



CASE STUDY

CUSTOMER

- Pune, Maharashtra

APPLICATION

- Critical Component Machining

Introduction / Overview about Critical Component Machining Industry:

The machinery industry produces different kind of products, for example, engines, pumps, logistics equipment; for different kind of markets from the agriculture industry, food & beverage industry, manufacturing industry, health industry, and amusement industry till different branches of the consumer market. As such companies in the machine industry can be classified by product of market.

Machining Industry specialises in production of close tolerance CNC machining of highly critical components like Transmission system components, Steering system components, Turbo charger component, Engine components etc. as well as stamping products like alternator components.

Challenge/ Problem statement (BEFORE):

- Power factor is less than 0.93
- I-THDi is >22%
- Average Difference between KWH and KVAH is about 7000+ units
- Resonance causing DO fuse failures costing diesel consumption of DG till fuse replacement by Electrical authority.

Objective Set:

- Power Factor to be achieved >0.995 and
- I THDi to be achieved as per IEEE 519:2014 standard
- ROI expected to be less than 18 months

Various Solutions discussed (Future plan):

- APFC or RTPFC has limitation of step less operation as well as it can not correct leading power factor & Harmonics. It has high maintenance cost.
- We proposed Hybrid Filter of 600kVAr with Advanced SVG (Static Var Generator) of 125kVAr which is Bi directional dynamic reactive power compensation device, which performs stepless dynamic reactive power compensation by a self-commutated power semiconductor bridge inverter. It has superior dynamic response and fast power factor correction time. It has 50% capacity allocated to mitigate odd harmonics up to 25th order.

BEFORE:

October, 2022 MSEDCL Bill:

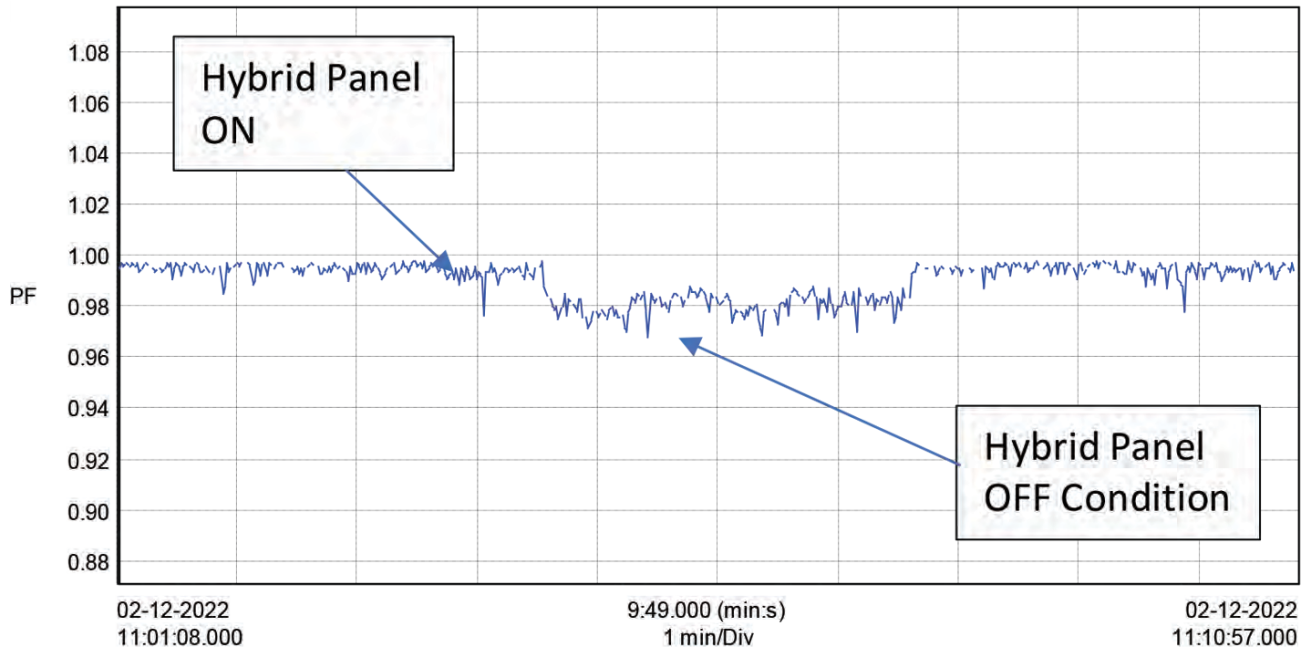
CURRENT CONSUMPTION DETAILS						
Reading Date	KWH	KVAH	RKVAH (LAG)	RKVAH (LEAD)	KW (MD)	KVA (MD)
Current 31/10/2022	557251.500		184633.500	8320.500	69.960	80.560
Previous 30/09/2022	531321.500		175072.000	8104.000		
Difference	25930.000		9561.500	216.500		
Multiplying Factor	4.000		4.000	4.000	4.000	4.000
Consumption	103720.000		38246.000	866.000	279.840	322.240
L.T. Metering	0.000		0.000	0.000	0.000	0.000
Adjustment	-1544.000		0.000	0.000	0.000	0.000
Assessed Consumption	0.000		0.000	0.000	0.000	0.000
Total Consumption	102176.000	109162.000	38246.000	866.000	280.000	322.000
BILLING DETAILS						Amount in Rs.
Billed Demand (KVA)	322	@ Rs.	454.00	Demand Charges		1,46,188.00
Assessed P.F.		Avg. P.F.	0.936	Wheeling Charge @	0.56 Rs/U	60,039.10
Billed P.F.	0.936	L.F.	37	Energy Charges		7,52,126.18
Consumption Type	Unit	Rate	Charges Rs.	TOD Tariff EC		-25,321.50
Industrial	1,09,162	6.89	7,52,126.18	FAC@ 1.35.00	Ps./U	1,47,368.70
Residential	0	5.70	0.00			
Commercial	0	10.95	0.00	Electricity Duty		81,030.04

AFTER SOLUTION is implemented:

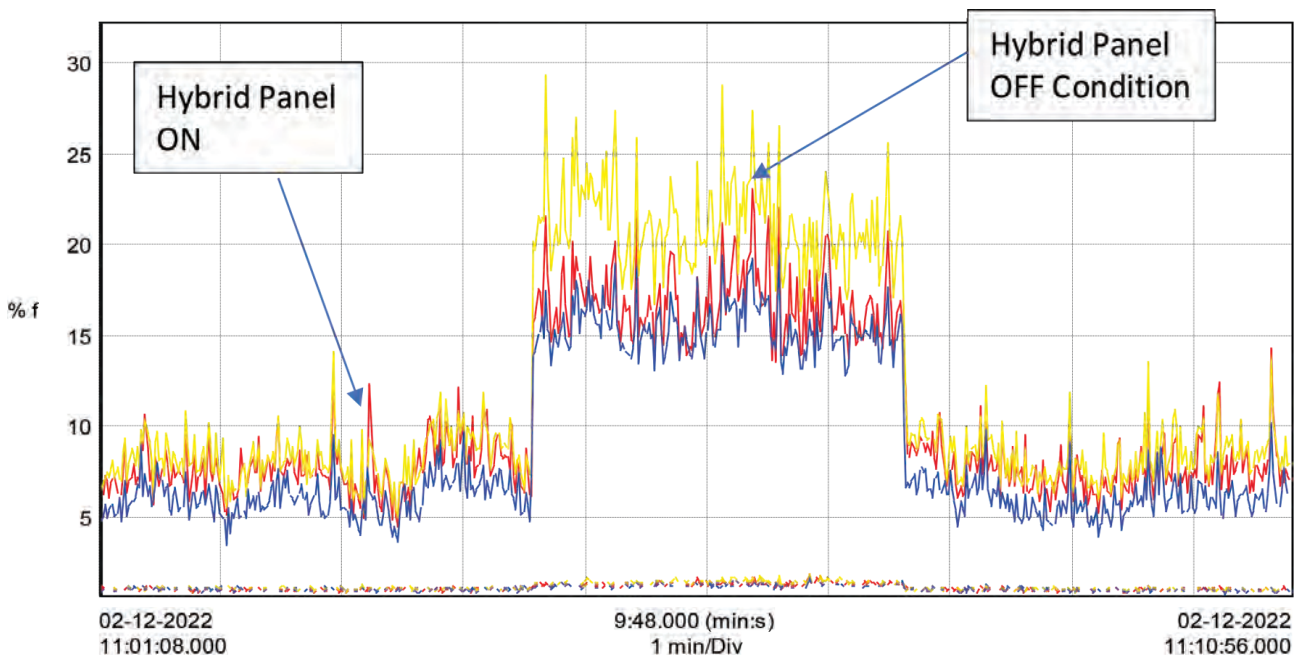
December, 2022 MSEDCL Bill:

CURRENT CONSUMPTION DETAILS						
Reading Date	KWH	KVAH	RKVAH (LAG)	RKVAH (LEAD)	KW (MD)	KVA (MD)
Current 31/12/2022	613475.500		195823.500	8758.000	67.800	67.880
Previous 30/11/2022	586860.500		195709.000	8471.500		
Difference	16615.000		114.500	286.500		
Multiplying Factor	4.000		4.000	4.000	4.000	4.000
Consumption	106460.000		458.000	1146.000	271.200	271.520
L.T. Metering	0.000		0.000	0.000	0.000	0.000
Adjustment	-118.000		0.000	0.000	0.000	0.000
Assessed Consumption	0.000		0.000	0.000	0.000	0.000
Total Consumption	106342.000	106342.000	458.000	1146.000	271.000	272.000
BILLING DETAILS						Amount in Rs.
Billed Demand (KVA)	272	@ Rs.	454.00	Demand Charges		1,23,488.00
Assessed P.F.		Avg. P.F.	1.000	Wheeling Charge @	0.56 Rs/U	58,488.00
Billed P.F.	1.000	L.F.	36	Energy Charges		7,32,696.38
Consumption Type	Unit	Rate	Charges Rs.	TOD Tariff EC		-23,998.20
Industrial	1,06,342	6.89	7,32,696.38	FAC@ 1.35.00	Ps./U	1,43,561.70
Residential	0	5.70	0.00			
Commercial	0	10.95	0.00	Electricity Duty		77,567.70

Power Factor Improvement



Distortion Improvement



RESULT AND CONCLUSION:

- ✓ Power factor improved from 0.93 to unity
- ✓ KWH and KVAH difference reduced from 6986 to 0 units.
- ✓ KW MD and KVA MD difference reduced from 42 to 1KVA.
- ✓ Electrical Bill savings achieved > INR 67,000.00
- ✓ There is no Fuse failure noticed.

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