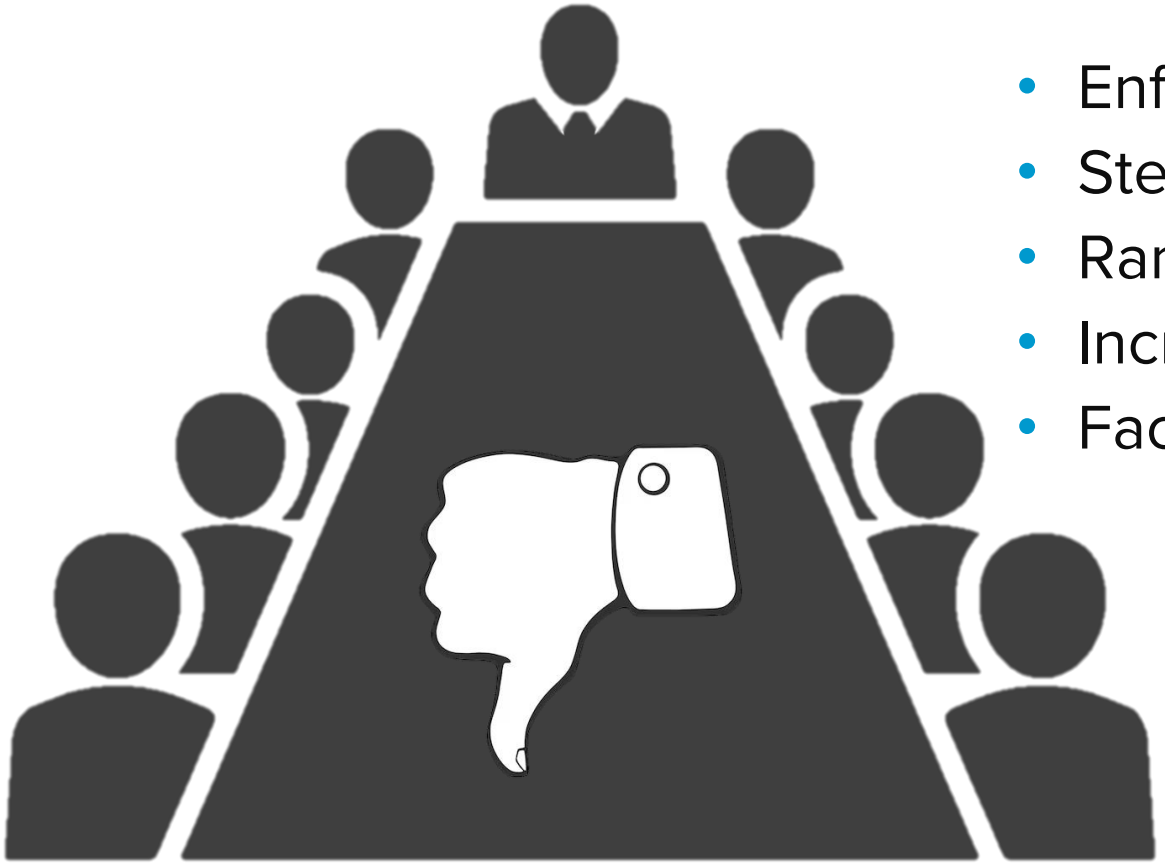
3 STEPS TO ELIMINATE OPERATING ROOM DESIGN FRUSTRATION

Presented by

Joe Mezzetti

Precision Air Products

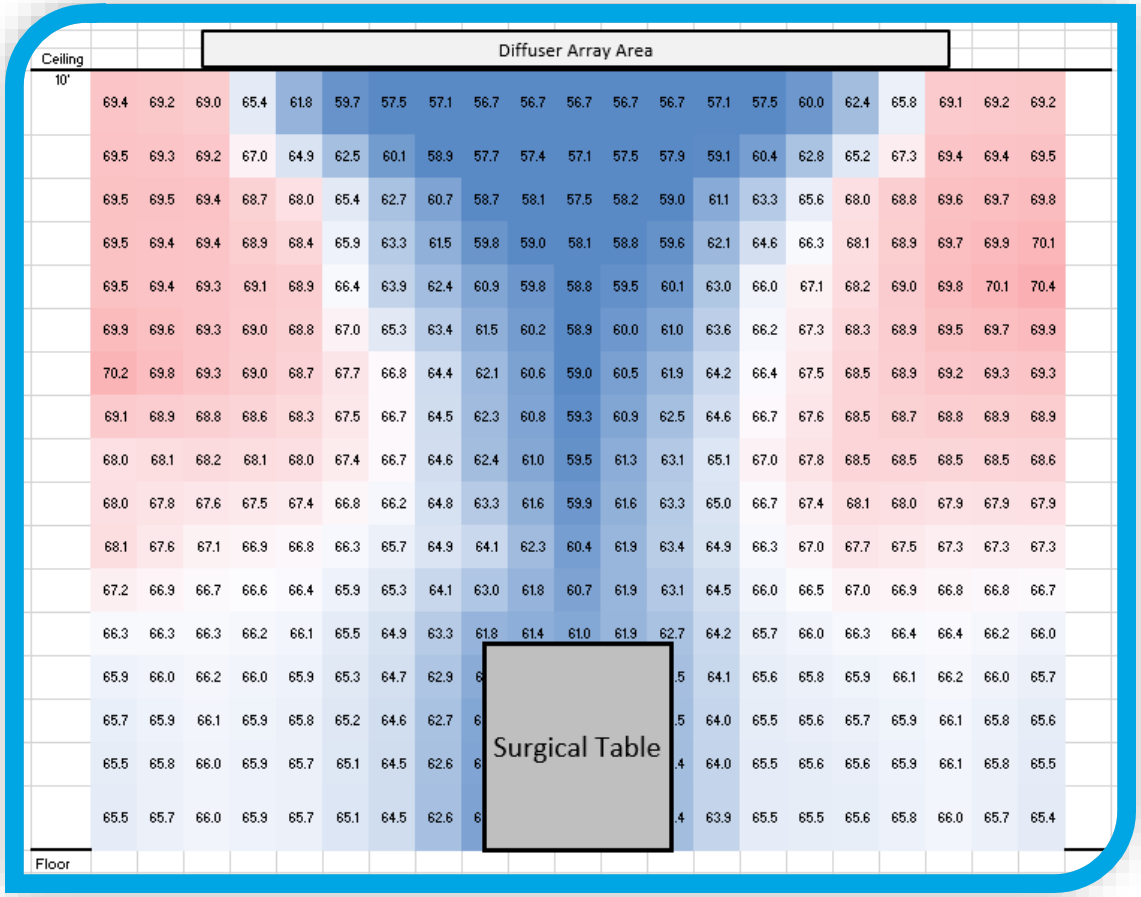
SOLVING THE PROBLEMS BECOMES CHASING BAND-AIDS



- Enforcing temperature rules on surgeons
- Stealing airflow from other spaces
- Ramping airflow only to chase new noises
- Increasing reheat on adjacent spaces
- Facilities teams altering components themselves

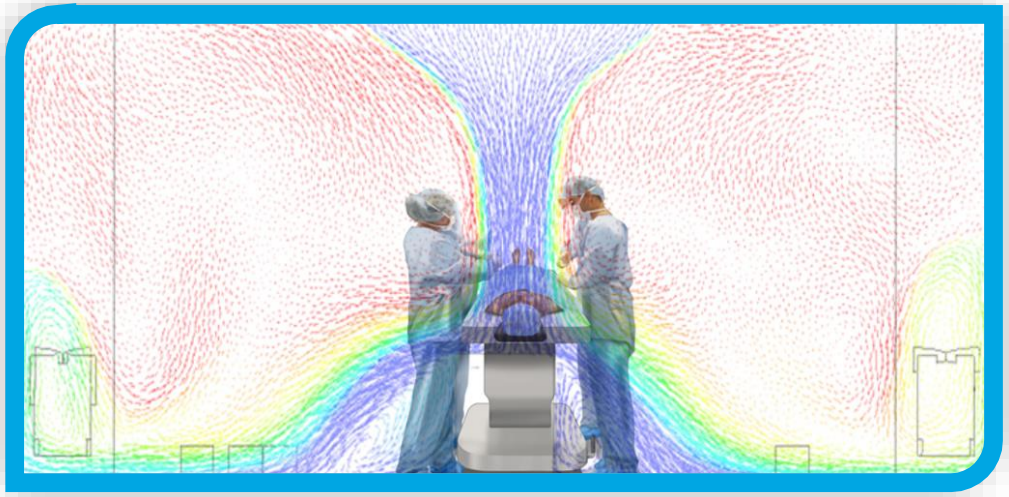
New projects can die in the board room

EMPIRICAL AND MODELED TEMPERATURE WITH BASIC LAMINAR AIRFLOW



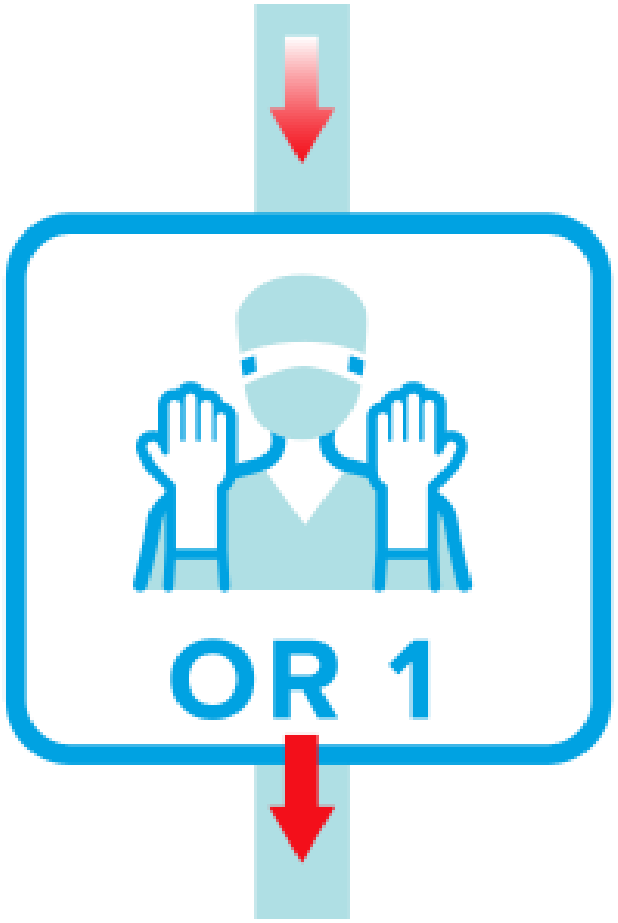
Air at Ceiling	59°F	➡ 56°F	➡ 54°F
Air at Patient	63°F	➡ 60°F	➡ 57°F
Air at Surgeon	68°F	➡ 67°F	➡ 65°F
Room Temp (set)	68°F	➡ 65°F	➡ 62°F

Cold airflow is focused exclusively on patient, missing surgeons



STEP #1

PROVIDE LESS AIR AND COOLING FROM THE AHU



65°F Room
60% RH
2,200 CFM
20 ACH

Lowered To

62°F Room
60% RH
2,200 CFM
20 ACH

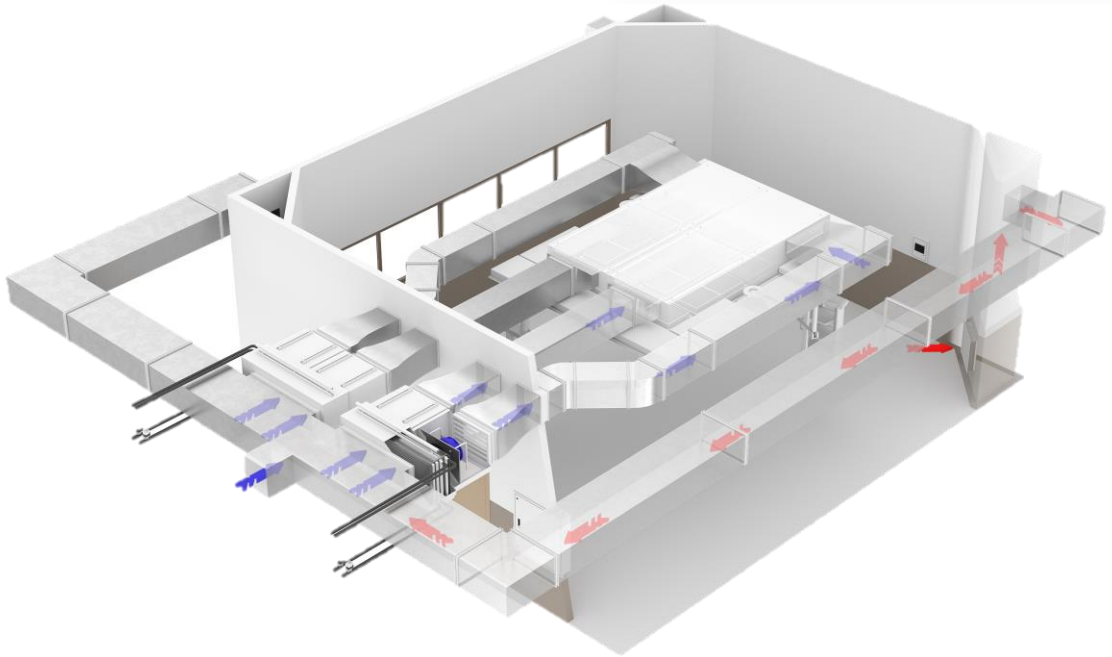
~~**15,800 BTU additional capacity per room**~~

STEP #2

LOCALLY INCREASE AIR CHANGES AND TEMPERATURE

55°F AHU Supply
73% RH
4-10 ACH

HVLR
61°F Delivery
58% RH
40-60 ACH



65°F Room
60% RH

OR 1

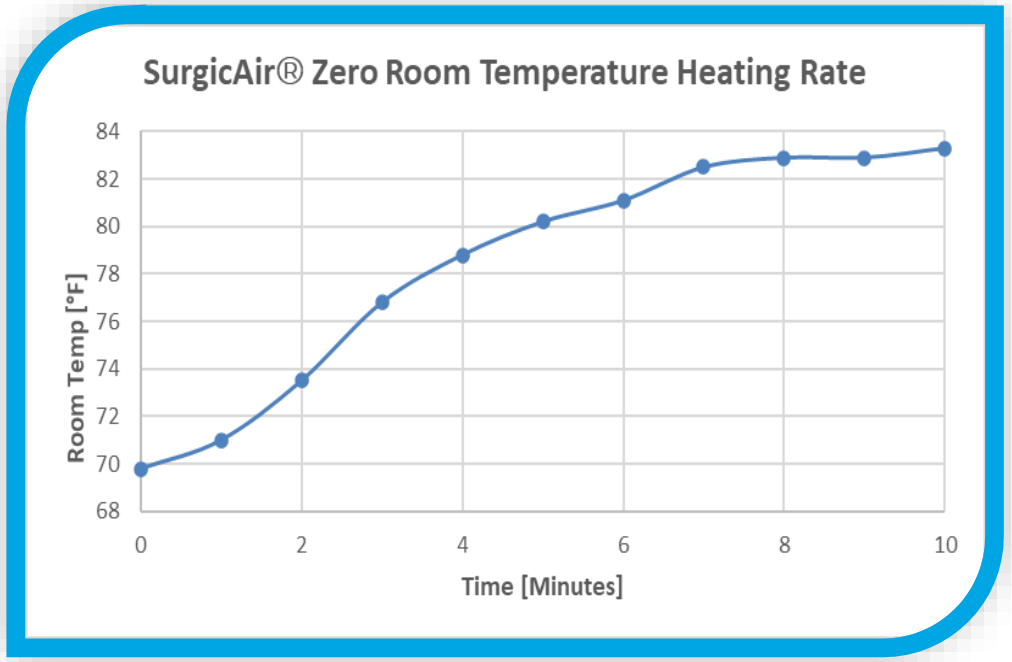
ENERGY SAVINGS WITH HIGH VOLUME LOCAL RECIRCULATION

- IES Virtual Environment serving:
  - **4 ORs**
  - **Sterile corridor**
  - **Surrounding corridor**
- Standard VAV system at **25 ACH**
- HVLR system at **62 ACH**

- **30% energy savings**

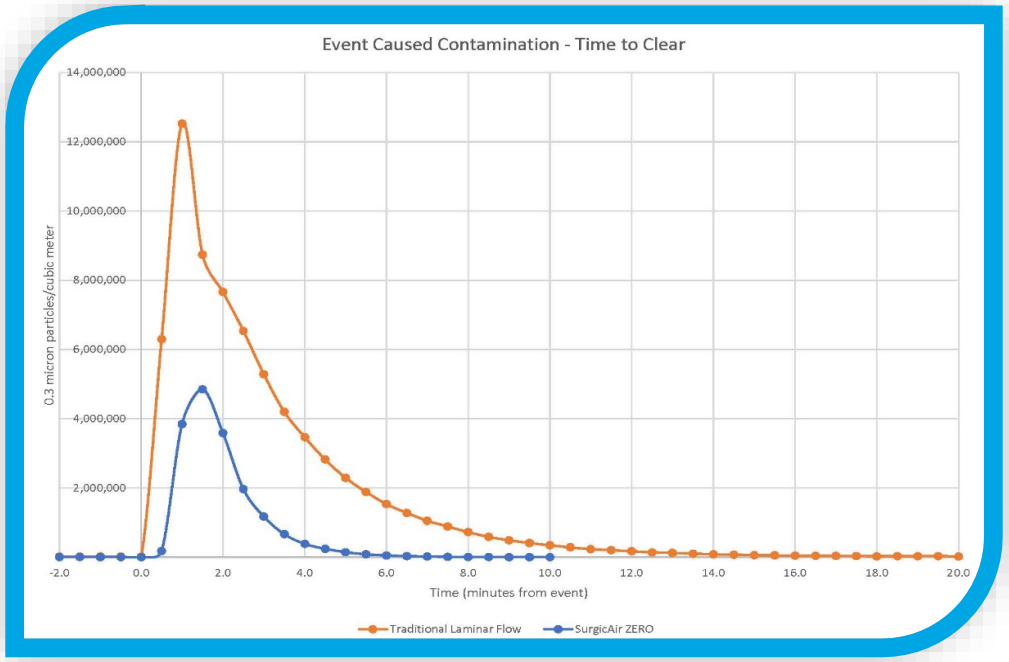
HVAC Options: Philadelphia PA	Standard VAV	HVLR System
Space Heating Boilers (therms)	6,560.0	4,734.1
Boiler Pumps (kWh)	278.2	170.2
Space Cooling Chillers (kWh)	44,795.1	35,561.0
Primary Pumps (kWh)	2,035.6	2,075.8
Secondary Pumps (kWh)	7,475.8	5,783.7
Heat Rejection – Condenser Pumps (kWh)	12,235.2	12,138.2
Heat Rejection – Towers (kWh)	1,419.5	850.2
Interior Central Fans (kWh)	172,669.3	78,131.4
Interior Local Fans (kWh)	-	30,922.1
Total Electrical Energy (kWh)	240,908.6	165,632.7
Total Heating Energy (therms)	6,560.0	4,734.1
Total Electrical Energy Cost ($0.11/kWh)	$21,682	$14,907
Total Heating Energy Cost ($0.72/therm)	$6,691	$4,829
Total Cost ($)	**$28,373**	**$19,736**
	Cost Difference	**$8,637**
	Percent Savings	**30.4%**

RAPID ROOM HEATING AND COOLING



Cool 10°F in 10 Minutes ● Heat 10°F in 5 Minutes

75% LESS STAFF EXPOSURE TO SURGICAL SMOKE



STEP #3

DON'T TOUCH THE REST OF THE BUILDING

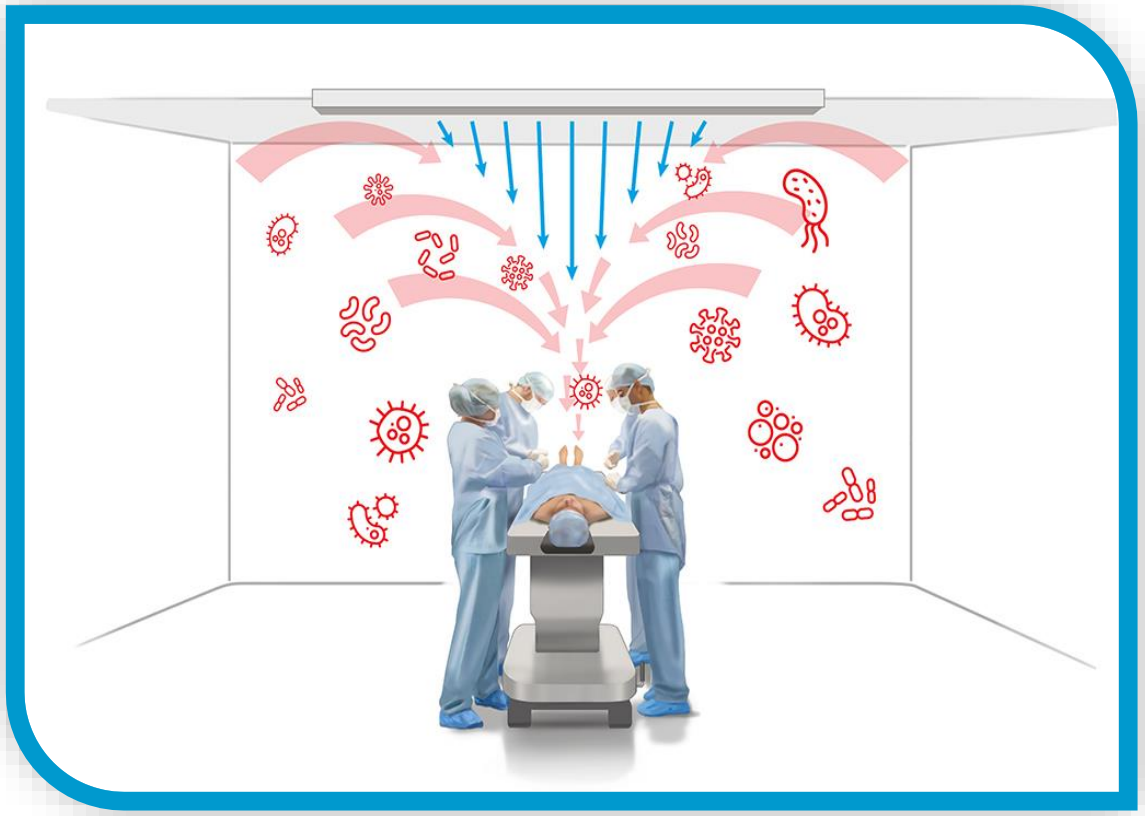
Updating an OR with higher heat load equipment?

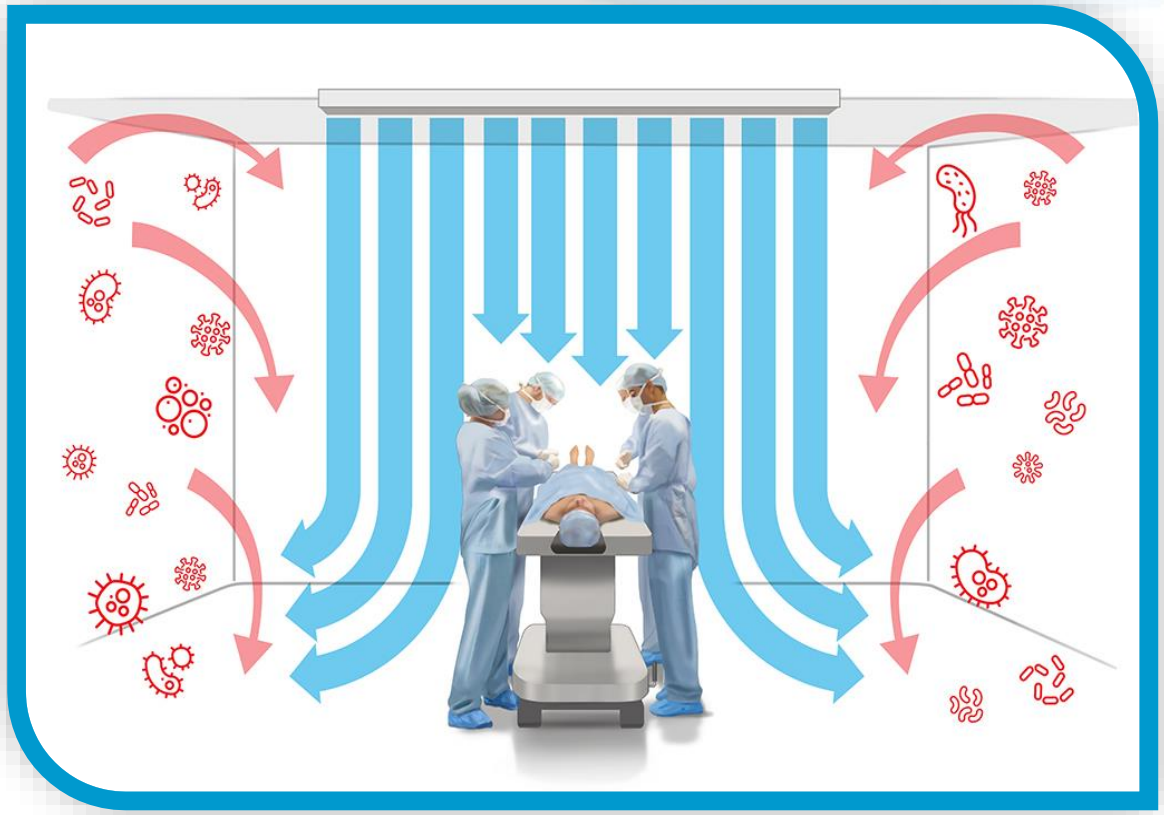
Making an OR bigger and need more air?

Want to future-proof your cooling, heating, and air volume capacity?

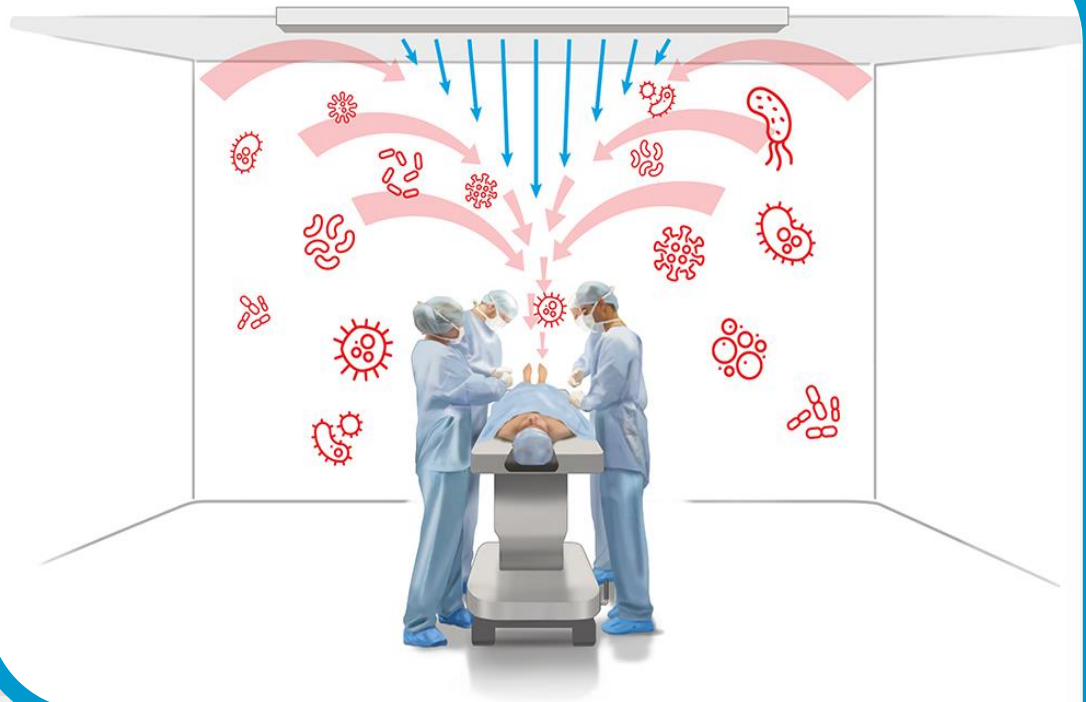
- No need to ICRA off half the building
- No chasing and upsizing duct lines
- No air handler replacements

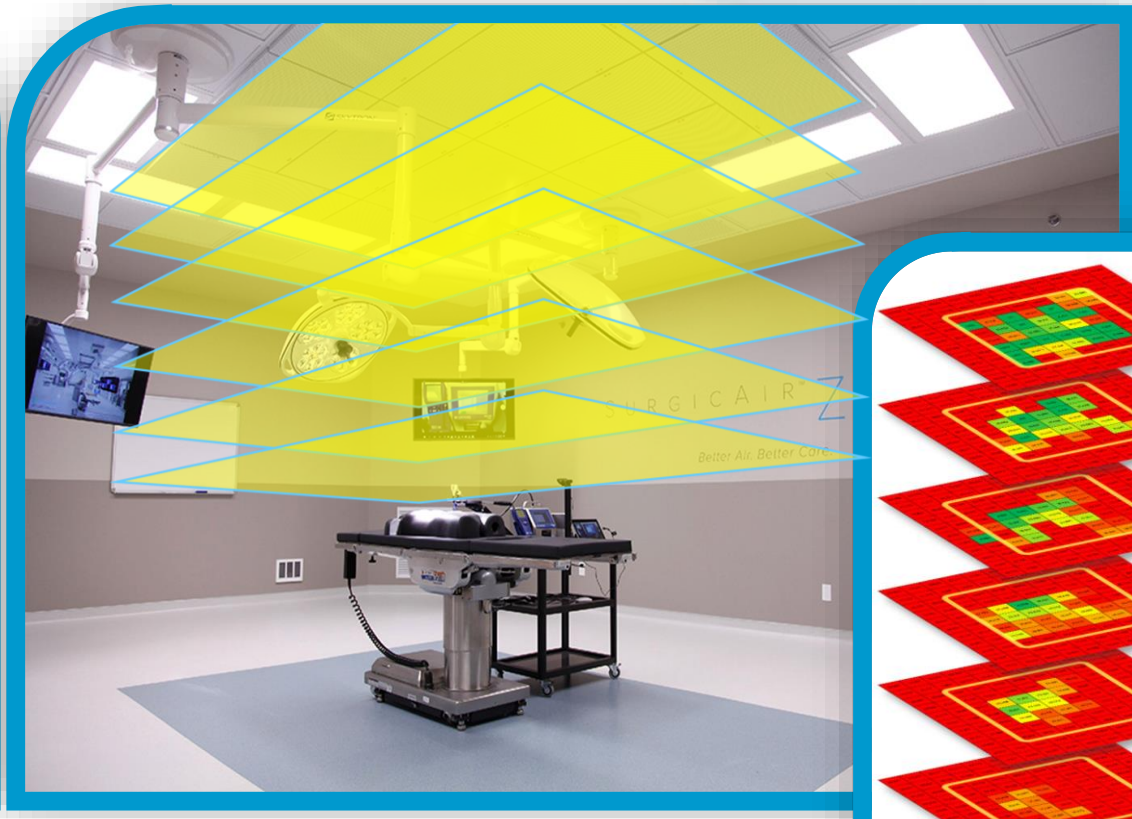
AIRBORNE CONTAMINANT CONTROL:
BASIC LAMINAR FLOW V. HIGH VOLUME LOCAL RECIRCULATION

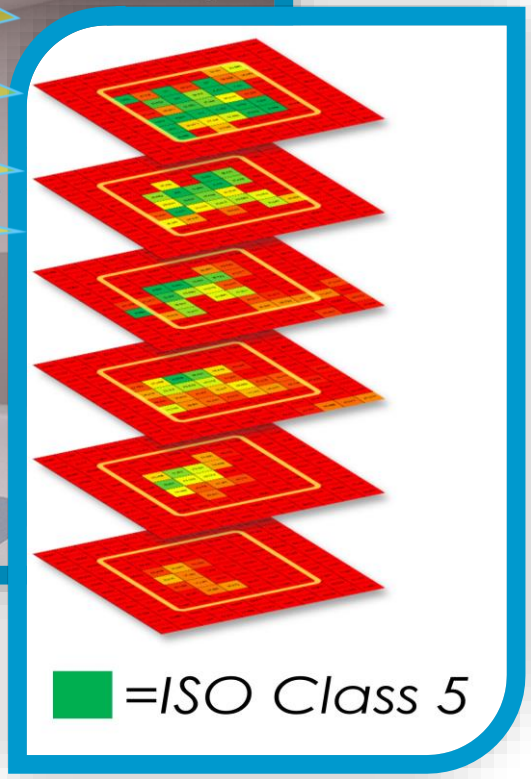




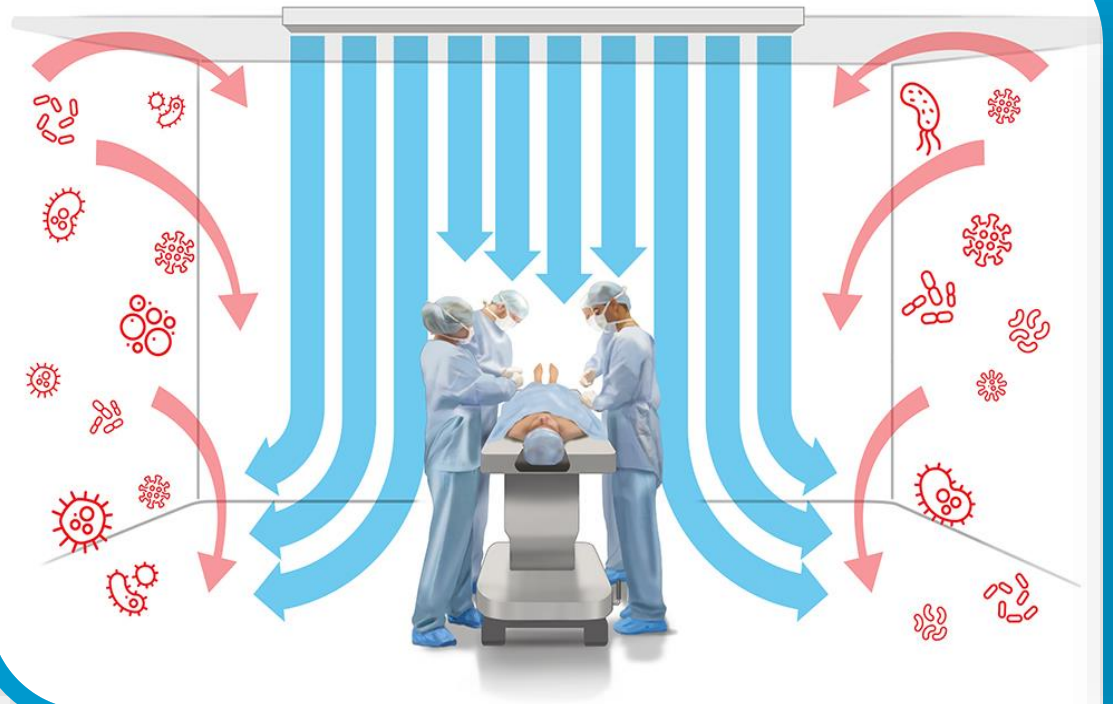
BASIC LAMINAR FLOW CONTAMINANT CONTROL

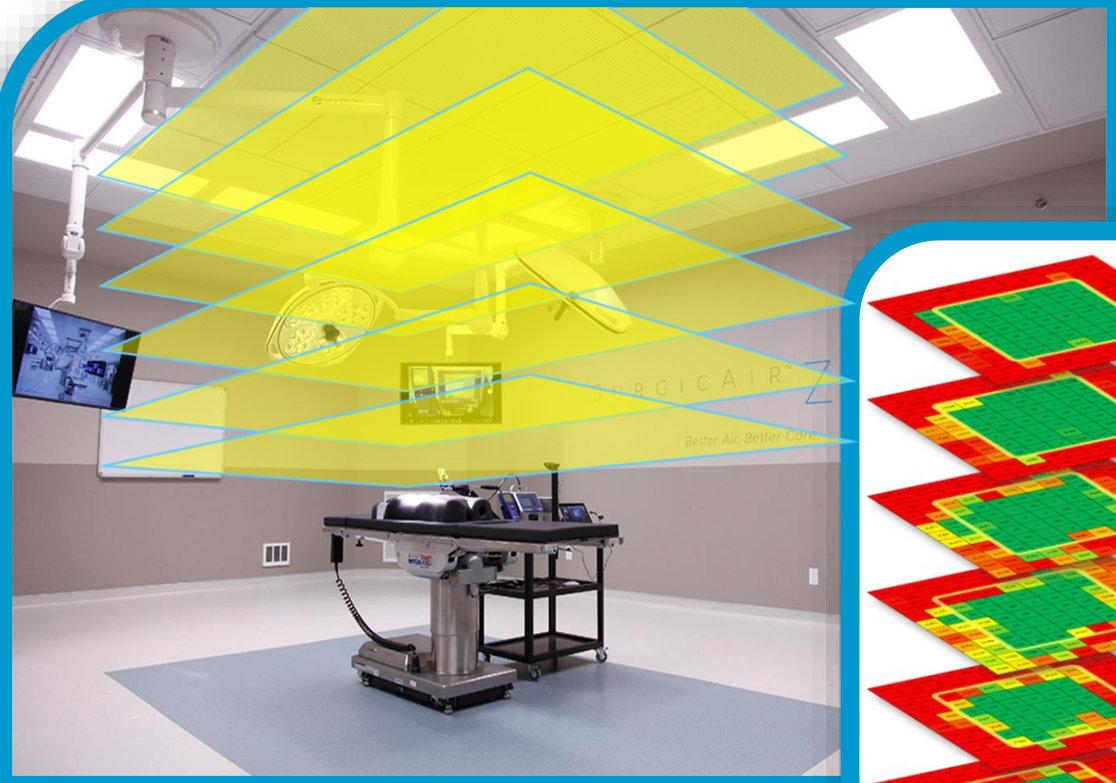


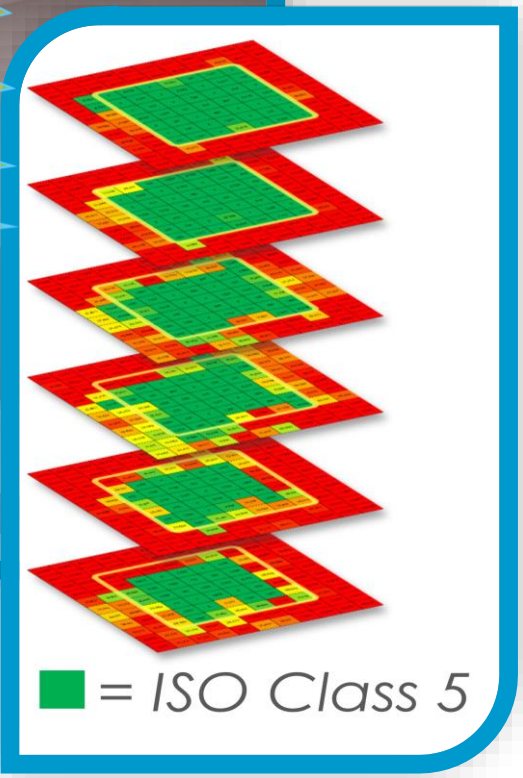




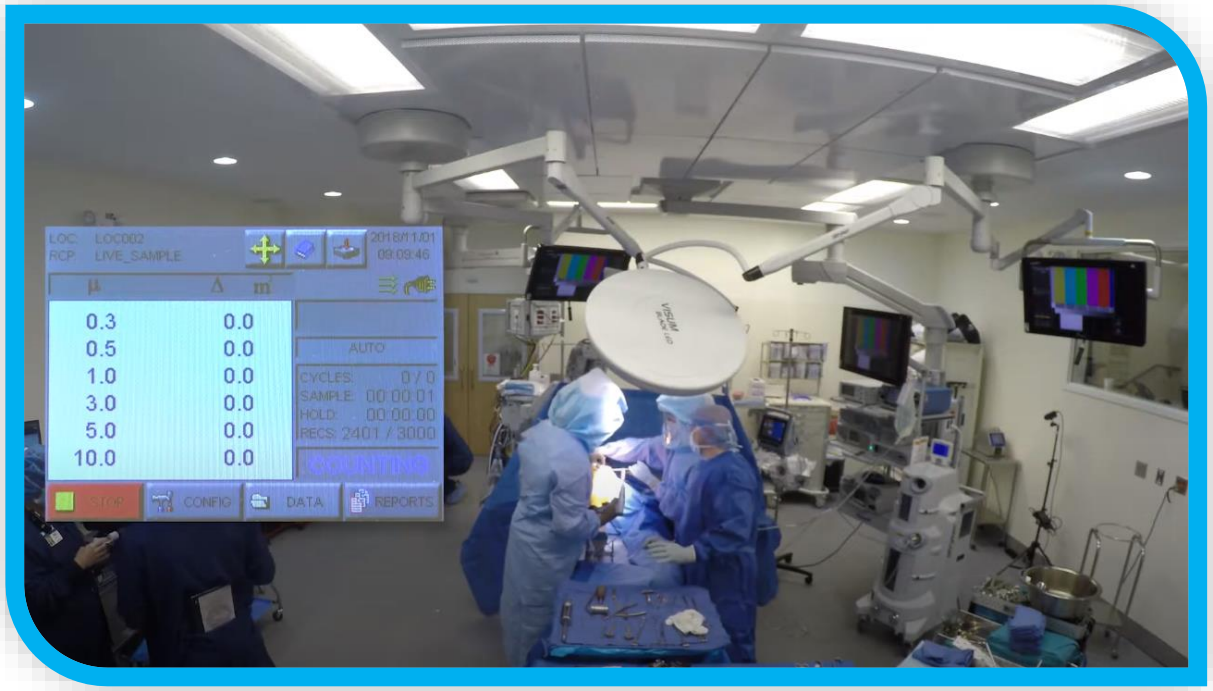
HIGH VOLUME LOCAL RECIRCULATION AIRBORNE CONTAMINANT CONTROL







HIGH VOLUME LOCAL RECIRCULATION AIRBORNE CONTAMINANT CONTROL – DURING SURGERY



	Viable Particles at Patient/m^3
OR #1 High Volume Local Recirculation	128
OR #2 Traditional Laminar Flow	974
Total Reduction	**87%**

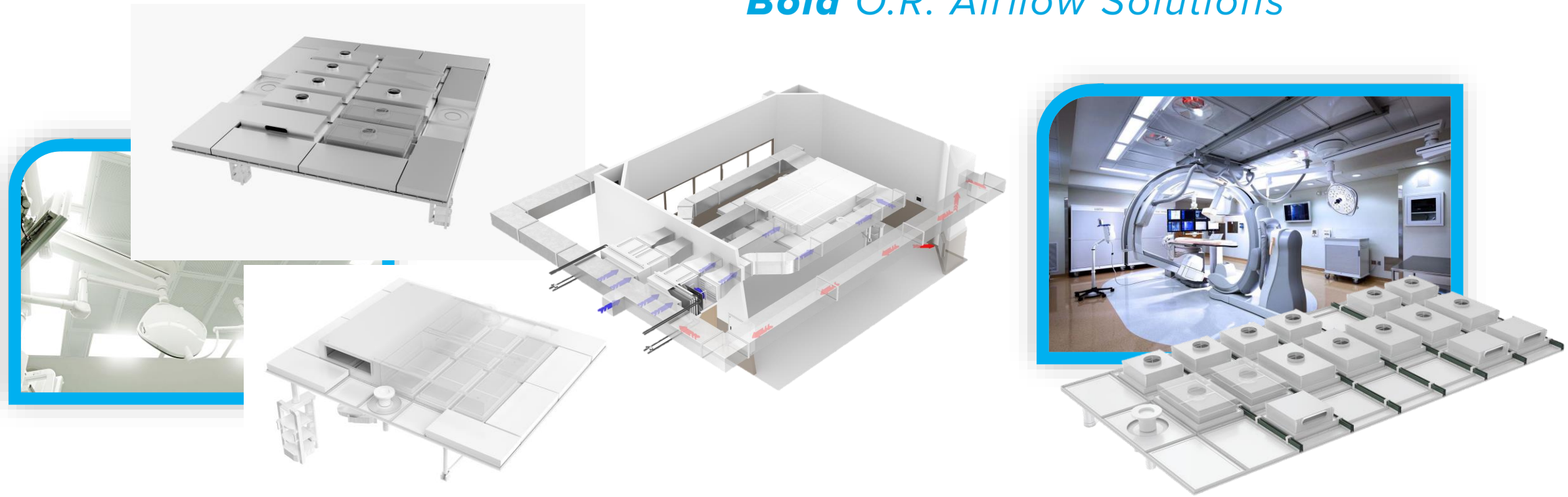
- **Single hip replacement in each room**
- **Sampling from open to close**
- **Heavy irrigation and activity at wound**

HIGH VOLUME LOCAL RECIRCULATION AN UNDERUTILIZED WAY OF ADDRESSING OR PROBLEMS TODAY AND TOMORROW

- Reduce AHU capacity requirements
- Reduce duct sizing throughout the facility
- Improve OR temperature conditions
- Reduce surgical smoke exposure
- Reduce project scope
- Reduce reheating requirements
- Reduce contaminants reaching the patient

Precision Air

Bold O.R. Airflow Solutions



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