



CASE STUDY

CUSTOMER

MIDC Wai, Maharashtra
(Application - Machine shop)

Introduction / Overview about Machine Industry:

The three principal machining processes are classified as turning, drilling and milling. A machine shop is a facility with equipment and supplies for machining, a process where parts are cut, fabricated, and finished to prepare them for use.

Machining is the process used to remove material, typically metal, to create parts for machines, tools, transportation, and more. Machine shops and machinists use equipment like lathes, mills, and drill presses to turn material into useful tools using precise cuts.

Challenge/ Problem statement (BEFORE):

- Power factor is less than 0.90
- I-THDi is $> 10\%$
- Average Difference between KWH and KVAH is about 6000 units

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 2 years

Various Solutions discussed (Future plan):

- APFC or RTPFC has limitation of step less operation as well as it can not correct leading power factor. It has high maintenance cost.
- We proposed 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 can work under high Voltage THD up to 15%.

Product Application:

SVG detects the phase angle difference on a real-time basis through an external CT's and determines the reactive content of the load current and generates leading or lagging current into the grid. We offer SVG from 30 kVAr onwards rating.

- Step less reactive power compensation
- Provides Unity PF at all load conditions
- Faster response time to correct PF during load changes

BEFORE:

March, 2022 MSEDCL Bill:

CURRENT CONSUMPTION DETAILS						
Reading Date	KWH	KVAH	RKVAH (LAG)	RKVAH (LEAD)	KW (MD)	KVA (MD)
Current 31/03/2022	304756.000	348217.000	151427.500	694.500	23.640	26.250
Previous 31/03/2022	292963.500	335124.000	146106.000	664.000		
Difference	11792.500	13093.000	5321.500	30.500		
Multiplying Factor	5.000	5.000	5.000	5.000	5.000	5.000
Consumption	58962.500	65465.000	26607.500	152.500	118.200	132.600
L.T. Metering	0.000	0.000	0.000	0.000	0.000	0.000
Adjustment	0.000	0.000	0.000	0.000	0.000	0.000
Assessed Consumption	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption	58963.00	65465.000	26608.000	153.000	118.000	133.000

BILLING DETAILS				Amount in Rs.	
Billed Demand (KVA)	270	@ Rs.	432.00	Demand Charges	1,16,640.00
Assessed P.F.		Avg. P.F.	0.900	Wheeling Charge @	0.56 Rs/U
Billed P.F.	0.900	L.F.	20	Energy Charges	4,55,636.40

AFTER SOLUTION is implemented:

May, 2022 MSEDCL Bill:

CURRENT CONSUMPTION DETAILS						
Reading Date	KWH	KVAH	RKVAH (LAG)	RKVAH (LEAD)	KW (MD)	KVA (MD)
Current 31/05/2022	332057.500	376431.000	156766.500	717.500	23.640	26.250
Previous 31/04/2022	317268.000	361554.500	155285.500	714.000		
Difference	14789.500	14876.500	1481.000	3.500		
Multiplying Factor	5.000	5.000	5.000	5.000	5.000	5.000
Consumption	73947.500	74382.500	7405.000	17.500	148.600	152.600
L.T. Metering	0.000	0.000	0.000	0.000	0.000	0.000
Adjustment	0.000	0.000	0.000	0.000	0.000	0.000
Assessed Consumption	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption	73948.000	74383.000	7405.000	18.000	149.000	152.000

BILLING DETAILS				Amount in Rs.	
Billed Demand (KVA)	293	@ Rs.	454.00	Demand Charges	1,33,022.00
Assessed P.F.		Avg. P.F.	0.994	Wheeling Charge @	0.56 Rs/U
Billed P.F.	0.994	L.F.	22	Energy Charges	5,12,498.87

RESULT AND CONCLUSION:

- ✓ Power factor improved from 0.9 to 0.994
- ✓ KWH and KVAH difference reduced from 6502 to 435 units only
- ✓ KW MD and KVA MD difference reduced from 15 to 3
- ✓ Electrical Bill savings achieved about INR 42,000/-

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