



LIGHTHOUSE
WORLDWIDE SOLUTIONS

Lighthouse Worldwide Solutions Master Presentation



LIGHTHOUSE
WORLDWIDE SOLUTIONS
Technology That Counts



R&D / Headquarters / Manufacturing



Medford, OR

Fremont, CA



Medford, OR

- ★ Manufacturing
- ★ Service & Repair Center
- ★ Central Calibration Lab
- ★ RMA Center



Fremont, CA

- ★ R&D
- ★ Engineering
- ★ Pilot Production
- ★ Executive Management



New Headquarters: **Silicon Valley**





Lighthouse Focus on Quality

ISO 9001:2000 Facilities



**United States:
Medford, OR
San Jose, CA**



**The
Netherlands:
Alphen**



Singapore



Thailand

5 Lighthouse Locations are ISO 9000 Registered



Lighthouse Worldwide Solutions

★ **Pharmaceutical Capabilities:**

- ★ Particle counters and facility monitoring systems for meeting cGMP monitoring regulations
 - ★ 21 CFR Part 210 & 211
 - ★ 21 CFR Part 11
 - ★ EU GMP Annex 1
 - ★ PIC/S Annex 1
 - ★ WHO Guidelines
 - ★ USP 788/797
- ★ Systems designed for compliance
- ★ Project management services
- ★ Installation services
- ★ Validation services
- ★ Service, repair, retrofit of monitoring systems
- ★ Calibration per ISO 21501 standards
- ★ Contamination control consulting and training



Monitoring Solutions

General Monitoring

- ✓ Air Particle
- ✓ Liquid Particle
- ✓ Temperature
- ✓ Humidity
- ✓ Differential Pressure
- ✓ Electrostatic Charge
- ✓ Air Velocity
- ✓ TOC

Specific Applications

- ✓ Current on FFU's
- ✓ Chillers/Refrigerators
- ✓ Door Switches
- ✓ Oven Temp
- ✓ Dry Box Humidity
- ✓ Gas Purity
- ✓ Incubators
- ✓ Large LCD Displays



Lighthouse Systems Experience

- ★ Lighthouse experience in FMS system installation, particle counter integration and software
- ★ Over 200 FMS system installations worldwide
- ★ Lighthouse is the number one shipper of remote particle counters (numbers exceeding 900 units / month)



Pharmaceutical Customers





Lighthouse Pharma Customers (System)

Large multi-building Pharma system which consists of particles counters and environmental sensors. These sensors are integrated to the FMS software with alarm beacons.

- ★ **Baxter System**
- ★ **ROCHE**
- ★ **Sandoz**
- ★ **Bimagen**
- ★ **Beta Plus Pharma**
- ★ **Budelpack NV**
- ★ **Galapagos NV**
- ★ **Helvoet Pharma Belgium NV**
- ★ **Mediline NV**
- ★ **Salvamed**
- ★ **Novo Nordisk**
- ★ **Styker Howmedica –system**
- ★ **West Pharmaceuticals**
- ★ **Hospira / Abbott**
- ★ **GE Healthcare – system**
- ★ **Kabi Fresenius**
- ★ **Biogalenica**
- ★ **Favea**
- ★ **Vericore**
- ★ **Jugoremedia**
- ★ **Octapharma**
- ★ **Q- Med**
- ★ **Alcomed BV**



Lighthouse Pharma Customers (System) — Cont'd

- ★ **Crucell**
- ★ **Dutch Veterian Institute**
- ★ **Fresenius Hemocare BV**
- ★ **Mallinckodt Medical/ Tyco**
- ★ **Microclean B.V**
- ★ **Nelipak / Seal Air**
- ★ **Sandoz**
- ★ **Schenker International**
- ★ **TNO –Dimes**
- ★ **ACE Pharmaceuticals**
- ★ **Allergy Therapeutics – system**
- ★ **Aston University (Mayne-Parma)**
- ★ **Astra Zeneca – system**
- ★ **Baxter system**
- ★ **Glan Clywdd Hospital**
- ★ **Medtronic**
- ★ **Glaxo Smith Kline – system**
- ★ **NIBSC Stem Cell Bank**
- ★ **Pfizer-system**
- ★ **University College London system**
- ★ **Vericore (Novartis) –system**
- ★ **Astra Zeneca – system**
- ★ **Bassaire**
- ★ **IBA Molecular**
- ★ **Amgen**
- ★ **Chiron**
- ★ **Organogenesis**
- ★ **Pharmaforce**
- ★ **Cell Genesys**
- ★ **McGuff Pharma**
- ★ **MDS Nordion**



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Lighthouse Family of Products



World's Number One Particle Counters!



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Lab Monitoring



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Lab Monitoring





Tank Levels and Status

Cryo Tank



- ★ LN2 Tank Level
- ★ LN2 Tank Lid (Open/Closed)
- ★ LN2 Bulk Tank Level
- ★ Co2 Tank Level
- ★ Oxygen Sensor





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Differential Pressure



- ★ Differential Pressure
- ★ 4 – 20mA Output
- ★ Gown Room Pressure
- ★ Cleanroom Pressure





HVAC System



- ★ HVAC Status
- ★ Temperature
- ★ Power Consumption



Power Monitoring



- ★ Voltage Monitoring
- ★ Current Monitoring
- ★ Split or Solid Core
- ★ 4 – 20mA Output





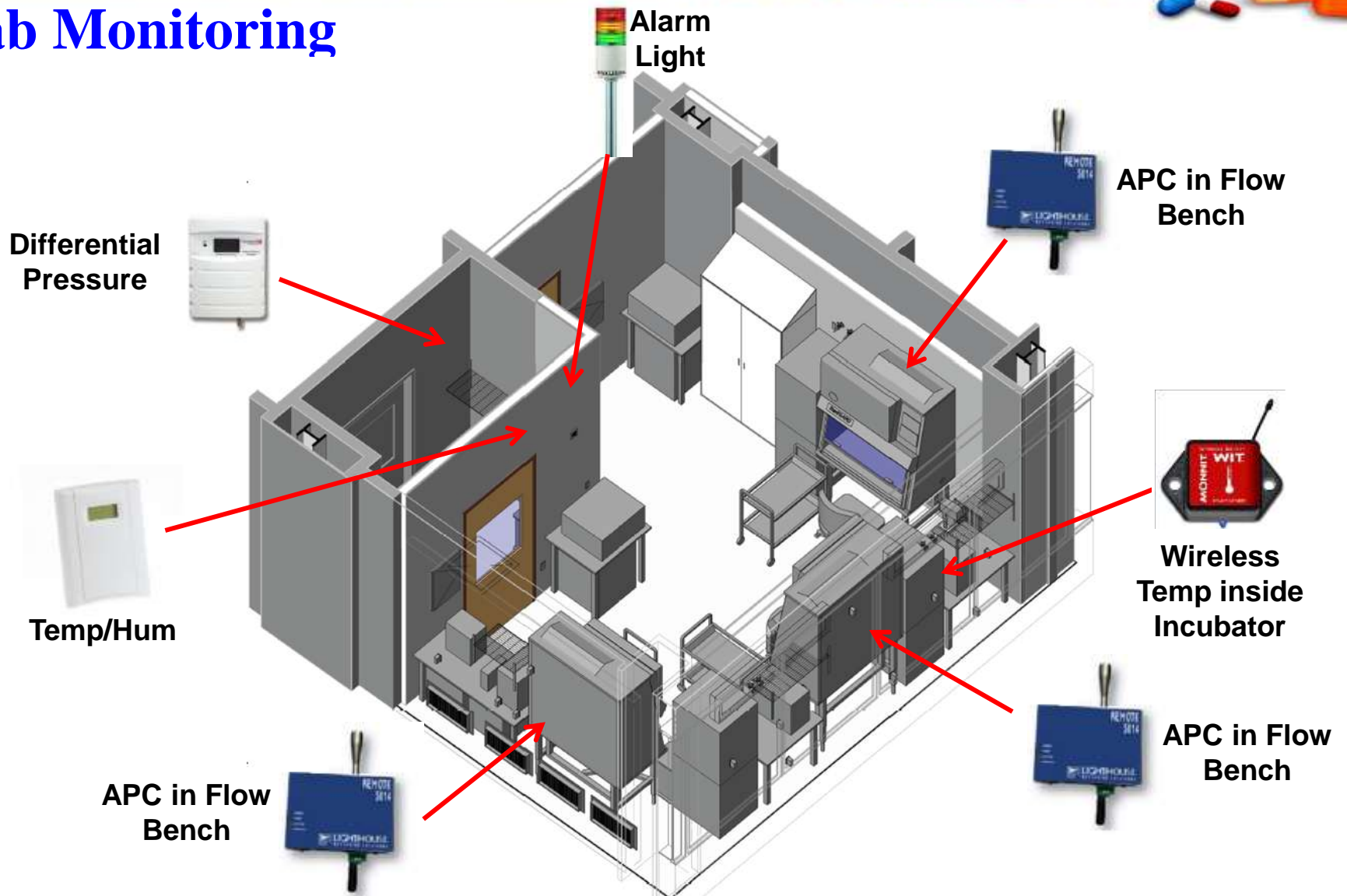
Summary

Description	Temperature	Humidity	Amp	Pressure	Dry Contact
HVAC run status Ah-1			X		
HVAC run status Ah-2			X		
HVAC run status AC 1 TI			X		
HVAC run status AC 2 TI			X		
HVAC Temp AC 1 TI	X				
HVAC Temp AC 2 TI	X				
Clean Room Temp Cord Blood 1	X				
Clean Room Temp Cord Blood 2	X				
Clean Room Temp Process Room	X				
Clean Room RH Cord Blood 1		X			
Clean Room RH Cord Blood 2		X			
Clean Room RH Process Room		X			
Room Pressure Corridor				X	
Room Pressure Exit				X	
Room Pressure Gown 1				X	
Room Pressure Gown 2				X	
LN2 Storage Tank Low level alarm					X
LN2 Storage Tank Low level alarm					X
LN2 Storage Tank High level alarm					X
LN2 Storage Tank High level alarm					X
LN2 Storage Tank Lid Open					X
LN2 Storage Tank Lid Open					X
LN2 Bulk Tank Low Level Alarm					X
Oxygen Sensor Cord Blood					X
Oxygen Sensor Process room					X
Co2 Bulk Tank Low Level Alarm					X
Genset Start alarm					X
Incubator #23					X
Incubator #24					X
Incubator #25					X
Freezer #30	X				
Freezer #50	X				
Refrigerator #47	X				
Refrigerator #19	X				

**This is a list of
all parameters
being
monitored by
LMS Pharma at
this customer
site.**



Lab Monitoring





Wireless



**Wireless Temp Sensor
with Internal Probe**



**Wireless Temp/Humidity
Sensor with External
Probe**

Particle



**Wireless Converter
(4 – 20mA to Wireless)**



Receiver



**Differential
Pressure**



Considerations:

- ★ Building Construction
- ★ Installation (inside or outside)
- ★ Distances
- ★ Sampling Frequency
- ★ Response Time
- ★ Battery Life vs. Powered



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Environmental Monitoring



Environmental Parameters



- ★ Temperature/Humidity Sensors

- ★ Room

- ★ Ovens

- ★ Freezers

- ★ Differential Pressure

- ★ Room to Room

- ★ Mini Environment

- ★ Air Velocity

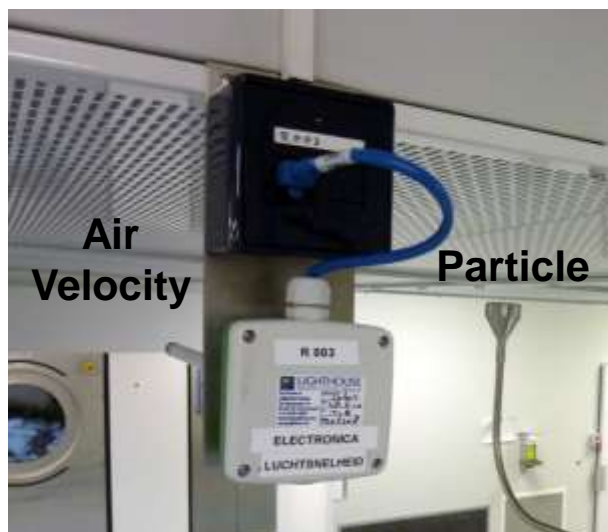
- ★ Cleanroom

- ★ Ducts





Environmental Parameters





Environmental Parameters



**Replace your
Magnehelic Pressure
Sensors**



**Monitor Air Velocity
in Ducts**



Air Velocity in a Duct





Environmental Parameters



Fluid or Tank
Levels

Incubator
Temperature



Dry Box Humidity and Particle

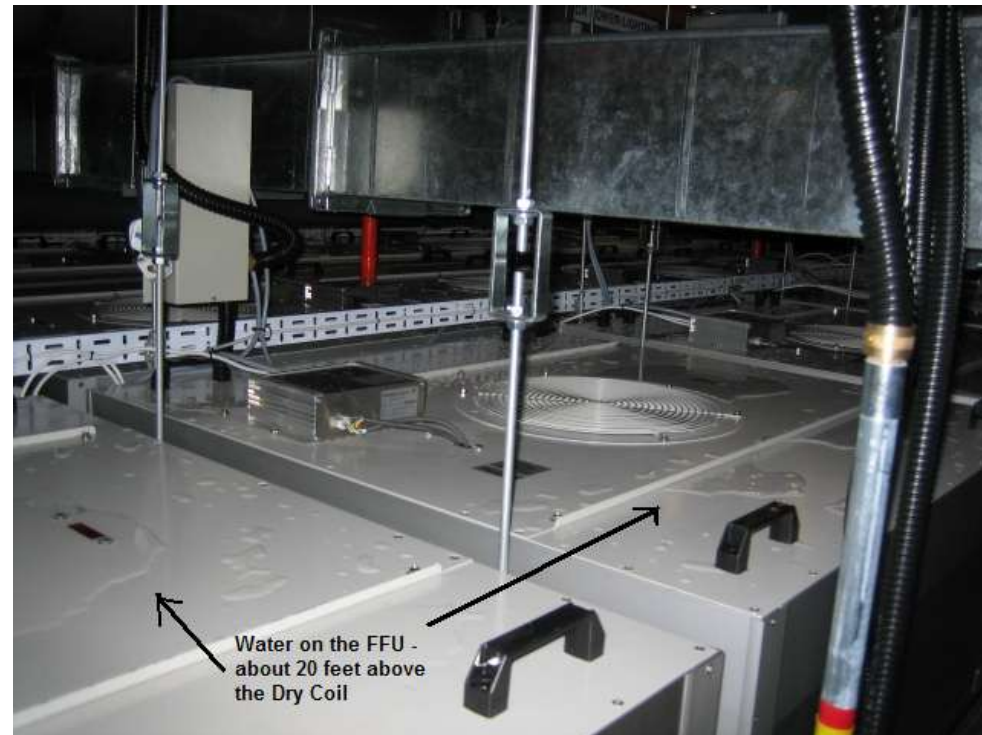




Leak Detection



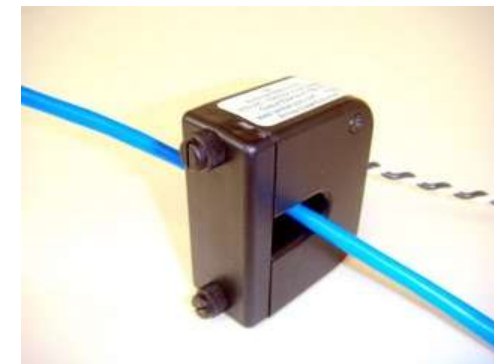
- ★ Real Time Leak Detection
- ★ Analog Signal





Power Monitoring

- ★ Voltage Monitoring
- ★ Current Monitoring
- ★ Split or Solid Core
- ★ 4 – 20mA Output

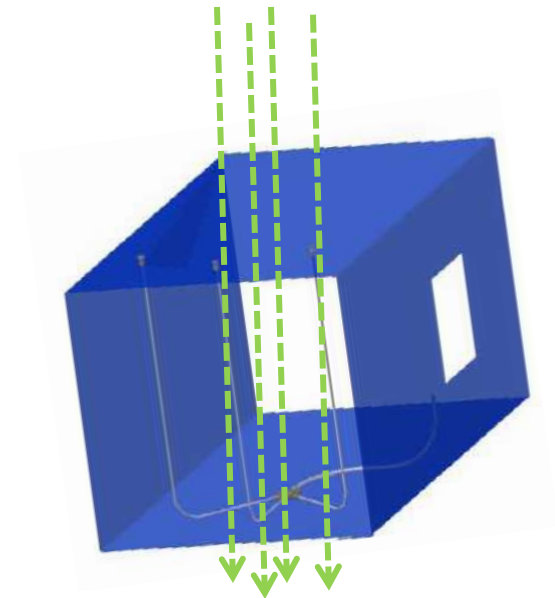




Particle Monitoring in Ducts



- ★ 0.2 to 100 Micron
- ★ Early Warning System
- ★ Immediately Notification of Catastrophic Failure





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Power Savings



Power Savings

4 Success Stories in the US this year

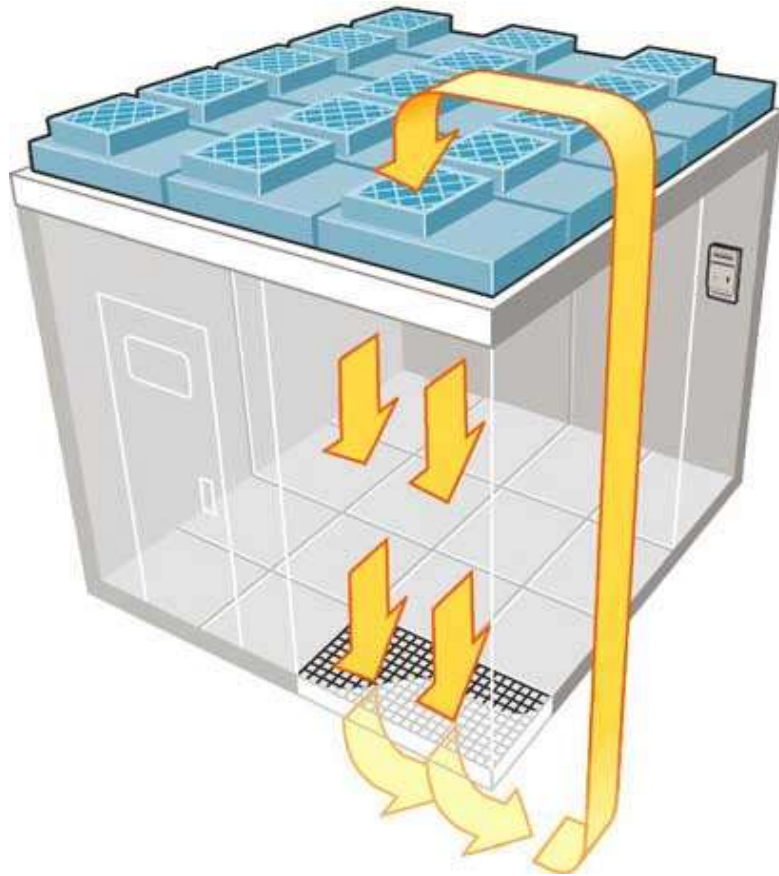
1. Kopin Semiconductor
2. UCSB
3. Moffit Cancer Research Center
4. University of Oklahoma

★\$400,000 in sales and growing

★Some power companies are offering incentives



Power Savings

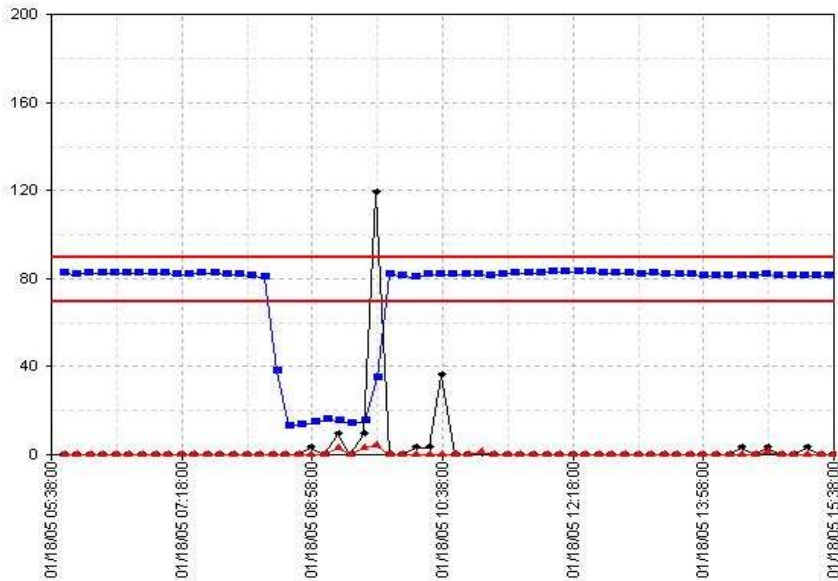


- ★ Typical Flow Rates 70 – 120 FPM
- ★ Reduced Air Changes = Power Savings
- ★ Particle Counters Used to Verify Performance
- ★ Particle Count Data is fed back to HVAC system
- ★ VFD is required for FFU or HVAC system



Power Savings

Air Velocity and Particle Data



★ Step 1: Verify room performance through certification

★ Step 2: Select optimum sample locations (Critical and Busy Sampling)

★ Step 3: Lower FFU speed and monitor for an increase in particle counts.

★ Step 4: Set new acceptable air flow rate based on testing

★ Step 5: Set alarming parameters

★ Step 6: Install the system

★ Reduced Air Changes = Power Savings

★ Particle Counters Used to Verify Performance



Thank You