

## Anti-Microbial Solution: Overview

Protected by the  
**ægis**  
MICROBE SHIELD®

## Jasper **Anti-microbial Treatment: Summary**

- *Anti-microbials* are agents that are capable of destroying or inhibiting the growth of micro-organisms such as fungus, bacteria, algae, and yeast
- Starts killing micro-organisms on contact; 99.99%\* effective
- Perfect for Healthcare, Clean Rooms, Education and multi-user (call center)
- Both keyboard and mouse are treated, for full protection
- Permanently bonds to treated surfaces – guaranteed 7 year effectiveness
- Destroys microbes on contact; Mechanically destroys the microbial cell
- Unlike other anti-microbial products, not consumed by microorganisms
- Unlike other anti-microbial products, does not transfer into the environment or onto user's skin
- Non-harmful ingredients, unlike metallic-based alternatives that leach harmful gases and material
- Does not allow for the adaptation of microbes



\* **Note:** For economic reasons, testing was only done to 4 x 9's level of accuracy. Further testing to more decimal places (ie. 5 or 6 x 9's) would have shown that bacteria was virtually eliminated from product surface.

## Anti-microbial Treatment: Lab Test

- Controlled testing of untreated vs. AEGIS-treated keyboard samples
- Industry-standard test methods were used
- Three tests were performed:
  1. **Effectiveness of anti-microbial treatment (ASTM E2149-01)** - measures how much bacteria is killed within a 1 hour period
  2. **Uniformity of anti-microbial chemical applied to keyboard (ACTM 0200 BPB Direct Stain)** - blue stain color appears on plastic surface denoting presence of the anti-microbial chemical
  3. **Amount of anti-microbial chemical applied to keyboard (ACTM 0210 BPB Extraction)** - measures the amount of anti-microbial extracted from the surface of the treated plastic, giving a good indication of how much was originally applied

## Anti-microbial Treatment: Lab Test Results

Positive Results: Jasper is an Aegis-certified manufacturer that has passed all tests, and is fully trained in the application and quality control of the Aegis chemical treatment

- ✓ 1. 99.99% \* of bacteria was eliminated on AEGIS-treated keyboard
- ✓ 2. Chemical was shown to uniformly applied across the entire keyboard surface
- ✓ 3. The amount of chemical applied to the keyboard surface was more than adequate

\* **Note:** For economic reasons, testing was only done to 4 x 9's level of accuracy. Further testing to more decimal places (ie. 5 or 6 x 9's) would have shown that bacteria was virtually eliminated from product surface.



# ANALYTICAL & ANTIMICROBIAL TEST RESULTS



**Customer: Jasper Designworks**

Date Received: 11-25-08

Date Reported: 12-05-08

AEM Project Number: 6518

The industry's way of saying "completely ineffective" or "0%"

Description	Microbiological Analysis	Chemical Analysis	
		Uniformity	% Extraction
Black Keyboards	ASTM E2149-01		
Untreated	<20%	No Stain	1%
Spray Treated w/ AEM	99.99%	Excellent	71%

### Effectiveness Test

**ASTM E2149-01**  
ACTM 0923  
8 keys removed from keyboard  
50 ml 0.3 mM KH<sub>2</sub>PO<sub>4</sub>  
1x10<sup>8</sup> *Escherichia coli* / ml  
0.01% Q2-5211 wetting agent  
1 hour contact time

### Uniform Application Test

**ACTM 0200 BPB Direct Stain**  
**(Uniformity):**  
8 keys removed from keyboard  
0.025% BPB dH<sub>2</sub>O solution  
20 minute exposure

### Application Amount Test

**ACTM 0210 BPB Extraction (EXT):**  
8 keys removed from keyboard  
0.001% BPB dH<sub>2</sub>O solution  
20 minute exposure  
595nm Absorbance  
0.01% Q2-5211 wetting agent



UT (Untreated)

TR (Treated)

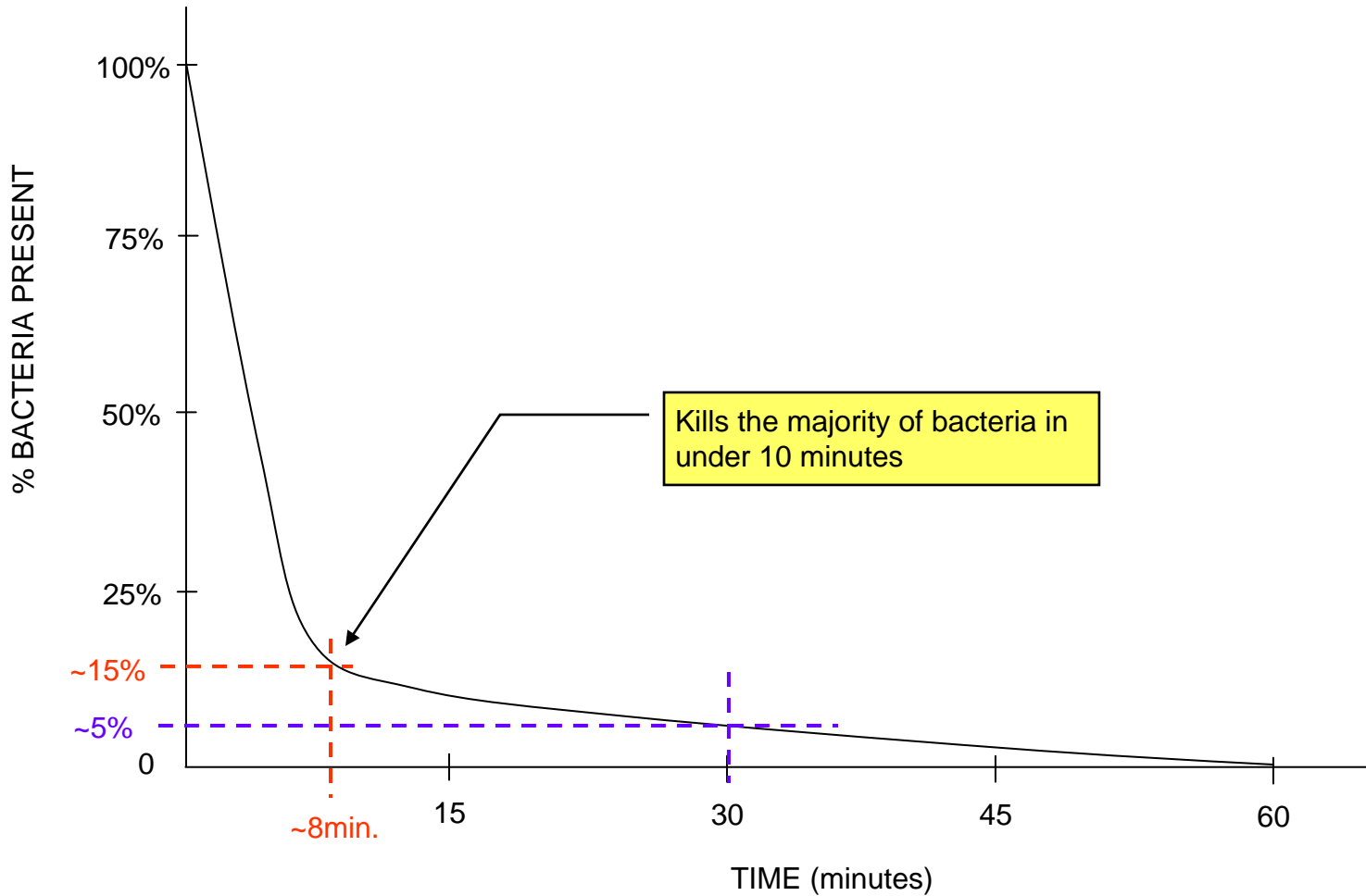
Picture- BPB Direct Stain of selected keys removed from keyboard

Results submitted by:

*Suzanne N. Hayes*

Suzanne N. Hayes  
Research Assistant

## Anti-microbial Bacteria Kill Efficiency Rate



***AEGIS Anti-Microbial Technology*** ®  
***An Overview***

## Microbiology 101

### Bacteria

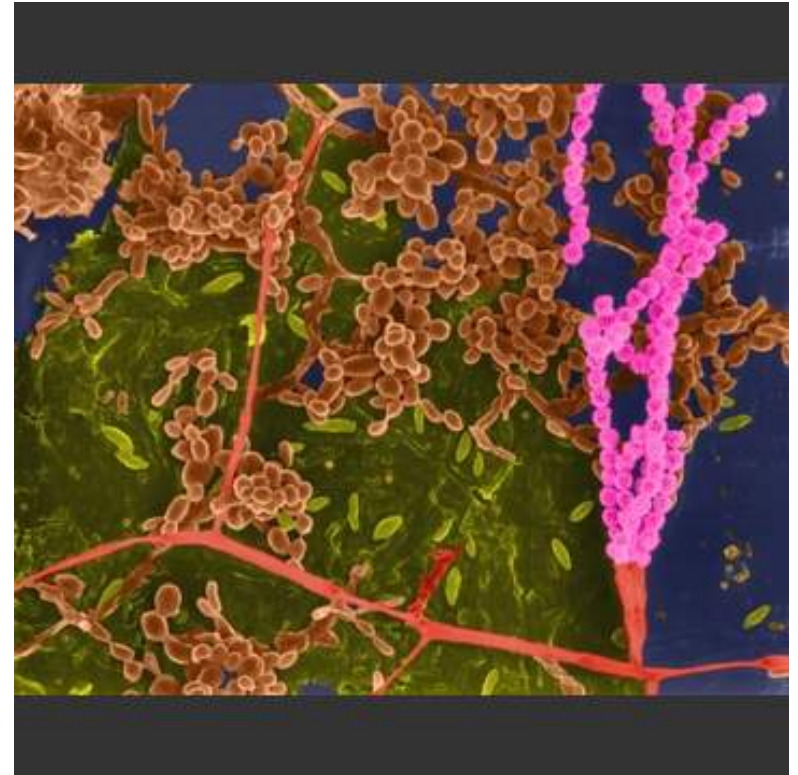
Gram (+) Gram (-)  
MRSA, *E. coli*

### Fungi

Mold, Mildew, Yeast  
*Aspergillus*, *Candida*

Microbes are found:

- In the air we breath
- On our skin and bodies
- In the soil
- On practically all surfaces we contact



## Microbiology 101

### Problems that Microbes Cause

- Odors
  - Musty, Putrid
- Health Concerns
  - Disease
  - Allergies
  - Sensitization
- Product Damage
  - Rot
  - Defacement
  - Stains



## Anti-Microbials 101



### What are **ANTIMICROBIALS**?

Agents that are capable of destroying or inhibiting the growth of micro-organisms such as fungus, bacteria, algae, and yeast.

## Anti-Microbials 101

### Differences in Antimicrobials

- Chemical Nature
- Mode of antimicrobial action
- Durability
- Effectiveness
- Safety
- Verification
- Regulatory Compliance

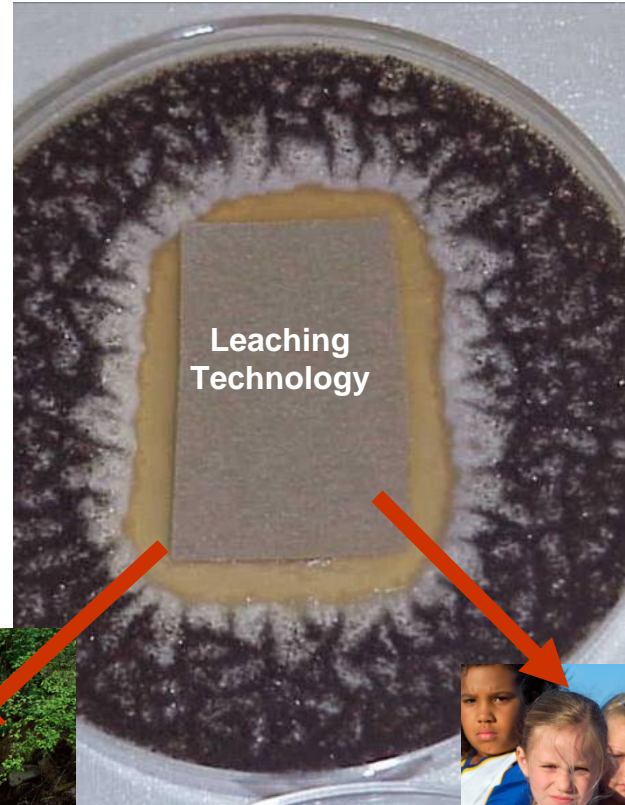


## Anti-Microbials 101

### LEACHING ANTIMICROBIALS

**Diffuse from the surface or product to react with the microbe**

- Leach or migrate off the product
- Are consumed by micro-organisms
- Chemically interrupt (poison) the cell
- Transfers to the skin
- Transfers to the environment
- Able to cause microbial adaptation



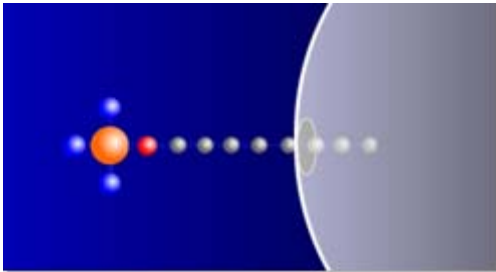
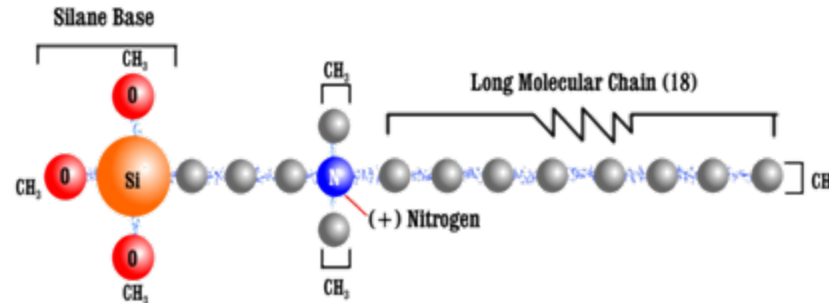
## Anti-Microbials 101

### THE ÆGIS MICROBE SHIELD® TREATMENT

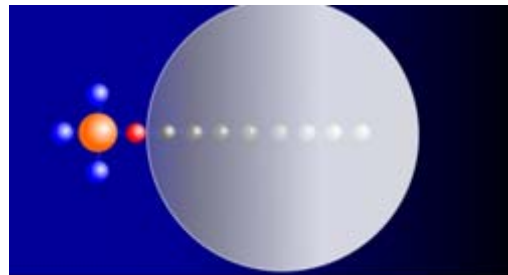
- Permanently bonds to treated surfaces
- Destroys microbes on contact
- Not consumed by microorganisms
- Remains functional for the life of the product
- Mechanically destroys the microbial cell
- Does not allow for the adaptation of microbes
- Does not transfer into the environment



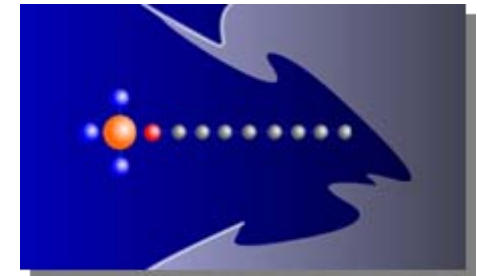
## The Science Behind AEGIS MicrobeShield® Technology



The cell membrane is attracted to the treated surface and then punctured by the long molecular chain



As it is drawn closer because of the positive negative ion exchange, it penetrates further into the cell membrane and....

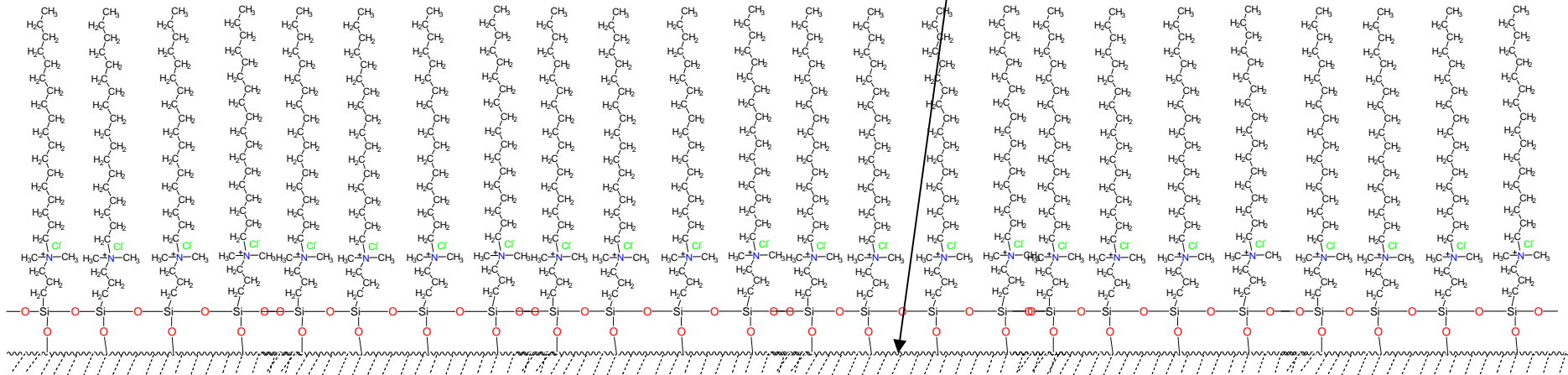


...the cell is physically ruptured by a sword-like action and then electrocuted by a positively charged nitrogen molecule thus destroying it.

# Polymer Network

- Bonds to itself and the treated good
- Does not leach
- Lasts the life of the product

Links together and attaches to the substrate



## Industry Recognition

As seen in *Textile Intelligence Magazine*



