

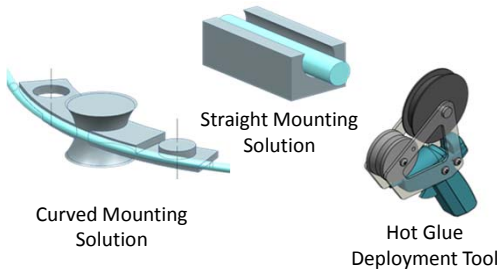
# Design Applications for Light Diffusing Glass Fiber Optics

**Purpose** To increase the customer base of Fibrance™ (Light Diffusing Fiber) for Corning, through applications in the automotive and architectural industries.

## Project History

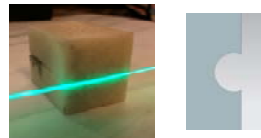
The Fall 2015 Fibrance™ Team:

- Developed a catalog of potential applications
- Investigated Fibrance™ applications in automotive and architectural markets
  - Wall decorating
  - Semi-Trailer Advertisement
  - Tabletop Decoration
  - Crosswalk Lighting
  - Foot Well Lighting
  - Chandelier
- Prototyped a laser control unit and an application deployment tool
- Designed components for mounting and researched methods of adherence



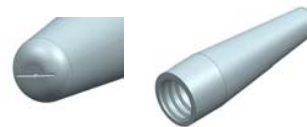
## Mounting Solutions

### Hook & Rail



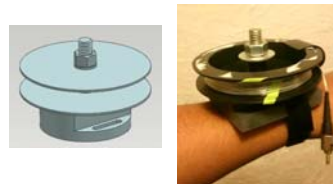
Pressure fitted shape with .030in diameter to hold Fibrance™ in place with friction

### Applicator Tip



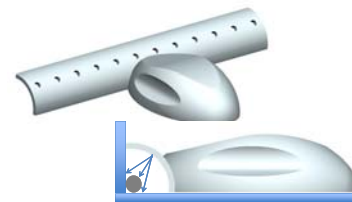
Attaches to tip of adhesive bottle to distribute glue evenly behind the Fibrance™ in contact with the surface

### Spool



Deployment device that attaches to arm to install Fibrance™ in a user-friendly manner

### UV Curing



Ergonomic handheld device to cure Bondic™ to desired surfaces

## Mounting Testing Results

### Adhesives

Shear and tensile strength tests on adhesive and material combinations:

- painted drywall, wood, vinyl plastic, and steel
- Super Glue, Epoxy, and UV Curing



Adhesive Testing Setup

### Hook & Rail



Testing Plastic Coverings



Hook Corner Testing

Prototyped hooks to test the fit with Fibrance™. Learned that the Fibrance™ will require an adhesive to hold it in place based on the tolerances and compliance of both the fiber and hooks.

### UV Curing



Tested for full curing of 12 LEDs, 30° viewing angle, spaced 0.609in at a velocity of 1.8 in/s

## Semester Objectives

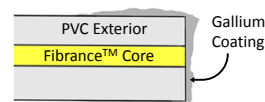
Develop Enabling Technologies

- Low cost, end of fiber reflector to achieve uniform light distribution throughout length: efficiency > 50%
- Practical mounting solutions to aid in Fibrance™ installation within architectural applications



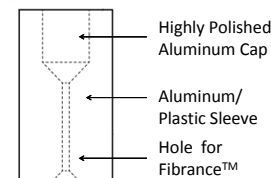
## Reflectivity Solutions

### Gallium



| Gallium Solidification Times |                   |                        |
|------------------------------|-------------------|------------------------|
|                              | Room Temp (22 °C) | Cool Tap Water (12 °C) |
| Solidification Time          | >30 Minutes       | 1-2 Minutes            |

### Reflective Sleeve



End of Fibrance™ lays flush against reflective cap

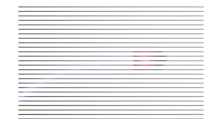
## Reflectivity Testing Results

### Gallium



30-53% Reflectivity

### Reflective Sleeve



20-33% Reflectivity

Used a photoresistor to measure the light along the length of Fibrance™. Took multiple measurements at 6 inch intervals, averaged, and then graphed the results.