

پروژه مربوط به هامونیک در سیستم های قدرت

در شکل ۱ شبکه ۱۳ باسه *IEEE* را مشاهده می کنید. با توجه به داده های شبکه پروژه ها را انجام دهید. فیلتر مناسب را نیز طراحی و شبیه سازی را مجدداً انجام دهید.

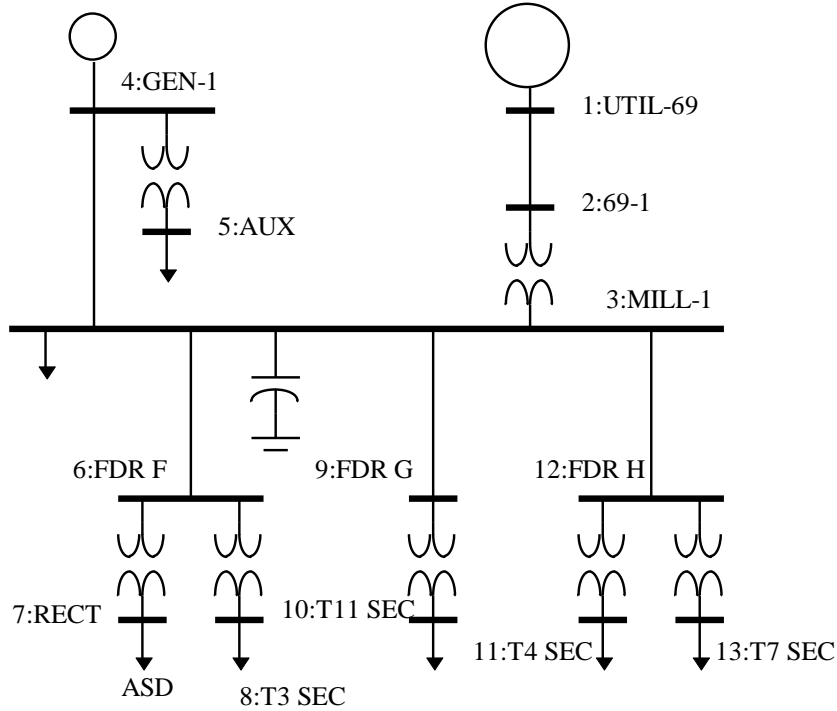


Figure.1. A sample industrial system.

Table 1. Per-Unit Line and Cable Impedance Data
(base value: 10,000 kVA)

From	To	R	X
UTIL-69	69-1	0.00139	0.00296
MILL-1	GEN-1	0.00122	0.00243
MILL-1	FDR F	0.00075	0.00063
MILL-1	FDR G	0.00157	0.00131
MILL-1	FDR H	0.00109	0.00091

Table 2. Transformer Data (R & X are in % !)

From	To	Voltage	kVA	%R	%X
69-1	MILL-1	69:13.8	15000	0.4698	7.9862
GEN1	AUX	13.8:0.48	1500	0.9593	5.6694
FDR F	RECT	13.8:0.48	1250	0.7398	4.4388
FDR F	T3 SEC	13.8:4.16	1725	0.7442	5.9537
FDR G	T11 SEC	13.8:0.48	1500	0.8743	5.6831
FDR H	T4 SEC	13.8:0.48	1500	0.8363	5.4360
FDR H	T7 SEC	13.8:2.4	3750	0.4568	5.4810

Table 3. Load Flow Input Data
 ('-' are load flow results to be determined)

Bus	V _{mag} (p.u.)	θ (deg)	P _{gen} kW	Q _{gen} kVar	P _{load} kW	Q _{load} kVar
UTIL-69	1.000	0.00	-	-		
69-1	-	-				
MILL-1	-	-			2240	2000
GEN1	0.995	-	2000	-		
Aux	-	-			600	530
FDR F	-	-				
RECT	-	-			1150	290
T3 SEC	-	-			1310	1130
FDR G	-	-				
FDR H	-	-				
T4 SEC	-	-			370	330
T7 SEC	-	-			2800	2500
T11 SEC	-	-			810	800

Table 4. Harmonic Source Data (ASD)

Harmonic #	Percent	Relative Angle
1	100.00	0.00
5	18.24	-55.68
7	11.90	-84.11
11	5.73	-143.56
13	4.01	-175.58
17	1.93	111.39
19	1.39	68.30
23	0.94	-24.61
25	0.86	-67.64
29	0.71	-145.46
31	0.62	176.83
35	0.44	97.40
37	0.38	54.36

Additional data needed to conduct a harmonic analysis of the example industrial system include the following:

1. The supply system (utility) equivalent impedance (transient and sub-transient) is $0.05+j1$ per unit based on 100 MVA. (That is the fault level of the supply system is 100MVA.) Enter 1/3 of the value for zero sequence impedance cells.
2. The local (in-plant) generator has an internal impedance of $X=0.25$ per-unit based on the generator rated kVA which is 2000kVA.
3. The plant power factor correction capacitors are rated at 5000 kVar.