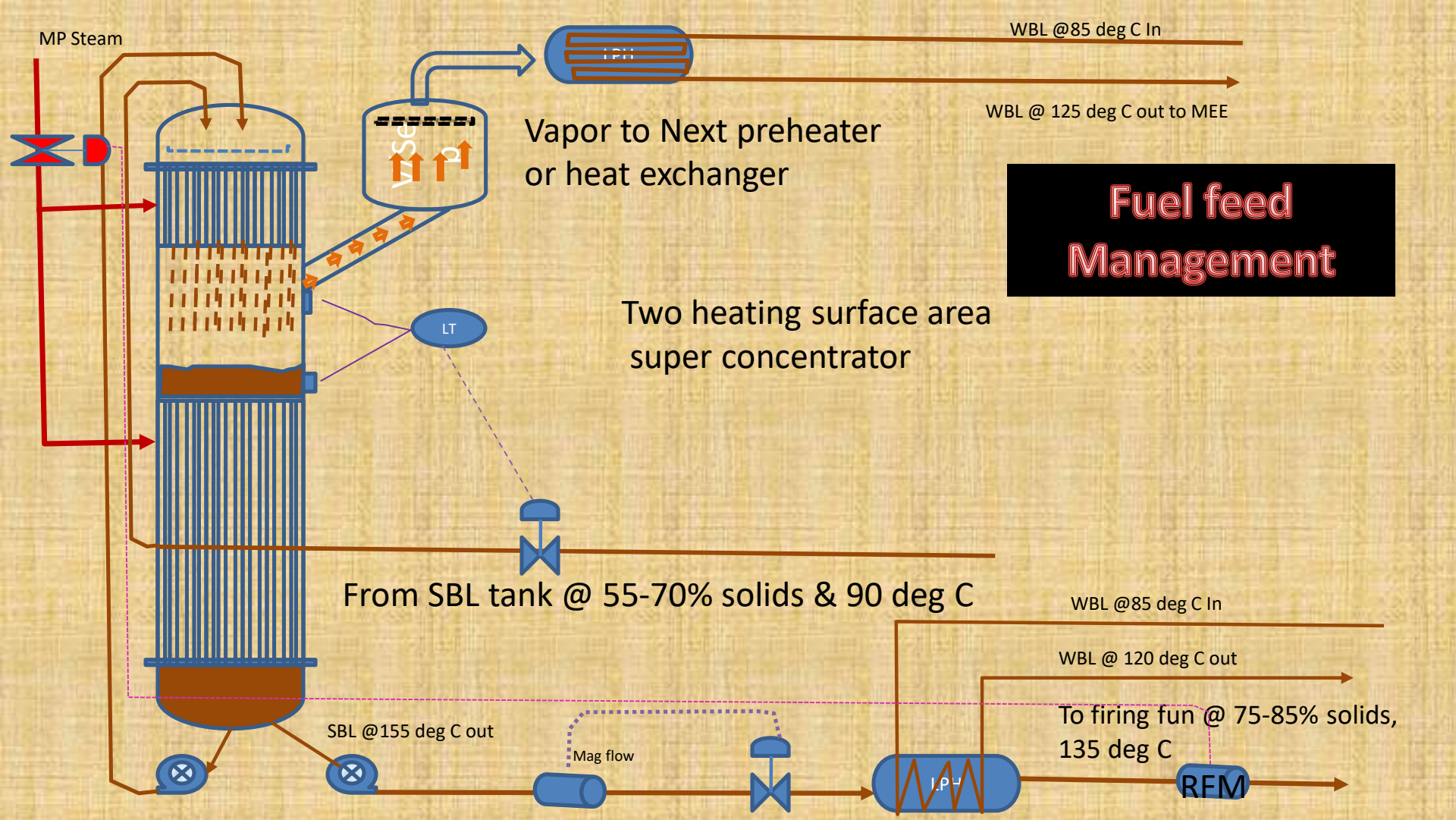
WBL @ 120 deg C out

To firing fun @ 75-85% solids,
135 deg C

SBL @155 deg C out

Mag flow

REM



Setbacks with Conventional Technology

S.N o.	Particular	Reasons	Impact	Remarks
1.	High Viscosity	1.Wood based HBL posses 400-450 cP viscosity at 65% solids 2. Agro based HBL posses 1200-2000 Cp at 50% solids	Due to High viscosity pumping power increases to 3-5 time than required. Scaling issue increases substantially due to low wetting degree	
2.	Storing (HBL)	As temperature drop, viscosity further increase	Some time HBL do not come out to pump suction, Pump trips frequently	
3.	Firing Fluctuations	High Viscosity makes this difficult	Steam flow and temperature fluctuations	
4.	Low temperature Issue	Low temprature and presure due to improper turbulence	No issue as temperature to be reduced	

DISTINCTION

Conventional flow

- HBL tank
- ESP ASH MIXING Tank
- Salt Cake Mixing tank
- Indirect heater
- Direct heater
- Firing

2 heating surface area flow

- HBL tank
- 2 Heating Area Super concentrator
- Indirect cooler
- Firing

**CAPEX: 2 Heating Surface area Super
Concentrator**

5-5.5 CR INR

FOR 700 TDS

OPEX: 2 Heating Surface area Super Concentrator

S.No.	Particular	UOM	Quantity	Rate	Value Rs/MT
1.	Steam Consumption	Mt/Mt	.200	2000	400
2.	Power	KWH/Mt	6.0	8	50
	Total				450

GAINS AND BENEFITS:

S.No.	Particulars	UOM	Quantity	Rate (INR)	Value Cr INR
1.	Main HP Steam generation	Mt	1,22,500	2,000	24.5
2.	Coal Reduction	Mt	30,625	6,000	18.4
3.	RB Running days				
4.	Soot blowing steam reduction	Mt	3,500	2,000	0.7
5.	Steam Eco	Mt	17,500	1,800	3.15
6.	Steam Saving	Mt	17,500	1,800	3.15
7.	Total Saving				50. CR INR

ROI: (50-14.28) x100/5.5=650%

Payback Period : Less than 1 year

Fuel Residue Management

Objectives

- 1.Exhaust heat loss capturing
- 2.Deareator Steam reduction by 25%
- 3.Low TDS water from wastewater
- 4.Salts Recovery from wastewater
- 5.A step towards Net Zero & climate change
- 6.A step toward No ETP

Fuel Residue Management

How It Done

Flue gas flow



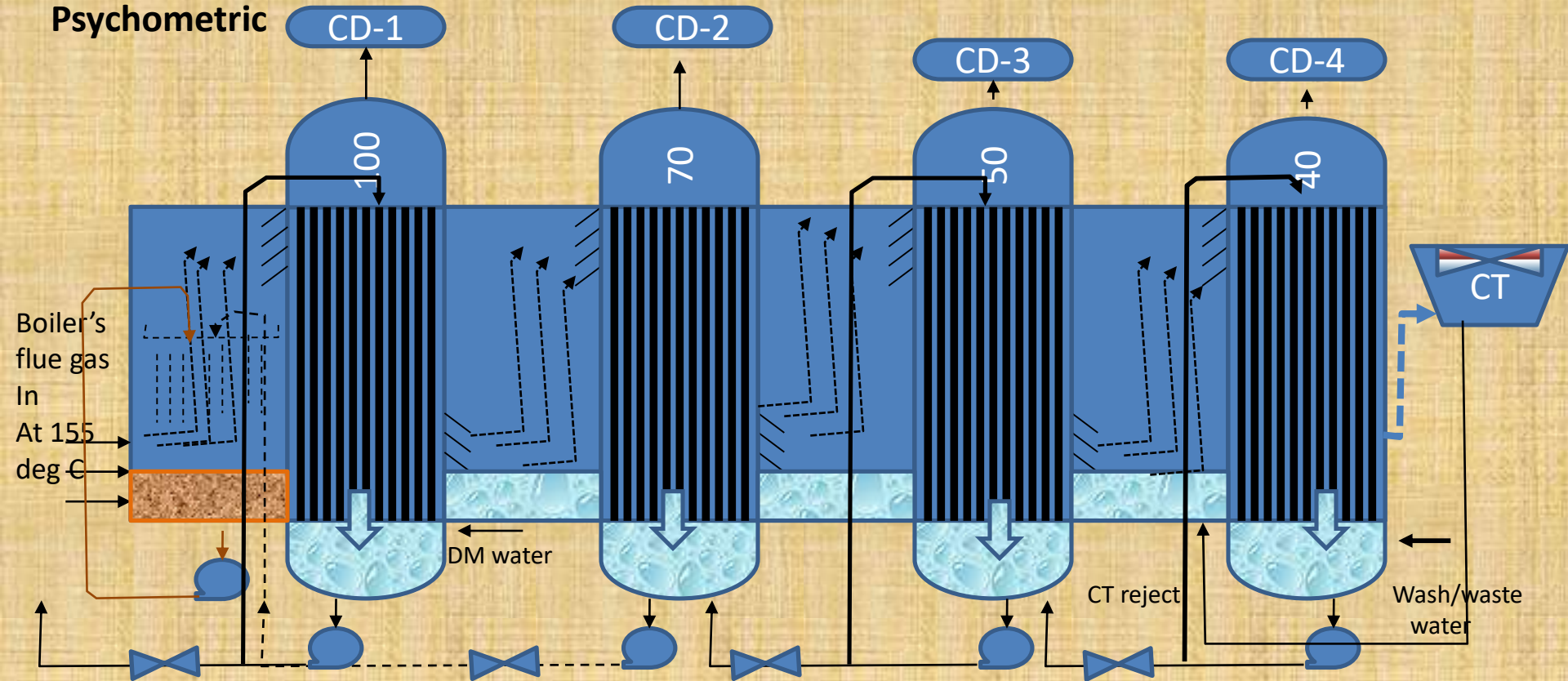
Waste water flow

Psychometric

S.No.	Temperature Deg C	Water Carrying capacity (approx) T/T
1.	165	2.6
2.	150	2.5
3.	100	.622
4.	50	.083
5.	30	0.027

How It is Done

Psychrometric



Cooling water To condenser
Power Plant S/Condenser

45 Deg C

-600 MMHG

-650 MMHG

-700 MMHG

35 C

25 C

15 C

8 C

Green liquid
Ammonia

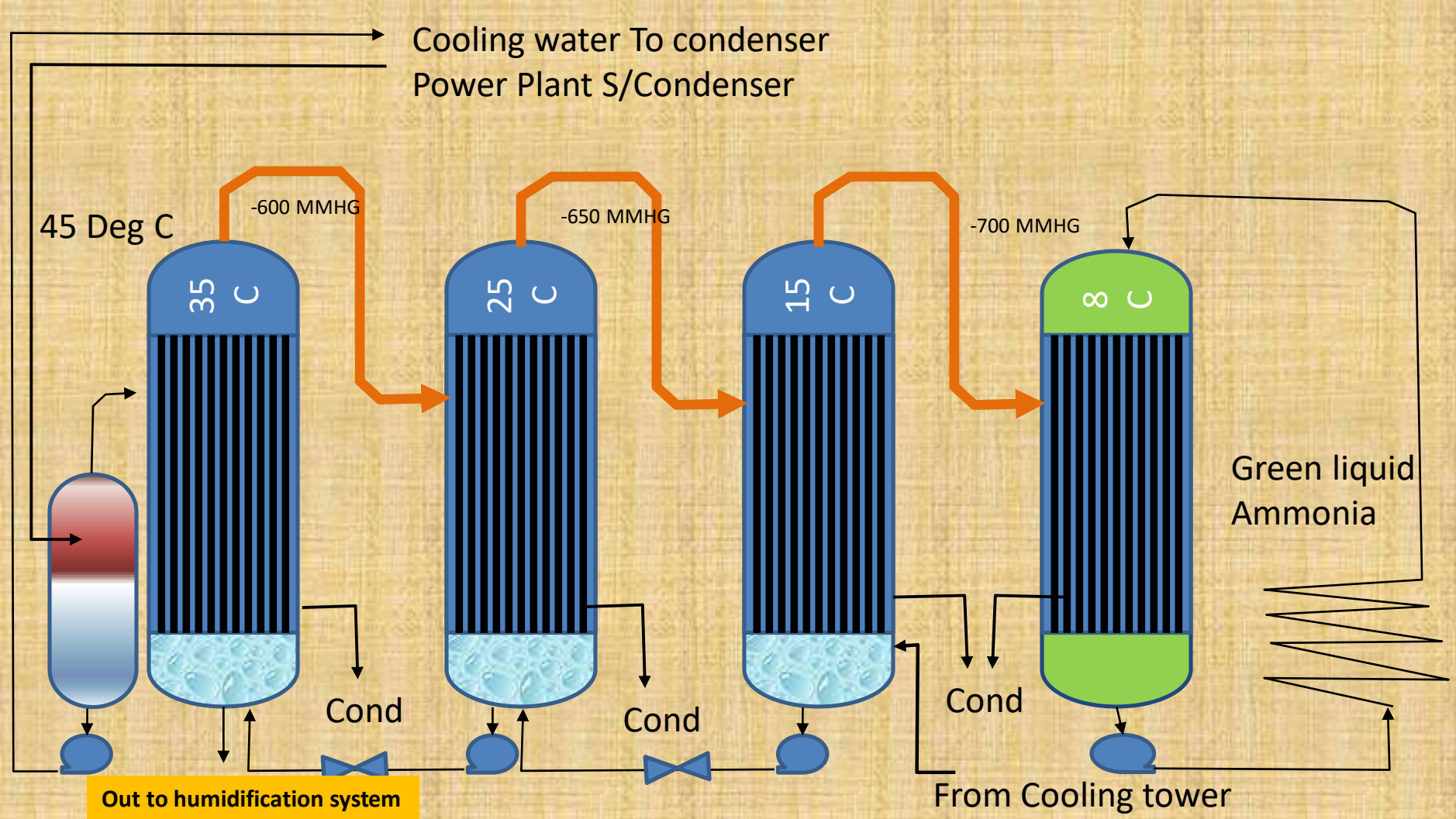
Cond

Cond

Cond

Out to humidification system

From Cooling tower



200 Ton per hr Flue gas

S.No.	Temperature Deg C	Water Carrying capacity (approx) T/T	Water Evaporated	Water Condensed 25% (T/H) (Dehumidifier Shell side)	Dehumidifier vapour side T/H (50% of condensate)
1.	165	2.6	=200*2.6	130	65
2.	150	2.5	=200*2.5	125	62.5
3.	130	.622	=200*.622	62.5	62
4.	120	.5	=200*0.5	50	25
5.	100	0.4	=200*.4	40	20
6.	80	0.35	=200*.35	35	17
7.	60	0.15	=200*0.15	15	8
8.	40	0.1	=200*0.1	10	5
		Total		467	264.5

Capex Required:

**= 10 Lakh Rs/Mt/Hr Evaporation Capacity
20 Cr INR for 700 TDS**

Opex Required:

Estimated power Consumption shall be 4-5KW/MT

Total Cost of water regeneration Shall be -50 Rs/Ton maximum

S.No.	Particulars	UOM	Quantity	Rate (INR)	Value Cr INR
1.	Power Consumption	KWH	1,96,00,000	8	15.68
2.	Total Expenses				15.68

Gains & Benefits

S.No.	Particulars	UOM	Quantity	Rate (INR)	Value Cr INR
1.	Low TDS water	Mt	39,20,000	100	39.2
2.	Deareator LP steam	Mt	33,600	1,800	6.05
3.	Zero Liquid discharge				
4.	Zero Emission discharge				
5.	Bleaching cost reduction	Mt		500	6.15
6.	Pulp Saving (shrinkages)	Mt	1225	25,000	3.1
7.	Power	KWH	84,00,000	8	6.72
8.	ETP Chemical saving	Rs		50,000 INR/Day	1.75
9.	Compliance expense				2

ROI: $(64.97 - 15.68) \times 100 / 20 = 246\%$

Payback Period: 1 Year Maximum

Conclusion :

- Firing black liquor solids 80%
- Deareator LP steam saving
- Low TDS water from waste water
- Higher pulp yield
- Higher RB Main Steam Pressure
- Recovery boiler Steam contribution
- Specific Steam ratio increase
- Waste heat capturing
- Net Zero & Climate change curbing

For More queries :

Henchmen Engineering Consultant Private Limited

Email: Info@henchmen-engineering.com

Website: www.henchmen-engineering.com

LinkedIn: <https://www.linkedin.com/in/henchmen-engineering-083817171/>

YouTube: <https://www.youtube.com/watch?v=bz8e9x3P7ql&t=140s>

Mob. No. +91-8979581875, 9897635384