

Graduate thesis

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Electric Power Systems Oriented.*

I. Missions:

Design industrial power supply systems with regards to the followings

1. Design the medium voltage distribution system for an industrial park,
2. Design the power supply system of the agricultural pumps manufacturing factory in the industrial park,
3. Analyse the voltage quality of the industrial park's distribution system.

II. INPUT DATA

1. List of installed demands and layout drawing of the industrial park (Figure 1 and Table 1),
2. List of installed demands and layout drawing of the machine tool manufacturing factory (Figure 2 and Table 2),
3. Demand list and layout drawing of the mechanical repairing shop (Figure 3 and Table 3),
4. Available supply voltage levels: 110kV and 35kV,
5. System short-circuit power at the downstream of the local transmission substation: $S_{SC} = 500\text{MVA}$,
6. The industrial park is connected with the local transmission substation (at 12km away) by an overhead line using the aluminium conductor steel reinforced,
7. Construction duration is within a year, the annual interest rate is 10% and the operating life is 30 years.

III. DETAILED DUTIES

1. Determine the maximum demands of the mechanical repairing shop and the agricultural pumps manufacturing factory.
2. Determine the maximum demands of the industrial park.

3. Design the medium voltage distribution system for the industrial park.
4. Design the medium voltage distribution network of the agricultural pumps manufacturing factory (including kVAr compensation for power factor correction).
5. Design the low voltage network of the mechanical repairing shop (including lighting system).
6. Analyse the voltage quality in the industrial park's distribution system

IV. REQUIRED DRAWING

1. Drawing of the demand layout and alternatives of network topology for the industrial park.
2. Drawing of the demand layout and alternatives of network topology for the agricultural pumps manufacturing factory.
3. Single line **diagram** of MV network of the industrial park.
4. Single line **diagram** of MV network of the agricultural pumps manufacturing factory.
5. Single line **diagram** of LV system of the mechanical repairing shop.
6. Layout drawing of LV system of the mechanical repairing shop.

Supervisor



Bach Quoc Khanh,

Ph.D

Table 1. List of installed demands of the industrial park

No	Plant	Installed power (kW)	Max demand hours (h)
1	Automobile and motor spare parts factory	5500	4000
2	Roofs manufacturing factory	6500	5000
3	Steel tubes factory	8000	4000
4	Agricultural pump manufacturing factory	To be calculated	4000
5	Electro-mechanical equipment factory	4000	5000
6	Mechanical repairs and assmebles shop	5000	6000
7	Plastic manufacturing factory	2500	3500
8	Watches and clock factory	1500	4500
9	Metallurgic factory	5000	5500
10	Machine tool manufacturing factory	4000	5000
11	Commercial area	600	3000

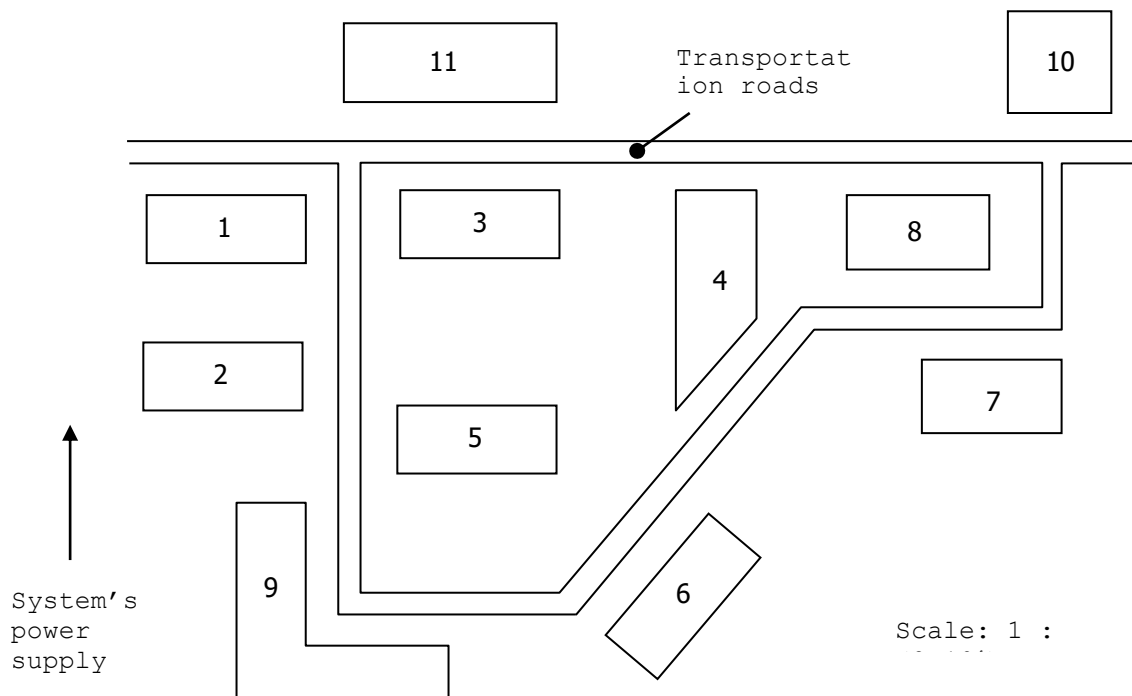


Figure 1. Layout drawing of the

Table 2. List of installed demands of the agricultural pumps manufacturing factory

TT	Shop	Installed power (kW)	load criticality
1	Office	300	III
2	Casting shop	2000	I
3	Mechanical repairing shop	3000	I
4	Assembling shop	3200	I
5	Alloying shop	1800	I
6	Steel alloy shop	2500	I
7	Mechanical repairing shop	Theo tÝnh to,n	III
8	Stamping shop	1500	I
9	Annealing shop	3500	I
10	Air compressor	1700	I
11	Water pumping area	800	I
12	Store	100	III

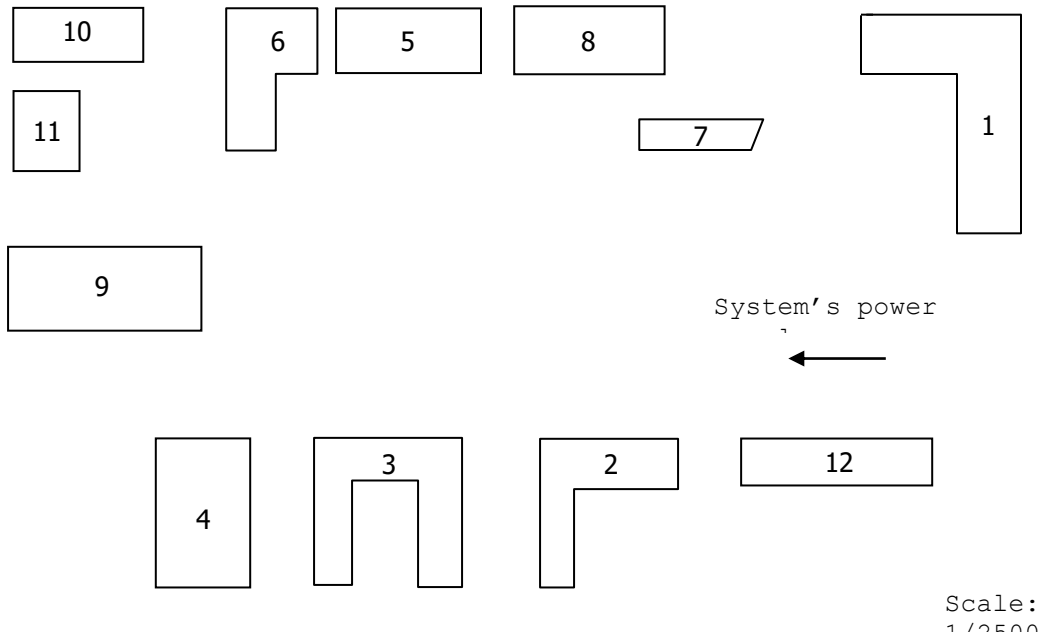


Figure 2. Layout drawing of the agricultural

Table 3. Bill of electrical loads of the mechanical repairing shop

No	Load	Q'ty	Ref.	Rated Power (kW)	
				Singe unit	Total
MachinING AREA					
1	Sawing machine	1	8551	1	
2	Table	2	-	-	
3	Boring machine	1	MC-12A	0,65	
4	Hand press machine	1	ΓΑΡΟ-274	-	
5	Hone machine (M,y mui)	1	3M634	2,8	
6	Vertical drilling machine	1	2A125	2,8	
7	Horizon planer	1	736	4,5	
8	Slotter machine (M,y xác)	1	7A420	2,8	
9	Grinding machine (M,y mui trβn v ¹ n n ² ng)	1	3A130	2,8	
10	Gear hobbing machine (M,y phay b ₁ nh r ² ng)	1	5Δ52	4,5	
11	Hobbing machine	1	5M82	7	
12	Gear shaper machine	1	1A62	8,1	
13	Gear shaper machine	1	IX620	10	
14	Gear shaper machine	1	163	14	
15	Gear shaper machine	1	1616	4,5	
16	Gear shaper machine	1	1Δ53Δ	10	
17	Gear shaper machine	1	163A	20	
ASSEMBLING AREA					
18	Vertical drilling machine	1	2118	0,85	
19	Crane	1	KH-204	24,2	

No	Load	Q'ty	Ref.	Rated Power (kW)	
				Singe unit	Total
20	Assembling table	2	-	-	
21	Electrical tools	1	-	0,85	
22	Driller	1	HC-12A	0,85	
23	M, y c@n b»ng tÜnh	1	-	-	
24	Table	1	-	-	
25	Hand press	1	-	-	
26	Oil heater	1	-	2,5	
27	Shaver	1	-	0,1	
28	Cooling tank	1			
29	NaOH plunge tank	1	-	-	
30	Hone machine	1	3M634	2,8	
BRAZING AREA					
31	Milling machine	1	Hb31	1,7	
32	Table	1	-	-	
33	Hone machine	1	3M634	2,8	
34	Fan	1	-	1,5	
35	Oven	1	-	-	
36	Hand press machine	1	ΓΑΡΟ-274	-	
37	Table	1	-	-	
38	Vertical drilling machine	1	2118	0,85	
39	Table	1	-	-	
40	Table	1	-	-	
ELECTRIC repairs					
41	NaOH plunge tank	1	-	3	
42	Cooling tank	1	-	3	
43	Table	3	-	-	
44	Shaver	1	-	-	
45	Hand press machine	1	ΓΑΡΟ-274	-	

No	Load	Q'ty	Ref.	Rated Power (kW)	
				Singe unit	Total
46	Winding machine	1	-	1,2	
47	Winding machine	1	-	1	
48	Oil heater	1	-	3	
49	Drying box	1	-	3	
50	Boring machine	1	HC-12A	0,65	
51	Table	1	-	-	
52	Hone machine	1	3M634	2,8	
53	Testing table	1	-	7	
CASTING AREA					
54	Hand cutter	1	BMC-101	-	
55	Oil cleaning tank	1	-	3	
56	Electric oven	1	-	5	
57	Electric oven	1	-	10	
58	Electric oven	1	-	3,5	
59	Electric oven	1	-	-	
60	Fan	1	-	1,5	
61	Table	1	-	-	
62	Boring machine	1	HC-12A	0,65	
63	Table	1	-	-	
64	Bending machine	1	C-237	1,7	
65	Hone machine	1	3M634	2,8	
66	Welding machine	1	MTII-25M	25	
ELECTRIC CHARGING room					
67	Charger panel	1	ΠI I-022	-	
68	Support accessories	1	ΠI I-022	-	
69	Rectifier	1	BCA-bM	0,6	
70	Table	1	-	-	

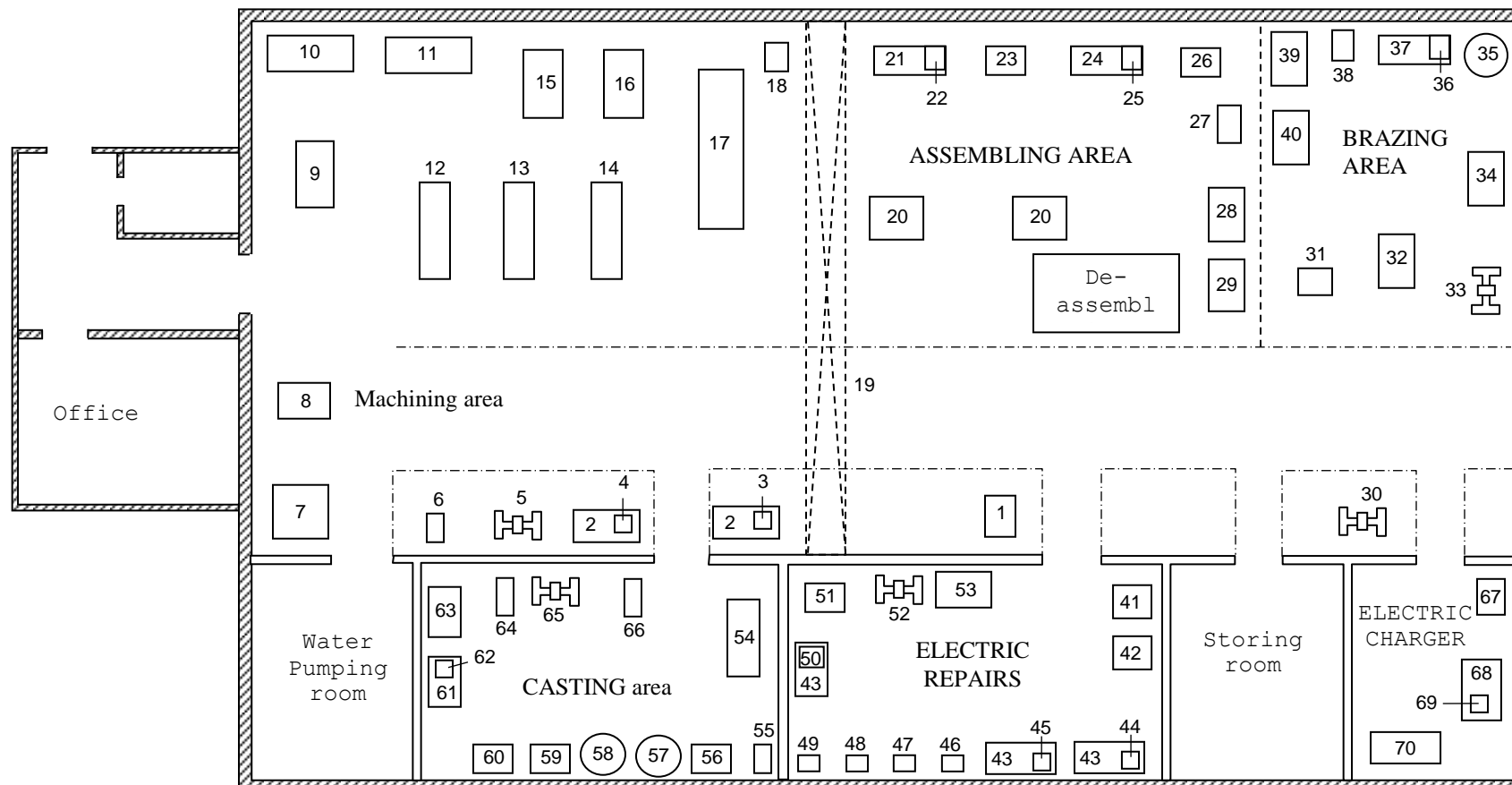


Fig. 3. Layout drawing of the mechanical