



# **Plasmacluster Ions**

**Verifications of Effectiveness from  
Various Outside Organizations**

**August 7, 2003**

**Air Conditioning Systems Division**

# Car Manufacturer

## Indoor Mold Fungi Inactivation Test Using Plasmacluster Ion Air Conditioner

### Corporate Profile

One of major Japanese car manufacturers whose vision is "Enrich People's Life". They contribute to global society through creation of attractive cars, efforts to protect environment and pursuit of safety.

### Background of the Technology Application

While they are searching for new features to improve air quality of inside the cars, they approved high performance of air conditioner with Plasmacluster Ion as results of experiment.

Measurement Location  
Indoor of automobiles

### Measurement Method

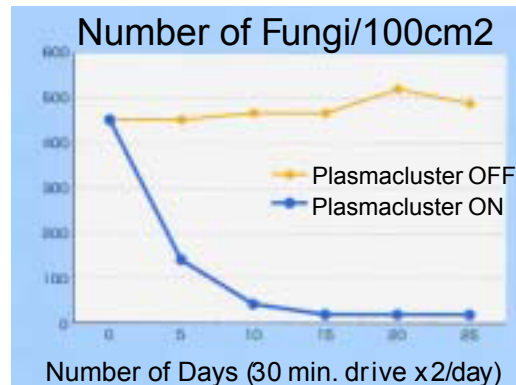
Assuming daily shopping or commuting is 30 minutes one way, operated ion generator 15 minutes. As total, operated ion generator 30 minutes per day for roundtrip. After that, measured settling microbes in 10cm x 10cm area on dashboard. Repeated the process for 1 month and compared the results of Plasmacluster ON/OFF.

Measured Microbes  
Fungi, molds

Tested Model  
Plasmacluster Ion Air Conditioner for automobiles



### Maintain number of indoor fungi below 1/10



# Dialysis Center

## Settling Microbes Inactivation Test Using Plasmacluster Ion Air Purifier

### Facility Profile

Outpatient dialysis center which is capable of simultaneous dialysis to 120 patients. Utilizing state-of-the-art health care technology, they focus on rehabilitation with measures for complication circulatory organs, digestive system, fairing, etc.,

### Background of the Testing

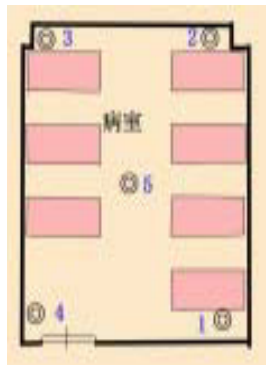
While they are searching for counter-measure for airborne fungi in CAPD room, they tried FU-80BCD and competitor's air purifier. Good results of Plasmacluster ions were verified.

Measurement Location  
Patients' room (large room)

Measurement Method  
Installed FU-80BCD in peritoneal dialysis room to run 24hours. For comparison, installed electrostatic precipitation air purifier of competitor. Room door was opened, air conditioned. Number of settling microbes on agar before/after air purifier operation were measured after the microbes were cultured for 1 week.

Measured Microbes  
Airborne settling microbes

Tested Model  
Plasmacluster Ion Air Purifier FU-80BCD

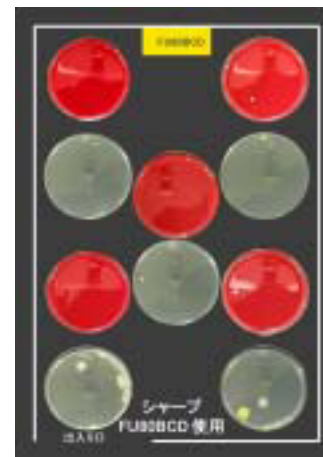


Location: Patient room  
4 corners and center  
Patients: 5-6 patients  
(No movements restricted)  
Measured Time: From 10:00am-10:30am  
Room Door: Opened  
Air Conditioning: Low (temp. 25 deg.C)  
Humidifier: ON (humid. 40%)  
Air Ventilation: ON (air flow:350m3/h)  
Window: Closed  
Room Capacity: 96m3

Before Use



SHARP (FU80BCD)



Competitor's Model



	Blood Agar			Sabouraud Agar		Total
	G + C	G + B	G - B	others	Fungus	
Before Using A/P	6	10	0	1	7	24
SHARP's A/P	1	1	1	0	1	4
Competitor's A/P	2	6	3	1	2	14

The results were announced at Japanese Association Of Dialysis Physicians on June 21, 2003

# Sanitary Service

## E.Coli Bacteria Inactivation Test Using Plasmacluster Ion Air Purifier

### Corporate Profile

Specializes in sanitary services for toilets and kitchens. Installs revolution of toilets, "Calmic Unit" (sanitizer) in toilets of famous companies. Offers rentals to more than 70,000 public organizations, companies and hospitals.

### Background of the Testing

Upon acceptance of Plasmacluster air purifiers, they conducted verification test.

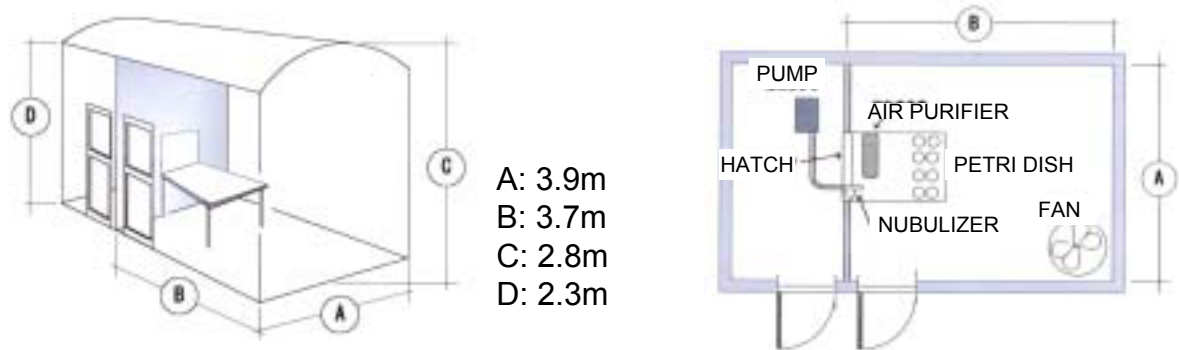
Measurement Location and Date  
Bioclean room of a medicine laboratory  
(November 21-22, 2002)

### Measurement Method

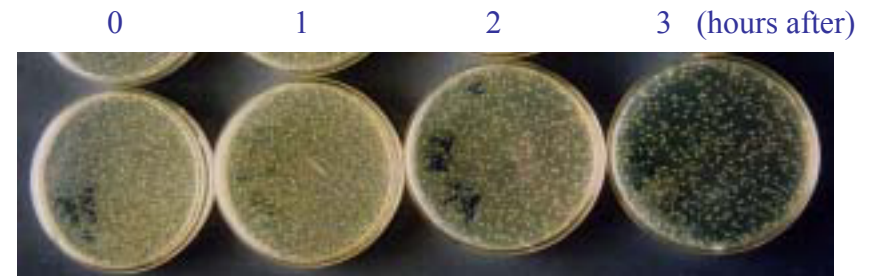
Sprayed E-Coli. in bioclean room for 40 min. and circulated room air with a fan. Right after E-Coli was sprayed, took the first sample, then operated Plasmacluster ion, then took samples every 1 hour three times. Petri dish were opened for 10 min. and the microbes were cultured 24 hours in 37 deg.C. The first day with Plasmacluster ions and the second day without Plasmacluster ions.

Measured Microbes  
E-Coli

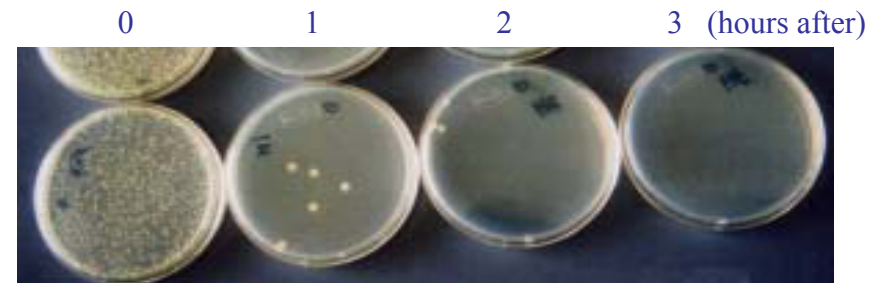
Tested Model  
Plasmacluster Ion Air Purifier



Without  
Plasmacluster  
Ions



With  
Plasmacluster  
Ions



Results

Number of E.Coli was uncountable before operation of Plasmacluster, but the number decreased to 7 and 11 after 1hr Plasmacluster operation, to 4 and 1 after 2 hours, to 3 and 0 after 3 hours. On the contrary, number of E.Coli in the samples without Plasmacluster slightly decreases as time passes but still uncountable after 3 hours.



# Food Manufacturer

## Settling Microbes Inactivation Test Using Plasmacluster Ion Air Purifier

### Corporate Profile

Manufactures food such as pound cakes

### Background of introduction

While they are searching for more effective means to remove fungi from production line, they tried a commercial use air purifier FU-80BCD, which was recommended by a sanitary management equipment dealer. They decided installation after they verified its effectiveness with specialized testing organization.

### Measurement Location and Date

Food factory

March 18 & 24, 2003

### Measurement Method

Put 5 petri dish with agar inside in 5 places of the factory. Took air samples before & after Plasmacluster operation. The microbes were cultured for 7 days in 30 deg.C, 80-90% humidity.

### Test Organization

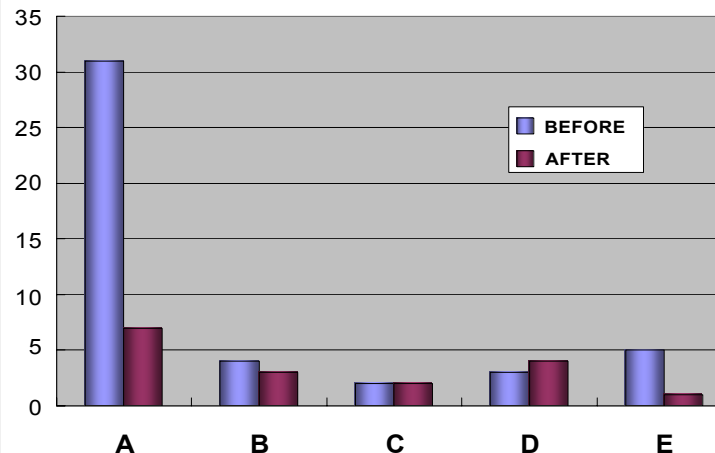
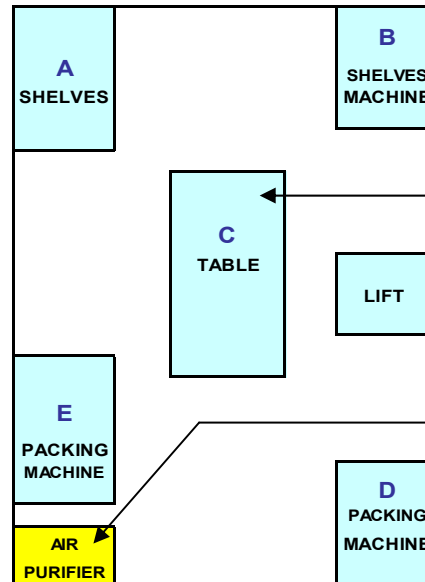
Food Packaging Laboratory of a trading company

### Measured Microbes

Settling microbes

### Tested Model

Plasmacluster Ion Air Purifier FU-80BCD



Compare Number of Settling Microbes

Unit: Number of settling microbes per petri dish

# Nursery Home

## Settling Microbes Inactivation Test Using Plasmacluster Ion Air Purifier

### Facility Profile

Special elderly nursing home

### Background of Installation

While they measured airborne bacteria in their facility to study effective means of removal, they compared Plasmacluster air purifier and electrostatic precipitation air purifier. They decided to install Sharp air purifier because of the good test results.

### Measurement Location and Date

Patients room and hall on the second floor  
April 22-23, 2003

### Measurement Method

Environment Systems Div. JAMCON Corp.

### Measurement Method

After 10 minutes suction of 1,000 liters air using PBI air sampler HIVAC petri, counted number of cultured bacteria.

### Measured Microbes

Airborne bacteria

### Tested Model

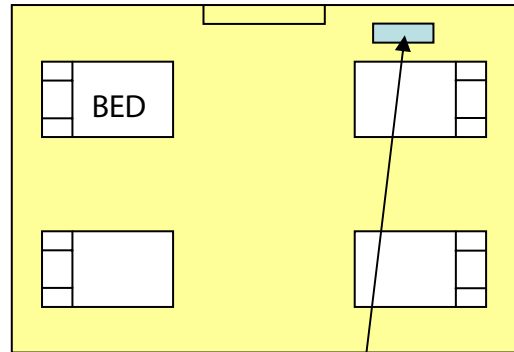
Plasmacluster Ion Air Purifier  
FU-N51CX and FU-80BCD

Patients room on 2<sup>nd</sup> Floor

Conditions: FU-N51CX

Operate 24 hours in MEDIUM fan speed

Approx.36m<sup>2</sup> (6.6m x 5.4m)

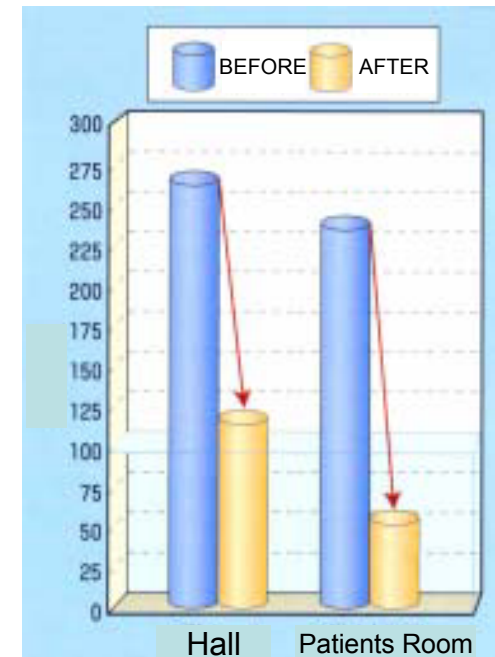


Hall on 2<sup>nd</sup> Floor

Conditions: FU-80BCD

Operate 24 hours in

MEDIUM fan speed



# A/C Maintenance

## Legionella Pneumophila Inactivation Test Using Plasmacluster Ion Generator

### Corporate Profile

Provides maintenance service including installation of air conditioning equipments into buildings with special rooms such as bioclean rooms. For hospitals, they also conduct measurement/diagnosis of microbes, airborne dust, radiation ray, etc.

### Background of the Testing

In order to provide air purifiers to their clients as a part of their business, they experimented inactivation of legionella bacteria using Plasmacluster ion generator.

Measurement Location and Date  
Inside of cooling tower miniature model  
May 8, 2003

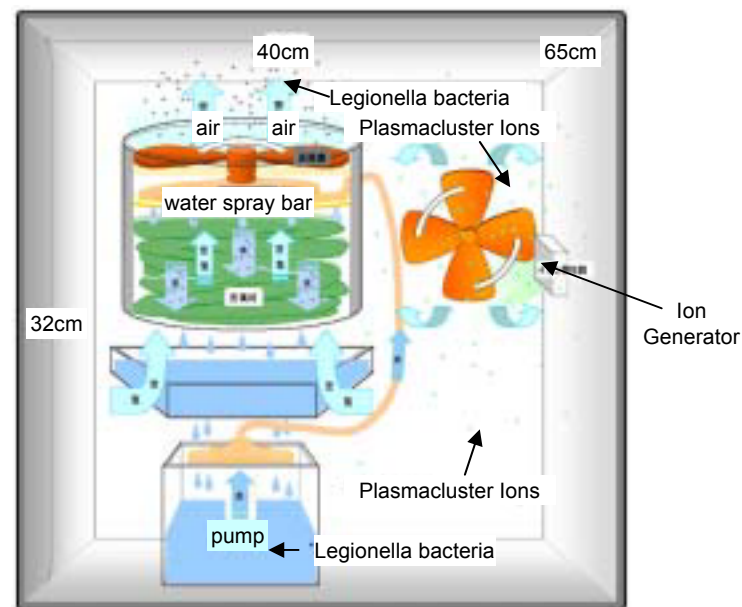
### Measurement Method

Circulated water with legionella bacteria inside water tower model, then sprayed the water into enclosed space of 83 litter plastic container. Increased humidity to 90% then sample 100-200 liters air using perforated plate air sampler. Compared the number of bacteria with/without Plasmacluster ions.

Measured Microbes  
Legionella pneumophila

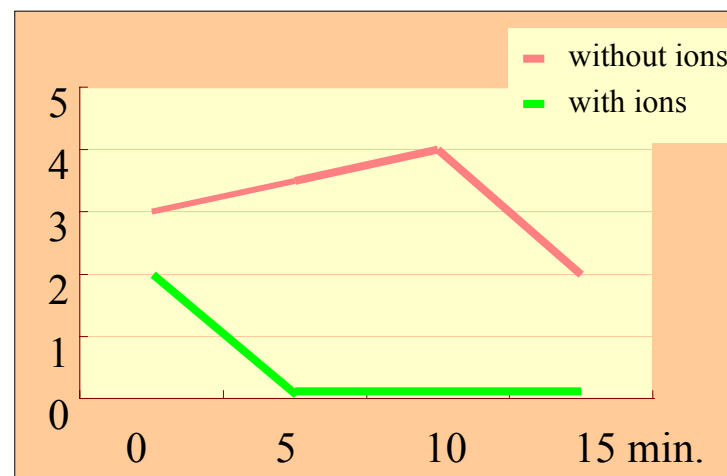
Tested Model  
Plasmacluster Ion generator

### Cooling Tower Model



### Time-Lapse Change

### Number of Airborne Legionella Pneumophila during Operation of Cooling Tower



# Medicine Manufacturer

## Airborne Fungi Inactivation Test Using Plasmacluster Ion Air Purifier

### Corporate Profile

Founded in 1954 as manufacturer of medicines for medical use such as infection medicines, external medicines. Established solid status especially in gynecology field for hormone drug, antibiotic, and diagnostic products. The started over-the-counter trading for their stock in 1995.

### Background of the Testing

To verify effects of Plasmacluster ions, conducted testing in unpacking room of medicine factory.

### Measurement Location and Date

Unpacking room of materials  
May 28, 2003 (without Plasmacluster)  
June 3-4, 2003 (with Plasmacluster)

### Measurement Method

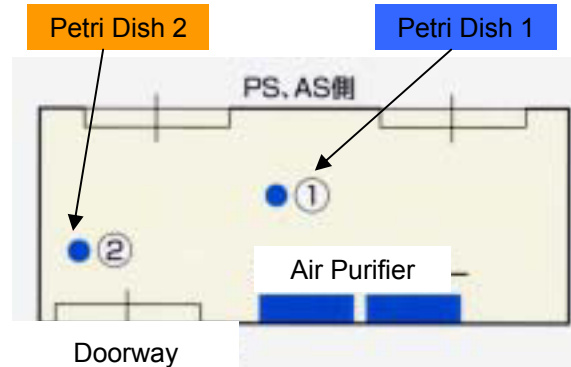
Put a petri dish in the center of the room and the other near the doorway. Took samples during unpacking, 30 min. after, and 60 min. after for 3 conditions; 1 unit with ions, 2 units with ions, 1 unit with fan only. Counted number of cultured fungi.

### Measured Microbes

Airborne fungi

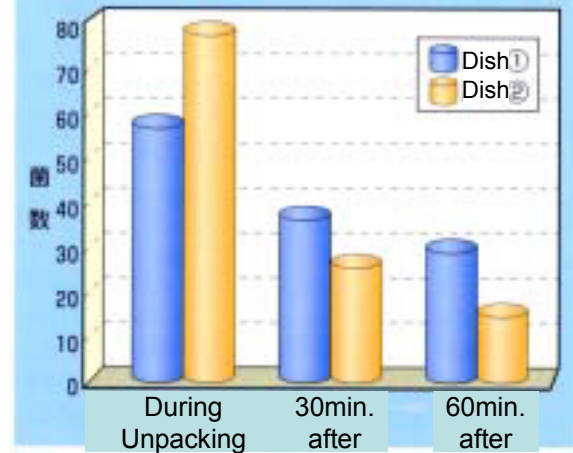
### Tested Model

Plasmacluster Ion Air Purifier



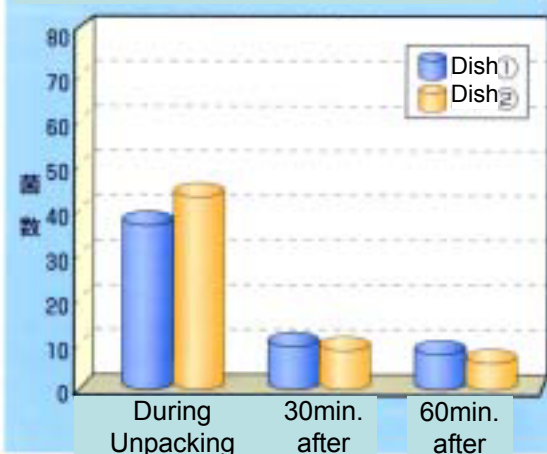
### Air Purifier 1 unit without ions (Fan Only)

Tested: May 28 Measured: June 5



### Air Purifier 1 unit with ions generated

Tested: June 3 Measured: June 11



### Air Purifier 2 units with ions generated

Tested: June 4 Measured: June 12

