

# WELCOME

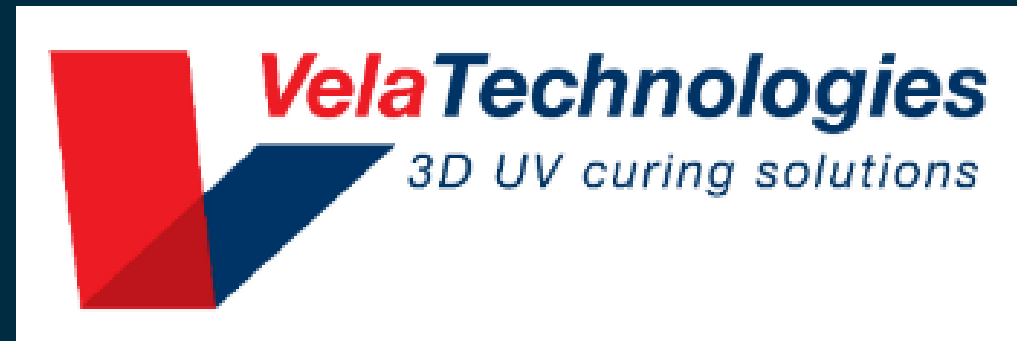
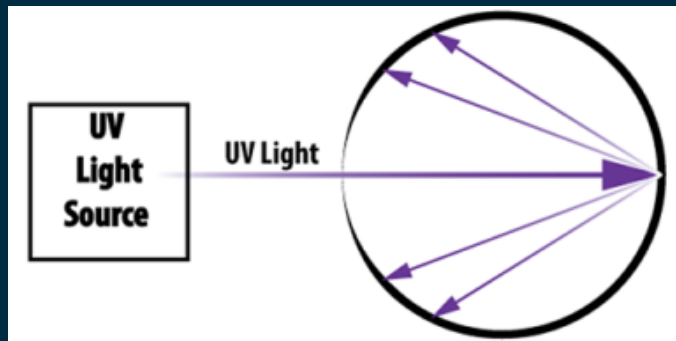
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**EFSEN** 

UV & EB TECHNOLOGY

# VELA

## THE MAGIC OF 3D CURING

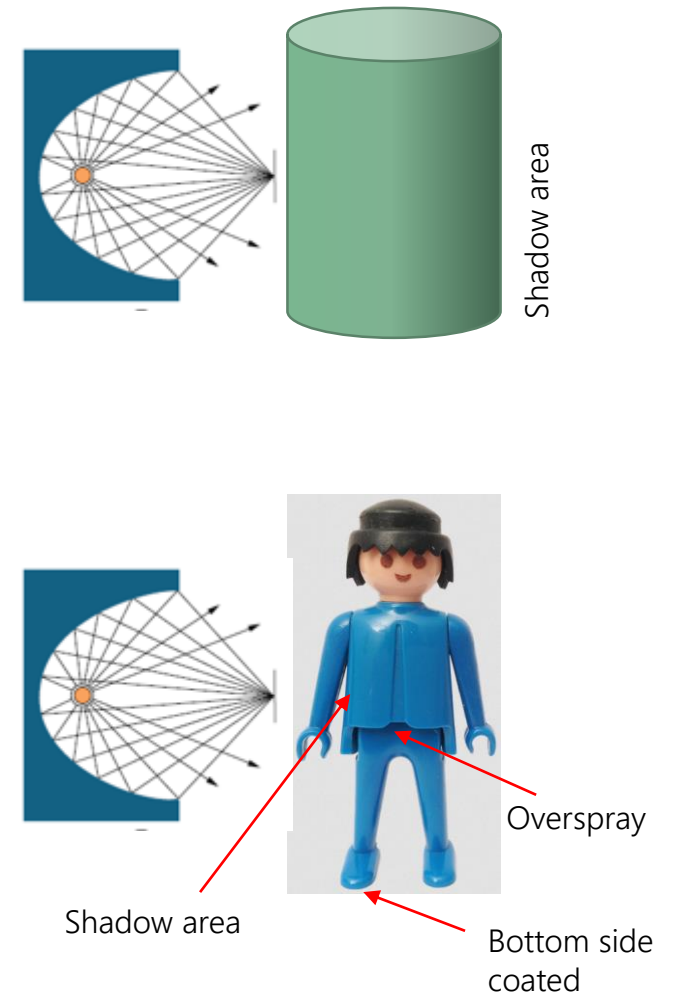


# Why think about Vela ?

Conventional UV Curing processes require a direct line of sight between lamp and the surface to be cured.

3D Geometries often contain surfaces which are shadowing each other, which contain threadholes or contain coated areas / overspray on the back side. To cure coating on these areas either the part or the lamps need to be moved mechanically or multiple additional lamps need to be installed with the only intention to cure these areas.

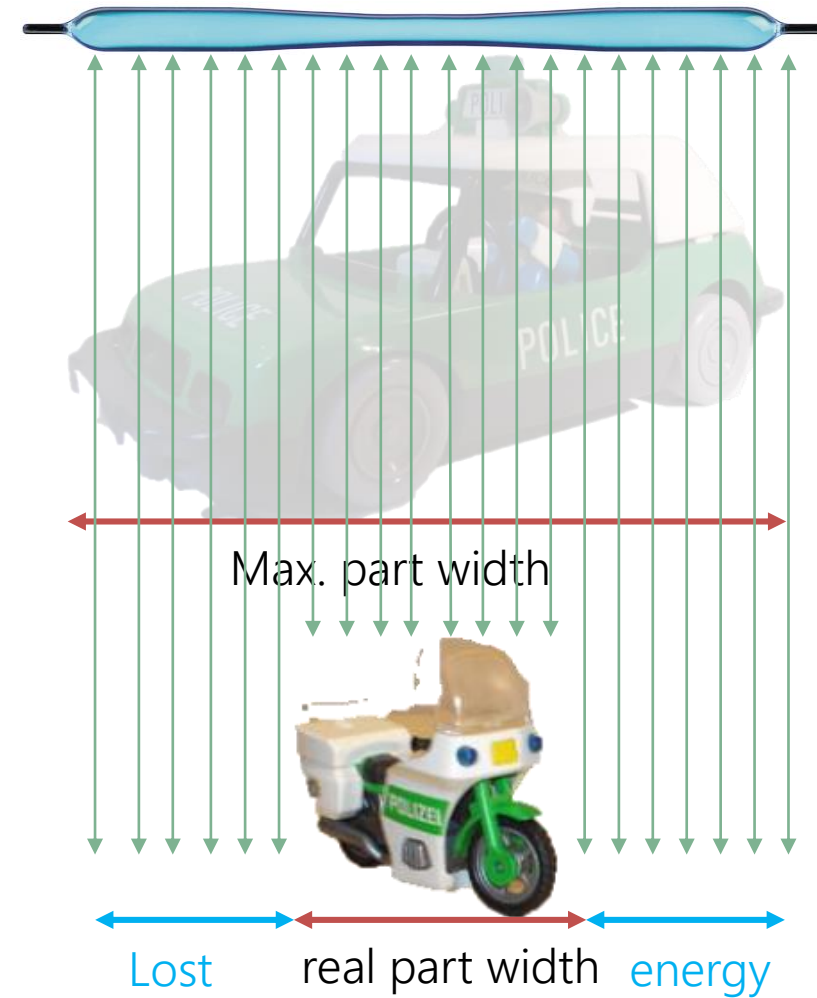
Differences in distance, view angle and rotation speed lead to a huge variation of the applied UV dose and intensity. Variances with a factor of 2-10 are absolutely realistic on different areas of the same 3D part.



# Why think about Vela ?

Conventional UV Curing processes need to irradiate the whole area where a part might be. But quite often the maximum part size is not being used. In this case power is being emitted into areas where no part is which could absorb the energy. In the same way at the space in between two parts on a conveyor all the energy being emitted from a UV lamps is lost energy.

Vela prevents that energy is being lost. It uses all the energy by reflecting the energy back to the substrates. In a totally controlled way inside a cycled process chamber or in a curing tunnel placed over a conveyor system.



# Vela makes the Difference !

Vela allows a full curing of all surfaces of 3Dimensional parts without any mechanical movement or installation of additional lamps. In addition Vela cures the whole part with a completely homogen distribution of irradiance and dose on each surface of the substrate.

Homogene 3D curing

Same dose and intensity on each surface area  
= Homogene chemical crosslinking  
≅ Homogene coating properties

Constant Intensity (\*)

No process deviations over the lifetime

Dose control (\*)

Prevents Over- or Undercuring. Allows Quality documentation of applied energy values

Minimal heat impact

prevents IR reflection to the substrates and protects part of being overheated

Energy efficiency

Vela uses ALL emitted UV energy. There is no unused straylight on the side or in between parts.

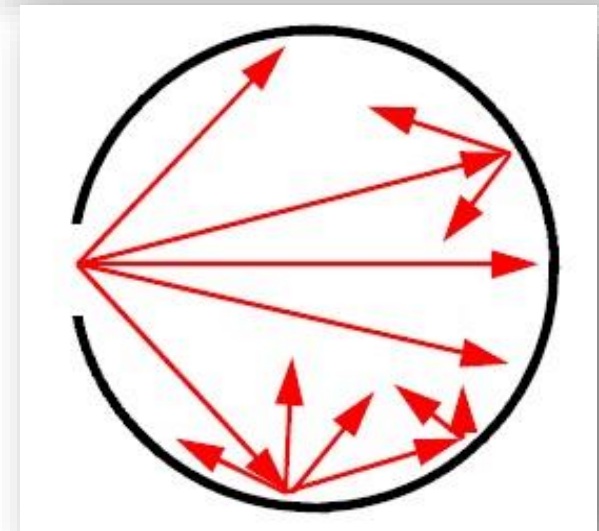
(\*) requires optional available inline sensor and adjustable UV sources

# Principle of the Vela technology

Vela works as an integrating sphere (Ulbricht-Sphere) which uses multiple diffuse reflections of light incident on the sphere inner surface to homogenize the light over the entire surface.

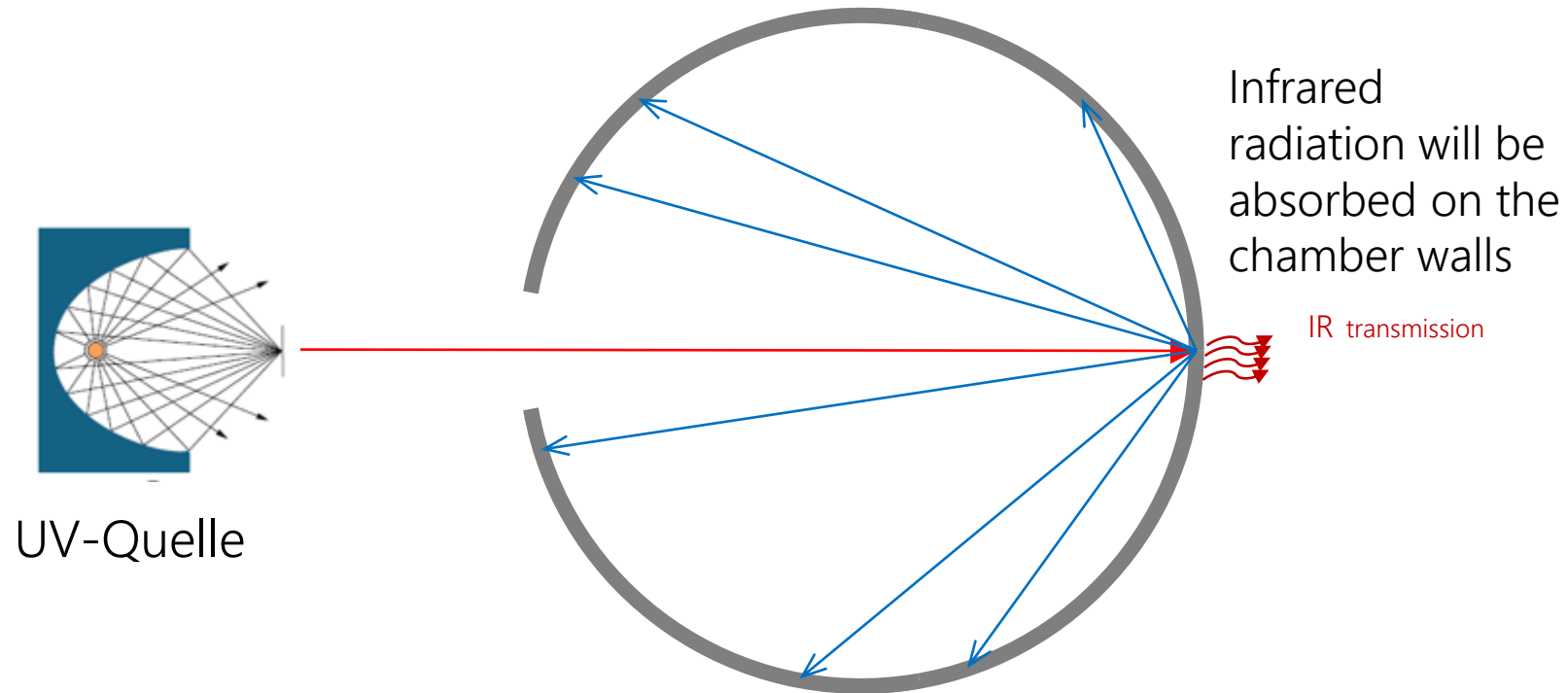
Each reflection point on the chamber surface starts acting as a new lightsource emitting light from all directions into the substrate area.

This results in uniform irradiance at all points on the interior surfaces of the integrating sphere.



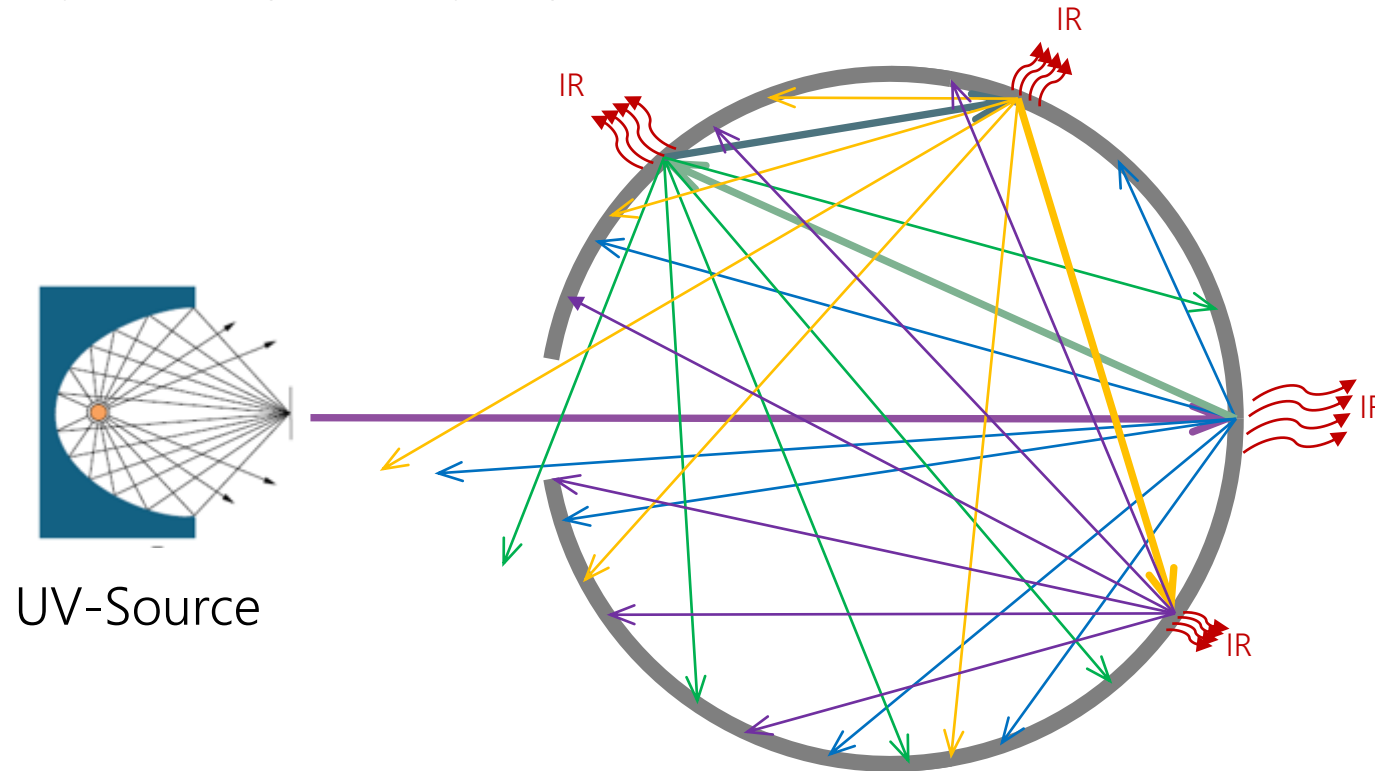
# How does it work ?

- A Ray enters the chamber. At the chamber wall it will be reflected **diffuse** into multiple new rays. Let's assume 6 new rays will be generated ...



# How does it work ?

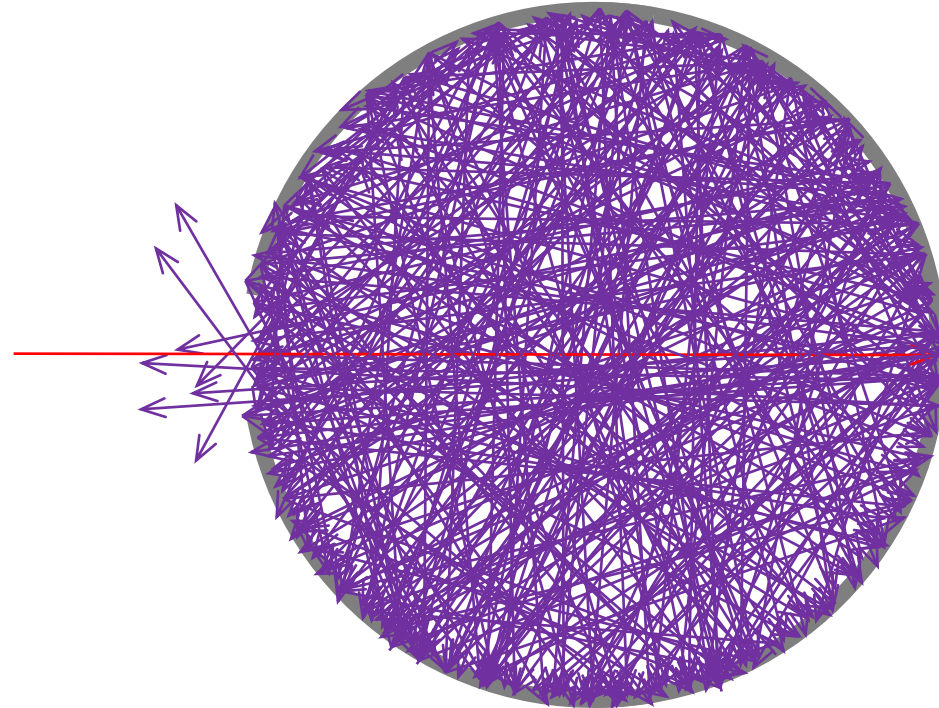
- A Ray enters the chamber. At the chamber wall it will be reflected **diffuse** into multiple new rays. Let's assume 6 new rays will be generated ...
- If we always follow only ONE of the generated rays we get after the 4<sup>th</sup> reflection...





# How does it work ?

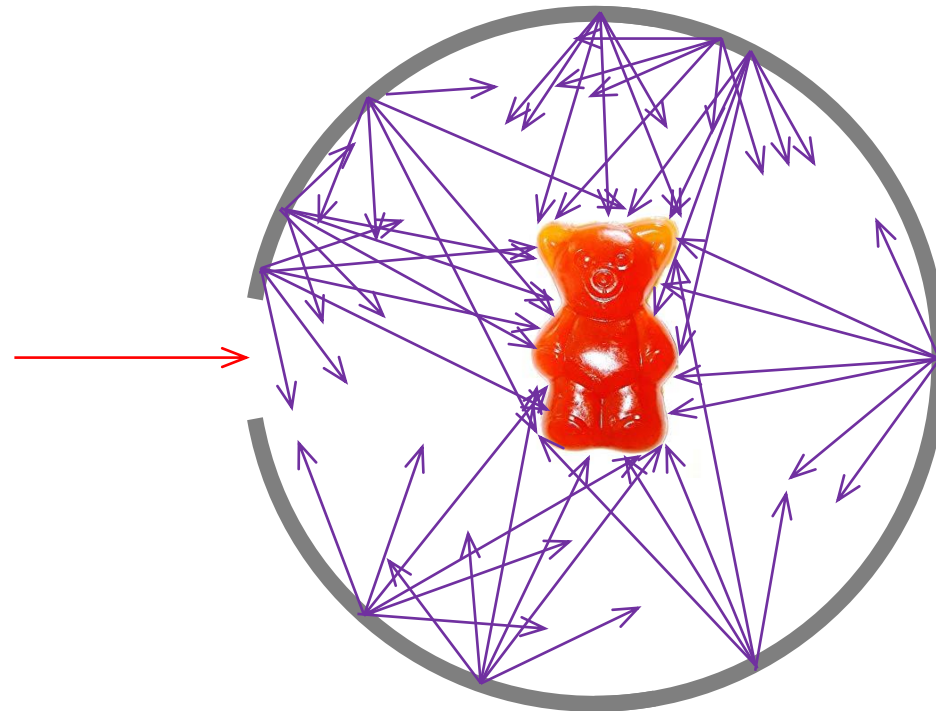
- Now we follow all 6 rays of the initial bounce over 10 reflections...



A fully homogenous volume is being created with “light sources” at each position of the chamber wall.

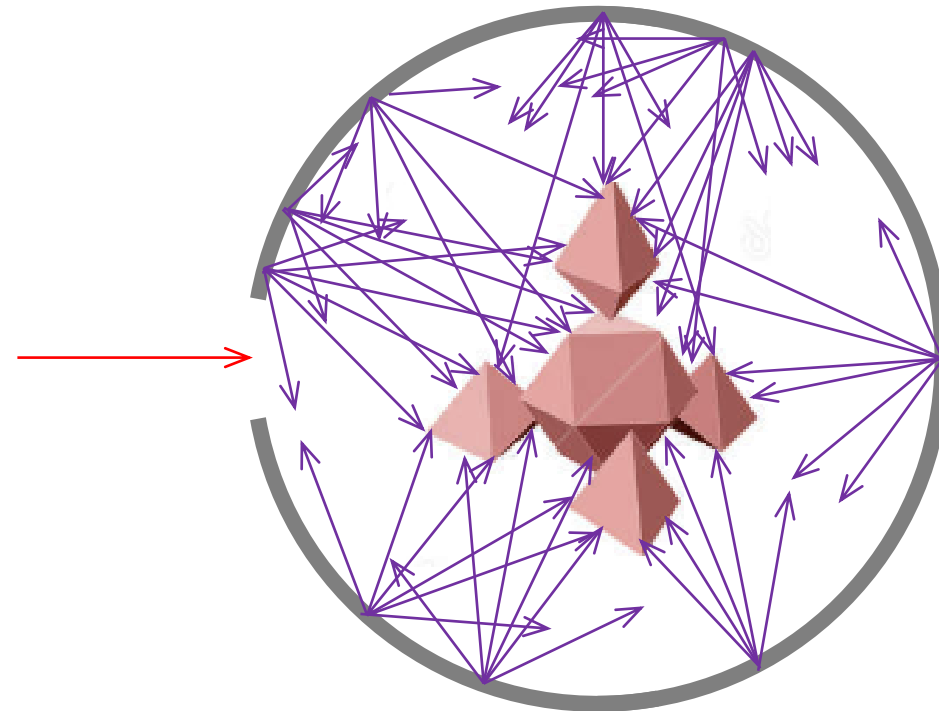
# How does it work ?

- ...and each 3D object will be cured from all sides without the need for part movement.



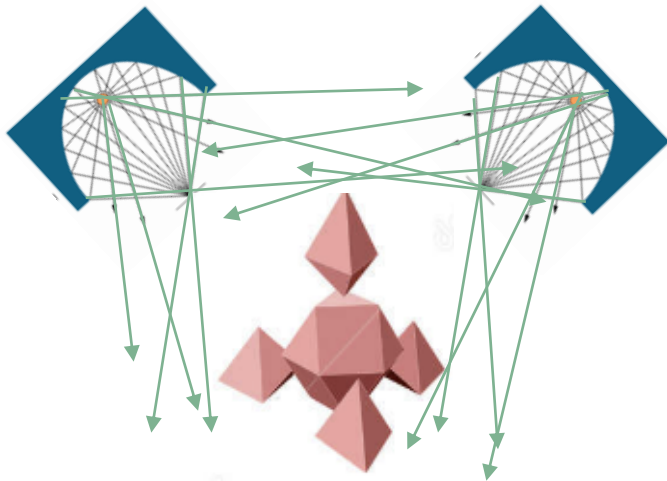
# How does it work ?

- ...even complex geometries can be cured on all areas – practically shadow areas do not exist !

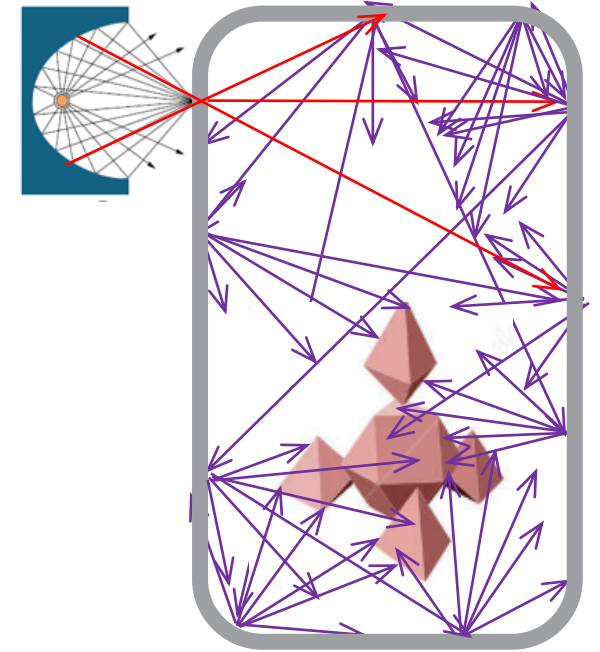


# Why is Vela Energy efficient ?

- A Vela chamber is a closed area where the UV ray can't get out. All the energy coupled into the chamber is being reflected until its being used
- The only absorbing surface is the part itself.
- ALL energy being produced by the UV-lamp and being coupled into the chamber will end on the part. There is no lost straylight.



- A conventional UV curing installation uses multiple lamps to reach all surfaces. Energy which does not hit the surface is lost
- Usual 3D curing lines have an efficiency <<50%



# Dose control

Full automatic dose control is available as option in Vela installations. Using an intensity sensor the PLC is continuously monitoring and summarizing the intensity change being caused by the absorption of the coated part.

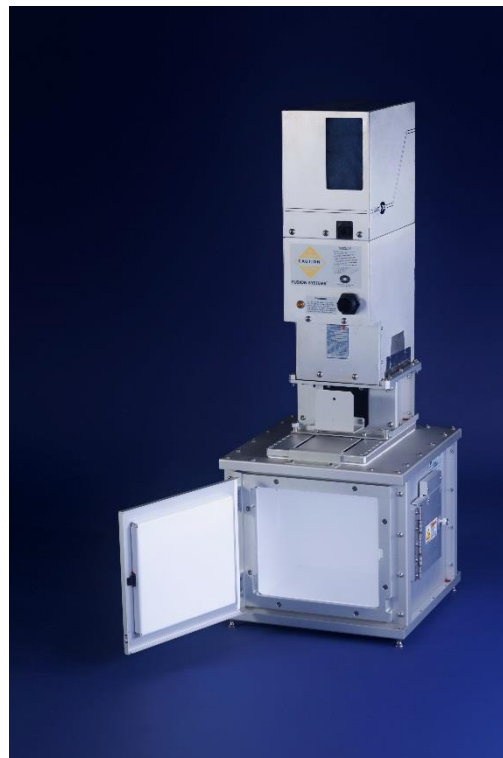
- Dose control automatically recognizes changes in Substrate size and coating absorption
- Dose control can adjust process time in cycled applications to adopt the process to changes in substrate size
- Changes of lamps (aging) is automatically being corrected by adjusting the process time
- Applied dose is longterm stable and controlled
- Curing according to requirements can be guaranteed

# Examples – from Lab to high volume production

MiniCure



Cure Chamber



Lab unit

# Production lines Catheters

Curing of hydrophilic coating on catheters

- Fully automatized production systems
- Various production volume units delivered (from 6 catheters up to 260 per batch)
- Utilizing 1 to 8 UV Systems per line
- Dose control included
- Dose level for each batch transfered to customer PLC for QS documentation





# Clamshell Design Indexing conveyor

Design example for multiple applications, from medical to automotive

- Fully automatized production system
- High level of customization possible
- Utilizing single or multiple interconnected or separated Vela chambers
- Dose control included





# Semi-automatic production system

Application of scratch resistant hardcoat on Polycarbonate safety glasses

- Manual loading and unloading
- 6-12 glasses per batch
- Dose control included, adjusts process time fully automatically
- Process starts when door is closed
- Dose level for each batch available for QS documentation



Thank you  
for your time

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