1. Project – Optimisation Survey

The site has 4 air compressors. 2 x Compressors at Powders Plant: GA 90 FF running as the main compressor and SSD55 operating as backup compressor. At Admixtures Plant: 2 x Compressors Sullair ST22 working on a shared time load.

- Powders Plant
  - 1 x Atlas Copco GA90FF
    - Rated Power: 90 kW
    - Rated Pressure: 7.25 bar
    - Rated Flow: 16.56 m³/min
  - 1 x Sullair SSD55
    - Rated Power: 55 kW
    - Rated Pressure: 7.5 bar
    - Rated Flow: 6.3 m³/min
- Admixtures Plant:
  - 2 x Sullair ST22
    - Rated Power: 22 kW
    - Rated Pressure: 8 bar
    - Rated Flow: 3.6 m³/min

2. Compressed Air Measurement Analysis

2.1. Annual usage and costs

Table 1: Compressed air usage and costs

Air Usage and Costs	Values
7 day energy usage	5 MWh
Annual energy usage	269 MWh
Electricity average unit rate	$0.19/kWh
Annual energy cost	$51,100
Annual maintenance cost	$20,000
7 day air production	20,711 m³
Annual air consumption	1,076,972 m³
Average unit cost of air – energy and maintenance costs included ($/m³)	**$0.066/m³**

2.2. Compressor Efficiency

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

Energy consumption (kWh)	Air Delivered (m³)	Specific power (kW/m³/min)	Energy consumption (kWh/m³)
5,171.40	20,711	14.98	0.250

Note:
Approximately 20,711 m³ of compressed air produced for 7 days period, with energy consumption of 5,171.4 Kwh. The efficiency of the compressed air system is **very poor** at 14.98 kW/m³/min, this is due to the compressors being most of the time at the Unload state.

2.3. Compressed air leakage

Table 3: Compressed air leakage costs

Air Leakage Costs	Values
Air Leakage	0.45 m³/min
Annual air leakage	235,872 m³
Average unit cost of air – energy and maintenance	$0.066/ m³
Average air leakage costs ($)	$15,568
Energy consumption of compressed air	0.250 kWh/m³
Annual energy usage	59 MWh

3. Summary and Recommendations

The opportunities are around considering substitution of compressed air for other technologies (for example, electric drives instead of compressed air driven equipment), and finding sensible methods to optimise the air consumption of the existing compressed air end users.
During the air leakage survey, 13 leaks were located. The overall air leakage from the system is estimated 0.45 m3/min. The estimated energy loss is 59 MWh at the costs $15,568 per annum, which equals to 21.93 % of total compressed air production capacity.

Graph 1: Breakdown of compressed air users

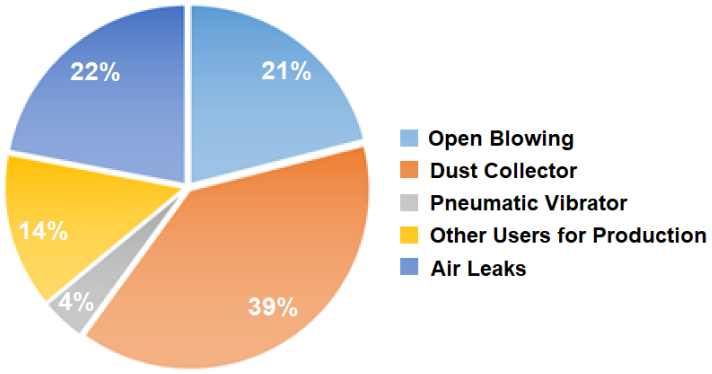

Table 3: Summary of Recommendations

Compressed air opportunity	Compressed air savings (m³/min)	Electricity savings (MWh/year)	Cost savings ($/year)
Z1 – Open Blowing	4.5	14.7	2,800.98
Z2 – Dust Collector	1.25	32.9	3,907.15
Z3 – Open Blowing	0.89	40.8	7,756.63
Z4 – Pneumatic Vibrator	0.51	11.1	2,116.30
Z5 – Dust Collector	1.25	37.42	7,109.81
Z6 – Dust Collector	0.63	11.46	2,176.78
Z7 – Dust Collector	0.05	5.09	967.60

Table 4: Summary of Recommendations

Description	Energy Saving
Leakage repairs (Reduce Costs by ~ **22%**)	**$15.570 p.a.**
Optimisation on Air Users (Reduce Costs by **~ 38%**)	**$26.835 p.a.**
Total Estimated Saving	**$42,405 p.a.**

Recommendations:

- Keep the leakage level as low as possible. Encourage fitters to report and/or repair any compressed air leak (13 leaks) found as soon as possible.
- Check each optimisation opportunity (open blowing, dust collector, pneumatic vibrator) 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.