1. Project – Measurement & Optimisation

Plant has 2 air compressors, 2 x VOC160 (C1 & C2). Compressors are operating as the lead & lag compressors to supply the factory air demand on a rotational basis.

- 2 x Sullair Champion VOC 160
  - Rated Power: 160 kW
  - Rated Pressure: 10 bar
  - Rated Flow: 23.5 m^3/min

2. Compressed Air Measurement Analysis

2.1. Annual usage and costs

Table 1: Compressed air usage and costs

Description	Values
7 day energy usage	20,045 kWh
Annual energy usage	1,042,361 kWh
Electricity average unit rate	$0.15/kWh
Annual energy cost	$156,354
7 day air production	74,779 m^3
Annual air consumption	3,888,508 m^3
Average unit cost of air – energy component only	**$0.040/$m^3$**

Logged Period analysis

- Total compressor energy consumption during the 7-day period was **approx. 20 MWh.**
- The estimated annual energy consumption is **1,042 MWh** (based on 52 weeks per annum).
- The estimated annual energy cost is **$156,354** per annum, based on the average unit cost of the energy 15 c/kWh, which is collected from September 2021 site electricity bills.
- The estimated unit cost of compressed air is **$0.040/ m^3**.

2.2. Compressor Efficiency

Table 2: Air production and energy consumption over 7-day period

Energy consumption (kWh)	Air Delivered (m^3)	Specific power (kW/m^3/min)	Energy consumption kWh/m^3
20,067.4	74,779	16.08	0.268

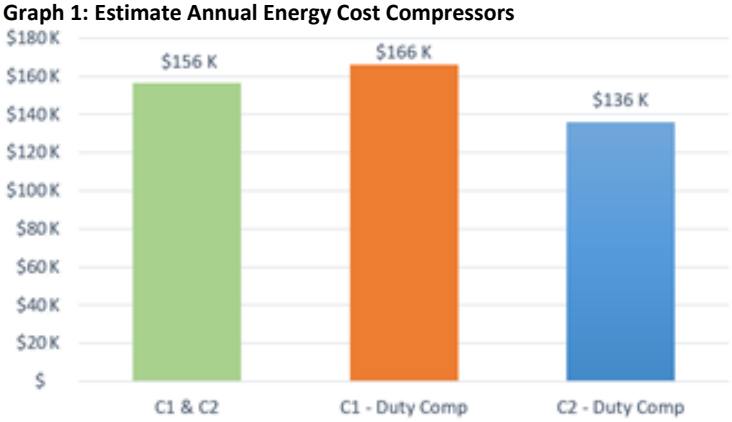
Note:
Approximately 74,779 m^3 of compressed air produced over 7-day period, with energy consumption of 20,067.4 kWh. The specific energy consumption shows that the efficiency of the compressed air system is **low**, at 16.08 kW/m^3/min.

3. Summary and Recommendations

The system is well maintained when C2 is running as the main compressor, but not the same when C1 is the main compressor, as we observed some possible problems in the C1 in which case it needs to get a mechanic to repair it.

The system has enough drying capacity to eliminate condensate (liquid moisture) from forming in the system. However, dew point below 0°C might cause some problems such as the water freezing and then the ice blocking the pipes. In the end, the dryer will be completely blocked.

Graph 1: Estimate Annual Energy Cost Compressors



Graph 2: Breakdown of compressed air users

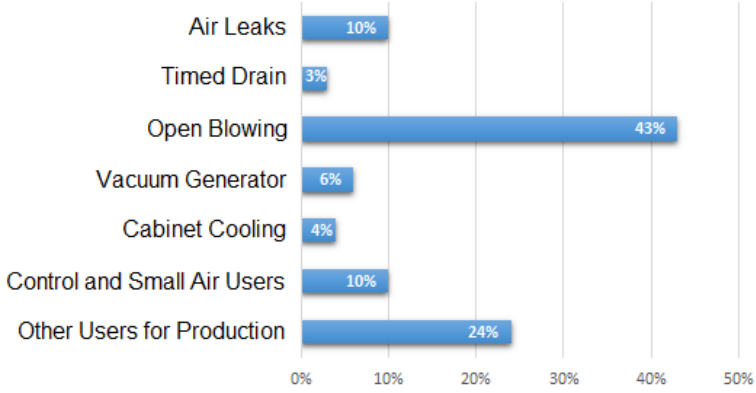


Table 3: Summary of Recommendations

Description	Energy Saving
Fix air delivery issue with Compressor 1 (Reduce Energy usage by ~ **13%**)	**$20,000 p.a.**
Leakage repairs (Reduce leakage by ~ **10%**)	**$15,000 p.a.**
Optimisation on air users (Reduce air usage by - **56%**)	**$87,000 p.a.**
Total Estimated Saving	**$122,000 p.a**

Recommendations:

There are not big changes to be made, but there are some improvements/comments that can be looked at:

- Check C1 compressor air inlet/blowdown valves, regarding the compressors under delivering compared to the rated flow. C1 had the ability to deliver a maximum air flow of 15m^3/min air, which is 8.5 m^3/min below the rated flow on compressor plate.
- Keep the leakage level as low as possible. Encourage fitters to report and/or repair any compressed air leak (48 leaks) found as soon as possible.
- Check each optimisation opportunity (timed drain, cabinet cooling, open blowing, vacuum generator) for air demand reduction, considering substitution of compressed air for other technologies and finding sensible methods to optimise the air consumption of the existing compressed air end users.