Using Centralized Vacuum System Instead of De-Centralized Vacuum System

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The benefits of Centralization of Resources are obvious and is more so for vacuum systems especially when the Point of Use are in close proximity of each other.

Below we list some of the less obvious points;

Less Supporting Utilities

For certain production which requires a Clean Environment, having a centralized vacuum source located outside the Clean Room lessen the needs for auxiliary systems.

Auxiliary Systems such as exhaust system designed to handle the exhaust from the multiple vacuum pumps/system within the Clean Room become redundant. This lead to saving on both initial capital investments and subsequent maintenance of such systems.

Simpler Electrical distribution systems together with lesser start or control panels, easier space planning, etc are all indirect cost savings which are sometime overlook.

Energy Costs

Whilst the power consumption of individual smaller decentralized system might not be significant, the accumulative effect of it might be a different picture altogether.

A Centralized Vacuum Source leverage on probability so in many occasions a moderate system can easily replace the function of many small decentralized systems.

This usually led to a lower energy cost for a plant.

Reliability & Maintenance

A proper design Centralized Vacuum Source allow for enhance reliability with built in standby vacuum source/capability.

It also simplify the Centralized Monitoring of the Vacuum Utilities by the Building Automation System. This allow for up to date information to be captured allowing for informed decision to be made for facility management.

Maintenance is easier since there are fewer vacuum sources to be maintained in such a situation.

Environmental Impact

There are many aspects to environmental impact. The choice to use less resources to obtain the same outcome is one intelligent way of saving the environment.

With less maintenance need due to fewer vacuum producing source, it will also lead to lesser consumables required for the upkeep of the system.

A simple case study :

Case Study Parameters;

1. A Production Facility have 10 x Production Lines
2. Each Production Line is supported by an independence Vacuum Source.
3. Vacuum at Each Source is generated by Brand “B” Vacuum Pump configured in 1 x Operating + 1 x Standby Configuration.
4. Each Brand “B” Vacuum Pump is 30 Kw.

Summary of Differences

S/N	Item	Existing-De-Centralized	PV Centralised System	Remarks
A	Supporting Utilities			
	Exhaust System	10 Locations	1 Location	
	Mechanical Ventilation System	10 Locations	1 Location	
	Acoustic Treatment (if Required)	10 Locations	1 Location	
	Electrical Power Distribution	10 Locations	1 Location	
	Building Maintenance System Monitoring	10 Locations	1 Location	
	Production Floor Space	10 Locations	No-Located in Facility Area	
	Space Required	Space for 20 x Brand “B” Pumps + Panels + 10 x Vacuum Buffer Tank & Accessories. (10 x Space for 2 x Brand “B” 30 Kw Pump + Panels 10 x Space for Vacuum Buffer Tank + Accessories)	Space for 12 Brand “B” Pumps + Panels+ 1 x Vacuum Buffer Tank & Accessories. (Pumps configured in 10 x Operating + 2 x Standby with 1 x Large Vacuum Buffer Tank)	

B	Energy Costs			
	Electrical Power Requirement	2 x 10 x 30kw = 600 kw	12 x 30 kw = 360 Kw	For PV Centralised System-Pumps configured in 10 x Operating + 2 x Standby
	Possibilities of Sharing Vacuum Resources	No	Yes	Additional Demand from One Production Line might be able to be met by spare capacity available rather than the Actual Running of 1 x 30Kw Vacuum Pump.
	Minimum Running Vacuum Pumps	10 x 30 Kw = 300 Kw	1 x 30 Kw	For PV Centralized System- Vacuum Pump starts or stop depending on the Production Demand.
	Possibilities of Optimizing with the use of fewer Bigger Vacuum Pumps	No	Yes	
	Possibilities of Making Sure Vacuum Pumps operates closer to its highest efficiency segment of it performance curve	No	Yes	

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C	Reliability & Maintenance			
	Demand For Maintenance Needs	20 Vacuum Pumps + Accessories + Panels + 10 Vacuum Buffer Tanks.	12 Vacuum Pumps + Accessories + Panels + 1 x Vacuum Buffer Tank	Maintenance Needs can be met easier with less Budget.
	Enhance System Reliability with possibilities of sharing resources	No	Yes	In Proposed PV Configuration, Each Production Line is backed up by 2 x Standby Vacuum Pump indirectly.
D	Environmental Impact			
	Consumables Requirement such as Inlet Filters (If Applicable); Oil Filters (If Applicable); Oil (if Applicable), Cooling Water (If Applicable), etc.	Needs for 20 Sets of Vacuum Pumps	Needs for only 12 Sets of Vacuum Pumps	
	Demand on Environmental Resources	20 Sets of Vacuum Pumps + Accessories	12 Sets of Vacuum Pumps + Accessories	
	Treatment or Disposal of Waste Oil (if Applicable)	20 Sets of Vacuum Pumps	12 Sets of Vacuum Pumps	

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