POWER | PERUNDURAI PLANT AND DATA CENTRE

Lean-start load schedule

Equipment by area with connected kW, load factor, demand factor and running hours, for day 61 (leased shed) and month 6 (own plant). It sizes the TNPDCL connection, the transformer, the data-centre UPS and the data-centre-only generator. Every kW is a typical maker rating or a labelled assumption; the maker's datasheet replaces it at order.

DAY 61, MAXIMUM DEMAND
94 kW
99 kVA; connected 168 kW; average 23 kW

MONTH 6, MAXIMUM DEMAND
222 kW
234 kVA; connected 378 kW; average 55 kW

ANNUAL ENERGY, OWN PLANT
474 MWh
39,514 kWh a month at month-6 volumes

TNPDCL CONNECTION
HT, 300 kVA
315 kVA transformer; was 1,500 kVA

DATA CENTRE
12.9 kW IT
21 kW with cooling; genset 2 × 40 kVA, UPS 2 × 20 kVA

1. Load schedule by equipment

Load factor is the average draw while running as a share of connected kW. Demand factor is the share of connected kW coincident at the monthly maximum. Energy a month = quantity x kW x load factor x hours a day x days a month. Moulding and forging run in campaigns (days a month shown), because the month-6 volumes of 800 AJ, 80 N and 8 J need about 25 machine-hours of moulding a month at roughly 45 seconds a shot; the 36 campaign hours carry that plus set-up and heat-up. Day 61 is the leased shed: no moulding, forging, data centre or office block.

EQUIPMENT	QTY DAY 61	QTY MONTH 6	KW EACH	CONNECTED KW, M6	LOAD FACTOR	DEMAND FACTOR	HOURS A DAY	DAYS A MONTH	MAX DEMAND KW, D61	MAX DEMAND KW, M6	KWH A MONTH D61	KWH A MONTH M6	RATING BASIS
Electronics SMT line and assembly													
Stencil printer, semi-automatic	1	1	0.4	0.4	0.50	0.50	6	26	0.2	0.2	31	31	typical 0.3-0.5 kW; air 6 bar
Pick-and-place, mid-speed (JUKI JX-350 class)	1	1	3	3.0	0.60	0.70	6	26	2.1	2.1	281	281	typical 2.5-3.5 kW single-phase class; confirm on JUKI site-requirements sheet
Reflow oven, lead-free, 8 zones	1	1	24	24.0	0.55	0.75	6	26	18.0	18.0	2,059	2,059	idle 13.4 kW, loaded 16 kW, warm-up peak well above (IPC paper E18&S19-1, unidentified oven); 24 kW connected assumed
Inline AOI	1	1	0.8	0.8	0.70	0.80	6	26	0.6	0.6	87	87	typical 0.6-1.0 kW incl. PC
SMT link conveyors, 1 m	3	3	0.1	0.3	0.70	0.80	6	26	0.2	0.2	33	33	typical 0.1 kW each
Wave soldering, lead-free, 300 mm	1	1	14	14.0	0.45	0.50	3	26	7.0	7.0	491	491	preheat 6 kW + solder pot 6 kW + conveyor/fan; assumption
PCB depaneling router	1	1	3	3.0	0.50	0.50	2	26	1.5	1.5	78	78	spindle 1.5 kW + vacuum 1.5 kW
Automated functional test and MCU programming (AJ)	1	1	1	1.0	0.60	0.70	6	26	0.7	0.7	94	94	typical, incl. PC and supplies

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EQUIPMENT	QTY DAY 61	QTY MONTH 6	KW EACH	CONNECTED KW, M6	LOAD FACTOR	DEMAND FACTOR	HOURS A DAY	DAYS A MONTH	MAX DEMAND KW, D61	MAX DEMAND KW, M6	KWH A MONTH D61	KWH A MONTH M6	RATING BASIS
Functional test fixtures (N and J)	2	2	0.3	0.6	0.50	0.60	4	26	0.4	0.4	31	31	bench supplies and loads
Gang programmer, 8 stations	1	1	0.05	0.1	0.80	0.80	4	26	0.0	0.0	4	4	USB powered
Burn-in cabinets 2.1 × 0.8 × 2.3 m	2	2	5	10.0	0.50	0.70	8	26	7.0	7.0	1,040	1,040	heater 3-4 kW + fans + 120 device loads of 5 W
Ultrasonic plastic welder, 2-4.2 kW	1	1	4.2	4.2	0.15	0.30	4	26	1.3	1.3	66	66	duty about 15% of the cycle
Inline leak tester	1	1	0.5	0.5	0.50	0.60	4	26	0.3	0.3	26	26	pneumatic; PLC and valves
Fibre laser marker, 20-50 W	1	1	0.6	0.6	0.60	0.70	4	26	0.4	0.4	37	37	source + chiller fan + PC
ESD belt assembly conveyors	2	2	0.4	0.8	0.70	0.80	8	26	0.6	0.6	116	116	typical 0.25-0.55 kW
ESD workbenches: LED light, sockets, instruments	12	20	0.25	5.0	0.50	0.60	8	26	1.8	3.0	312	520	20 benches in the final list (12 by day 61, design value); 250 W each
Soldering stations 60 W	12	20	0.06	1.2	0.50	0.60	8	26	0.4	0.7	75	125	20 stations in the final list
Packing: tapers, L-sealer and tunnel, strapping, band sealers, stretch wrapper	1	1	6	6.0	0.30	0.40	6	26	2.4	2.4	281	281	sealer/tunnel heaters 2.5 kW + five machines 0.4-0.75 kW
Label printers, thermal, 4 inch	6	6	0.05	0.3	0.50	0.60	6	26	0.2	0.2	23	23	TVS LP 46 NEO class
Subtotal, Electronics SMT line and assembly				**75.8**					**45.2**	**46.7**	**5,166**	**5,424**	
Injection moulding													
Injection moulding machine, horizontal, about 150 t	0	1	30	30.0	0.45	0.70	6	6	0.0	21.0	0	486	22 kW pump motor + 8.3 kW heaters (150 t listing); Milacron 150 t is 40 kVA; month-6 volume needs about 25 machine-hours; 36 campaign hours include set-up and heat-up
Vertical rotary 2K moulding machine, 120 t	0	1	25	25.0	0.45	0.70	6	6	0.0	17.5	0	405	Design value: pump 15 kW + heaters 10 kW; no power on listing
Hopper dryers, 50 kg	0	2	3.4	6.8	0.70	0.80	10	6	0.0	5.4	0	286	heater 3 kW + blower 0.4 kW; pre-drying hours included
Hopper auto-loaders	0	2	0.75	1.5	0.30	0.50	6	6	0.0	0.8	0	16	typical 0.75 kW
Mould temperature controllers, water, about 9 kW	0	2	9	18.0	0.35	0.60	6	6	0.0	10.8	0	227	"about 9 kW" on the listing
Process chiller, 7.5 TR, air-cooled	0	1	9	9.0	0.60	0.70	6	6	0.0	6.3	0	194	7.5 TR at about 1.1 kW/TR + fan
Subtotal, Injection moulding				**90.3**					**0.0**	**61.8**	**0**	**1,614**	
Cold forging													
Automatic cold header, 2-5 mm wire (scale item, in place by month 6)	0	1	11	11.0	0.50	0.60	5	8	0.0	6.6	0	220	typical 7.5-11 kW main motor; 40 h a month covers 10x the screws needed
Automatic thread roller (scale item)	0	1	3.7	3.7	0.50	0.60	5	8	0.0	2.2	0	74	typical 2.2-3.7 kW
Wire feed, straightening, tool grinder, parts washer	0	1	2	2.0	0.40	0.50	5	8	0.0	1.0	0	32	allowance

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Subtotal, Cold forging				**16.7**					**0.0**	**9.8**	**0**	**326**	
QC and reliability lab													
Bench instruments: 4 DSO, 2 DMM, 6 DC supplies, 2 e-loads, 2 AWG, LCR	1	1	2.7	2.7	0.40	0.50	8	26	1.4	1.4	225	225	DSO 0.08, DC supply 0.25, e-load 0.3 kW
Temperature-humidity chamber -40 to +150 C, 20-98% RH	1	1	7.5	7.5	0.40	0.60	6	20	4.5	4.5	360	360	heater 3.5 + humidifier 1.5 + refrigeration 2.5 kW; assumption for 150-250 L
Electrodynamic vibration system with amplifier and blower	1	1	8	8.0	0.40	0.50	2	20	4.0	4.0	128	128	amplifier about 6 kVA + blower 2.2 kW; assumption
Dust chamber IP5X/6X	1	1	1.75	1.8	0.50	0.50	2	10	0.9	0.9	18	18	blower 0.75 + heater 1 kW
EMC pre-compliance set, ESD simulator, hipot, drop tester, RF boxes, leak testers, VMS, microscopes	1	1	3	3.0	0.30	0.40	4	20	1.2	1.2	72	72	allowance for ten small instruments
Subtotal, QC and reliability lab				**22.9**					**11.9**	**11.9**	**802**	**802**	
HVAC and cleanroom													
Process cooling, TR: ESD hall, ISO 8 clean zone, QC lab (air-cooled chillers plus AHUs)	15	30	1.4	42.0	0.45	0.85	11	26	17.8	35.7	2,703	5,405	30 TR from the heat-load build-up (envelope, lights, people, equipment, fresh air, +25% margin); 15 TR in the leased shed; 1.4 kW per TR installed incl. fans and pumps; part load in the local climate
Cleanroom recirculation fans (FFU), 12 × 0.15 kW	0	12	0.15	1.8	0.80	0.90	12	26	0.0	1.6	0	449	ISO 8 at about 20 air changes an hour
Fume and reflow exhaust, fresh-air fans	1	3	1	3.0	0.70	0.80	11	26	0.8	2.4	200	601	typical
HVLS and exhaust fans for non-air-conditioned bays	0	6	0.75	4.5	0.70	0.90	11	26	0.0	4.0	0	901	moulding, forging, stores, dispatch bays
Subtotal, HVAC and cleanroom				**51.3**					**18.6**	**43.8**	**2,903**	**7,356**	
Data centre													
GPU inference server, 4 x RTX PRO 6000 Blackwell (4U)	0	2	4.2	8.4	0.62	0.85	24	30	0.0	7.1	0	3,750	4 × 600 W GPU (NVIDIA) + 2 x Xeon 6 + 1 TB DDR5 + fans, at the wall; assumption for RDP QUASAR class
Rack server, 2U dual-socket	0	3	0.9	2.7	0.55	0.85	24	30	0.0	2.3	0	1,069	typical
Storage, 2U 12-bay	0	1	0.4	0.4	0.75	0.90	24	30	0.0	0.4	0	216	12 HDD + controller
Data-centre switches 100G (pair)	0	2	0.35	0.7	0.70	0.90	24	30	0.0	0.6	0	353	Arista 7050SX3-48YC8 class
Firewall pair (HA)	0	2	0.1	0.2	0.80	0.90	24	30	0.0	0.2	0	115	typical
KVM, DCIM sensors, NOC workstations	0	1	0.5	0.5	0.80	0.90	24	30	0.0	0.5	0	288	allowance
UPS losses and battery charging allowance (about 7% of IT)	0	1	1	1.0	0.80	0.90	24	30	0.0	0.9	0	576	online double conversion at about 93% plus charging

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Precision cooling, DX N+1, 2 × 6 TR (one duty, one standby)	0	1	6.5	6.5	0.45	0.80	24	30	0.0	5.2	0	2,106	EC fans + scroll compressor; 15 kW heat at design IT load
DC lighting, BMS, fire detection and suppression, access	0	1	0.8	0.8	1.00	1.00	24	30	0.0	0.8	0	576	allowance
Subtotal, Data centre				**21.2**					**0.0**	**18.0**	**0**	**9,049**	
Plant services													
Screw air compressor 22 kW (duty; second unit standby)	1	1	22	22.0	0.30	0.60	10	26	13.2	13.2	1,716	1,716	listed 2 × 22 kW duty/standby; air demand about 1 m3/min against 3.5 m3/min capacity, so load/unload average 30%
Material handling chargers: forklift, stacker, pallet truck	0	1	7.5	7.5	0.40	0.50	8	26	0.0	3.8	0	624	forklift 5 kW, stacker 1.5, pallet truck 1
EV goods-carrier chargers, 2 × 3.3 kW AC	1	2	3.3	6.6	0.80	0.50	4	26	1.6	3.3	275	549	Tata Ace EV 1000, 21.3 kWh each
Pumps, RO, STP blowers, water transfer	0	1	7	7.0	0.50	0.50	10	30	0.0	3.5	0	1,050	STP 10-20 KLD; allowance
Access switches, Wi-Fi 6 APs, CCTV, access control	1	1	3	3.0	0.85	0.90	24	30	2.7	2.7	1,836	1,836	10 switches x 0.15, 24 APs x 0.015, CCTV and access 1.0 kW
Subtotal, Plant services				**46.1**					**17.6**	**26.4**	**3,827**	**5,775**	
Offices and lighting													
Office and training-room air conditioning, TR (VRF/splits)	8	24	1	24.0	0.50	0.80	9	26	6.4	19.2	936	2,808	about 1.0 kW per TR; 4,000 sq ft first floor at 200 sq ft/TR = 20 TR plus 4 TR reception and training; 8 TR in the leased shed
LED lighting, production shed 32,000 sq ft	0.4	1	17.8	17.8	0.70	0.80	11	26	5.7	14.2	1,425	3,564	6 W/sq m over 2,973 sq m; 40% of the area in the leased shed
LED lighting, office block 8,000 sq ft	0.5	1	5.9	5.9	0.80	0.80	10	26	2.4	4.7	614	1,227	8 W/sq m over 743 sq m
External, street and security lighting	0.3	1	3	3.0	1.00	1.00	12	30	0.9	3.0	324	1,080	dusk to dawn
Laptops, printers, pantry, water coolers, small power	39	58	0.06	3.5	0.60	0.60	9	26	1.4	2.1	329	489	per head (39 staff at day 60, 58 at month 6)
Subtotal, Offices and lighting				**54.2**					**16.8**	**43.2**	**3,628**	**9,167**	
Total of all areas (sum of area demands, before diversity)				**378.5**					**110.1**	**261.7**	**16,325**	**39,514**	

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2. Summary by area

AREA	DAY 61 CONNECTED KW	DAY 61 MAX DEMAND KW	DAY 61 KWH A MONTH	MONTH 6 CONNECTED KW	MONTH 6 MAX DEMAND KW	MONTH 6 KWH A MONTH	MONTH 6 MWH A YEAR
Electronics SMT line and assembly	73.3	45.2	5,166	75.8	46.7	5,424	65.1
Injection moulding	0.0	0.0	0	90.3	61.8	1,614	19.4
Cold forging	0.0	0.0	0	16.7	9.8	326	3.9
QC and reliability lab	22.9	11.9	802	22.9	11.9	802	9.6
HVAC and cleanroom	22.0	18.6	2,903	51.3	43.8	7,356	88.3
Data centre	0.0	0.0	0	21.2	18.0	9,049	108.6
Plant services	28.3	17.6	3,827	46.1	26.4	5,775	69.3
Offices and lighting	21.3	16.8	3,628	54.2	43.2	9,167	110.0
Sum of areas	**167.8**	**110.1**	**16,325**	**378.5**	**261.7**	**39,514**	**474.2**
Maximum demand after 0.85 diversity between areas; kVA at power factor 0.95		**94 kW / 99 kVA**			**222 kW / 234 kVA**		

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How the connection is sized

- **Month 6:** area demands add to 262 kW; a diversity of 0.85 between areas (design value, usual 0.8-0.9) gives 222 kW, or 234 kVA at power factor 0.95 (an APFC panel holds the HT limit of 0.90).
- **Contract demand 300 kVA** = 234 kVA plus 28% excess. It is also the AC ceiling for the solar plant (TNERC GISS Regulations 2021, reg. 7.3).
- **HT, not LT:** LT supply stops at 112 kW demand (up to 150 kW only if the consumer gives space for a distribution transformer); 222 kW is above both, so the supply is HT-I at 11 kV.
- **Transformer 315 kVA** (standard rating above 300 kVA), 11 kV/433 V, owned by AiVibe.
- **Day 61:** 94 kW (99 kVA) is below 112 kW, so the leased shed can run on the landlord's connection or an own LT-III B service.

Against the earlier plan

ITEM	EARLIER	LEAN START
Contract demand	1,500 kVA	300 kVA
Average load, own plant	450 kW	55 kW
Average load, leased shed	120 kW	23 kW
Generator	750 kVA, whole plant	2 × 40 kVA, data centre only
Data-centre UPS	2 × 60 kVA	2 × 20 kVA
Process cooling	130 TR	30 TR
Data-centre cooling	70 TR	2 × 6 TR

3. Data centre, cooling and UPS basis

Data centre, month 6

BLOCK	PEAK KW	AVERAGE KW
2 GPU inference servers (4 × 600 W GPU each)	8.4	5.2
3 rack servers, storage, 2 switches, 2 firewalls, KVM	4.5	2.8
IT load	**12.9**	**8.0**
UPS losses (7% of IT), precision cooling at full load, lighting and controls	8.2	4.4
Data-centre total	**21.1**	**12.4**

Annual energy 109 MWh, a power-usage ratio of about 1.54. GPU card power: NVIDIA RTX PRO 6000 Blackwell Server Edition, 600 W (NVIDIA specification); the server draw is an design value until the RDP QUASAR build sheet is read.

Sizing results

- **UPS:** IT peak 12.9 kW. Two 20 kVA online units in 1+1 parallel redundancy; one unit alone carries the load at about 70-80% of its kW rating.
- **Generator:** 21.1 kW (full IT, UPS losses, cooling) plus 3.1 kW to recharge one UPS bank = 24.2 kW, or 27 kVA at power factor 0.9. A 30 kVA set would run at 90%; a 40 kVA set runs at 67% with room for IT growth to about 17 kW.
- **100% uptime:** two 40 kVA sets, one duty and one standby, each with an AMF panel and a common changeover panel; the UPS bridges the 10-15 seconds to generator start and the 25-40 minutes of battery covers a failed first start.
- **Cooling for the data centre:** 15 kW of heat at design IT load, about 4.4 TR; two 6 TR precision units, one duty and one standby, on generator power.

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Process cooling heat-load build-up (conditioned zones: ESD hall 8,000 sq ft, clean zone 2,000, QC lab 1,500 = 1,068 sq m)

COMPONENT	KW OF HEAT	BASIS (DESIGN; THE HVAC CONSULTANT CERTIFIES)
Roof, walls and solar gain	19.2	18 W per sq m of floor, insulated sheeting, design 35 C dry bulb
Lighting	10.7	10 W per sq m
People	3.9	30 occupants at 130 W
Equipment released to the room	22.0	reflow oven 40% of 13 kW, placer, AOI, wave solder 30%, burn-in leakage, benches, test, QC chambers
Fresh air and exhaust make-up	15.4	2,000 cubic m an hour, enthalpy difference 24 kJ/kg
Subtotal plus 10% duct and fan gains	**78.3**	**22.3 TR**
With 25% margin	**97.9**	**27.8 TR, so 30 TR is installed (earlier plan: 130 TR)**

4. Open items to confirm

- Maker datasheets for the reflow oven, the 2K press, the 150 t press, the vibration system and the humidity chamber replace the typical ratings marked in the basis column.
- Air compressors are listed as 2 × 22 kW duty and standby; average air demand is about 1 m3 a minute, so the average draw is taken at 30% of one unit. A smaller VFD compressor would cut the load further.
- Scale items other than the cold header and thread roller (second placer, 100 t press, extra burn-in cabinets) are not in this load; the 28% excess in the contract demand covers switching one of them in, and the contract demand can be raised later.
- Hourly profile and season factors for cooling are assumptions; a metered month after commissioning supersedes them.

Sources: the equipment list of the costing schedule (AIVIBE/SIDBI/CST/2026-10/008); volumes from the project model (800 AJ, 80 N, 8 J in month 6); headcount from the launch plan (39 at day 60, 58 at month 6); floor zones and roof from the concept drawing set (AIVIBE/SIDBI/DRG/2026-10/009); Demag Ergotech 150 t listing (22 kW motor, 8.3 kW heater) on plastemart.com; IPC paper E18&S19-1 for reflow oven idle and loaded power; NVIDIA RTX PRO 6000 Blackwell Server Edition datasheet (600 W).

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