Translucent Panel VT Testing Suggested Strategy

NFRC Translucent Panel Task Group
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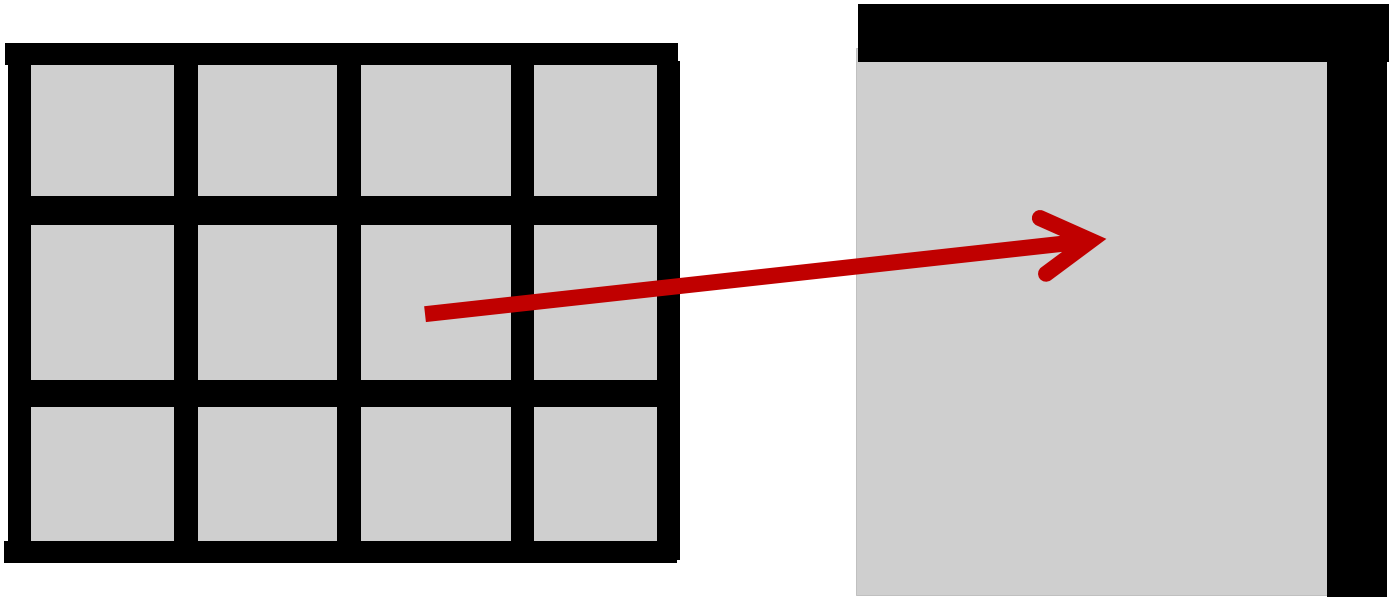
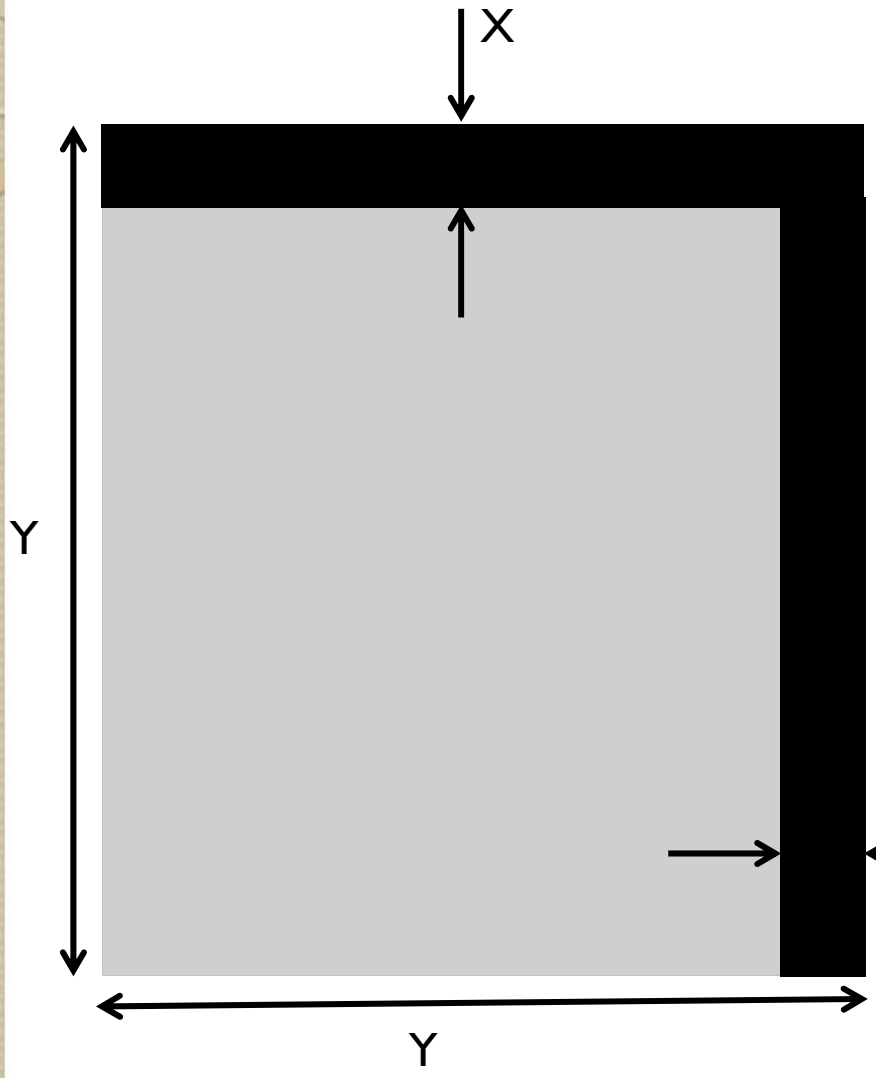
8 November 2011

Simplified Optical Model

- Suppose we can treat most translucent panels on the market as relatively homogeneous central areas
- Plus an opaque edge on two sides



Area weighted VT Simplification



A_T = Total cell area
A_E = Edge area
Y = Cell width (one period)
X = Edge width
VT_{COG} = Center of Glazing VT
VT_E = VT of the edge

$A_T = Y^2$

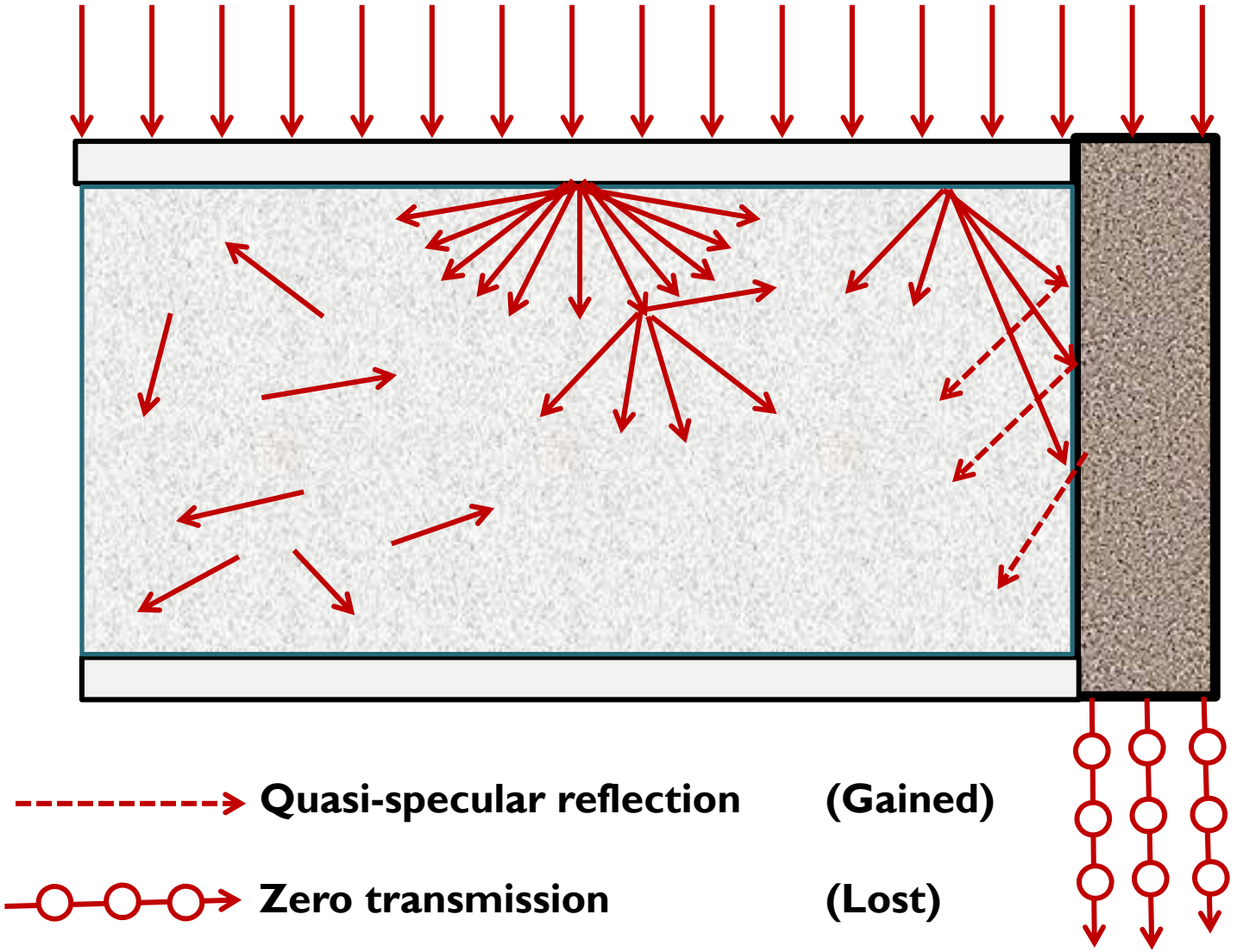
$A_E = XY + X(Y - X)$

$$VT_{PROD} = \frac{VT_{COG}\,(A_T - A_E) + VT_E\,(A_E)}{A_T}$$

If $A_E/A_T < 0.01$ to 0.05 (TBD) Then

$$VT_{PROD} = VT_{COG}$$

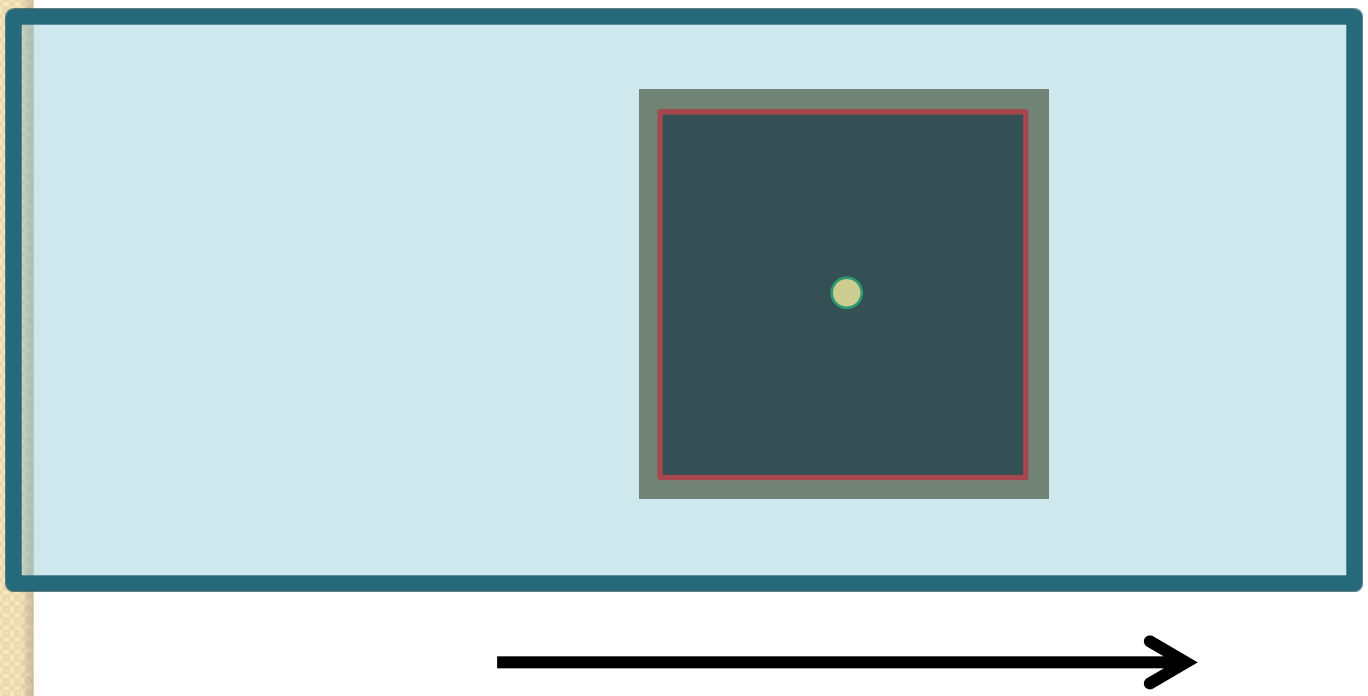
Details of the Approximation



Stipulations

- Manufacturer must be willing and able to make a sample without dividers or other linear inhomogeneous segments inside a 39” x 24” perimeter
- This must be otherwise identical to a marketed product
- Then the rating is calculated from the area-weighted average VT calculation on slide 3

Center of glazing VT is obtained from 39” sample by translating and measuring as it crosses the E1084 box



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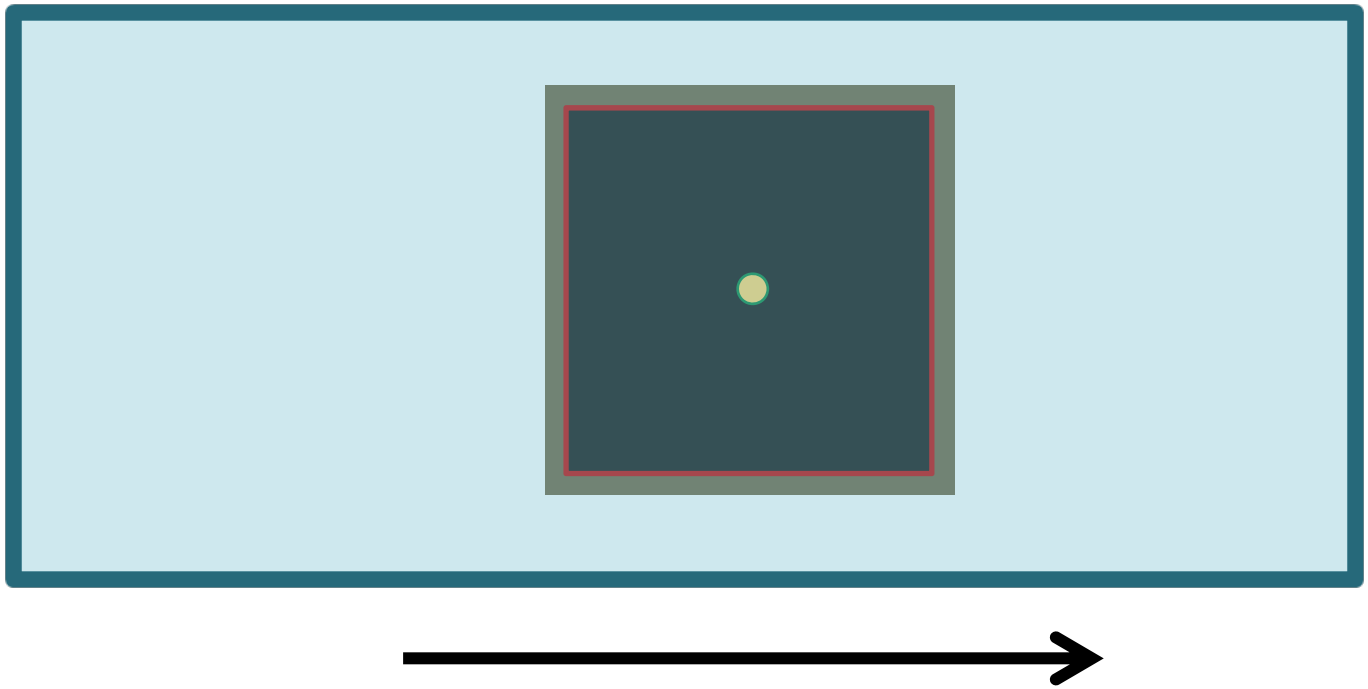

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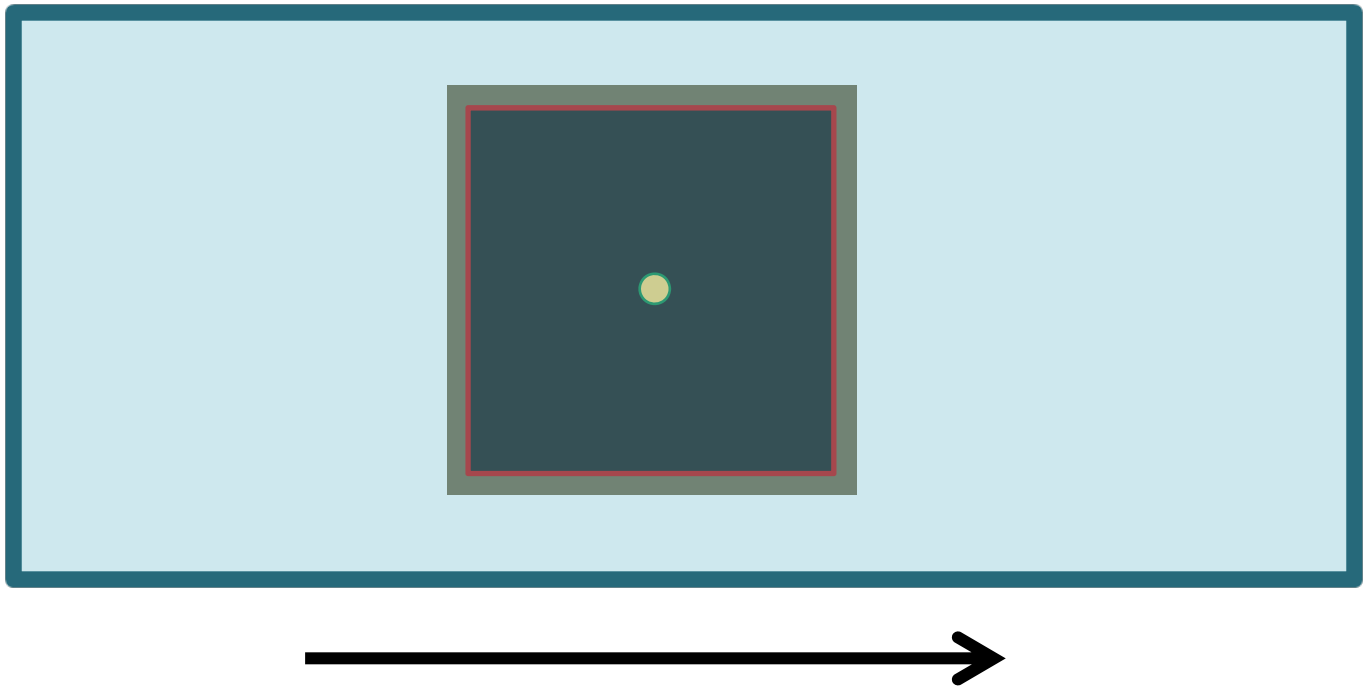

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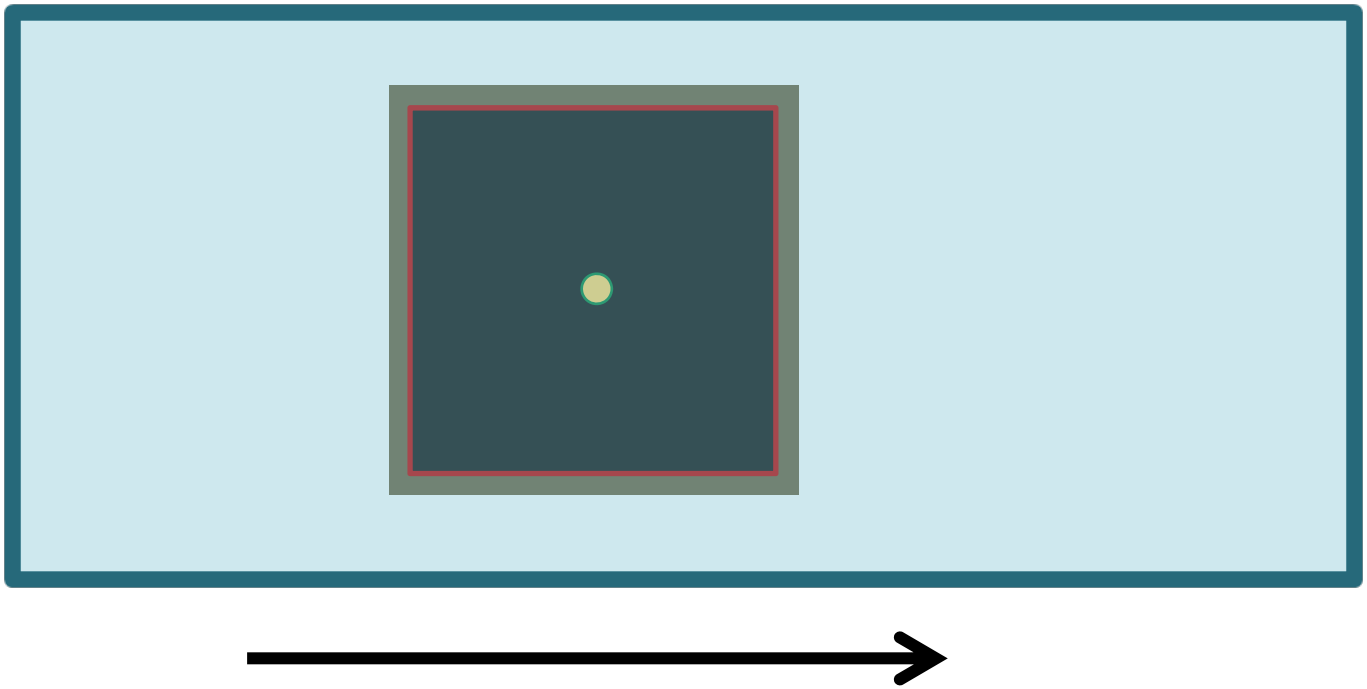

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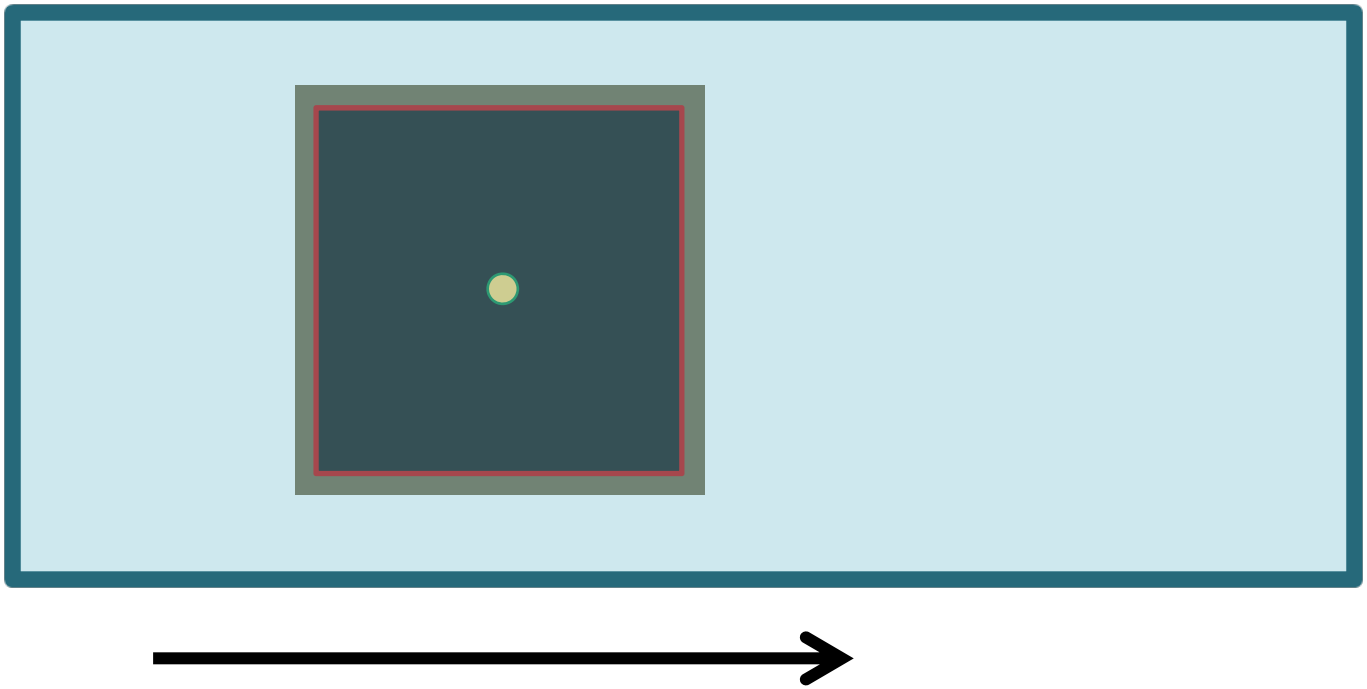
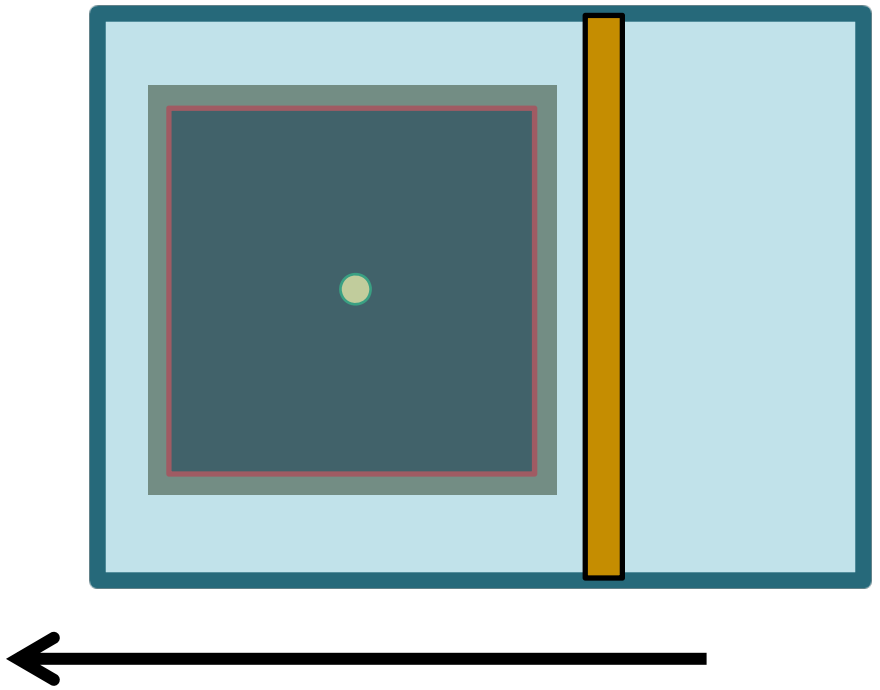


The process

- The average of the multiple readings is the center-of-glazing VT value (VT_{COG})
- Then the width and length of the glazing squares are measured
- Then the width and length of any divider or structural member are measured
- Then the relevant areas are calculated
- And the appropriate formula on slide 3 is used to determine the sample's overall VT

If a sample cannot be made without a crossing member, divider, or mullion

- The transmittance is measured as one of the dividers is drawn across the sensor



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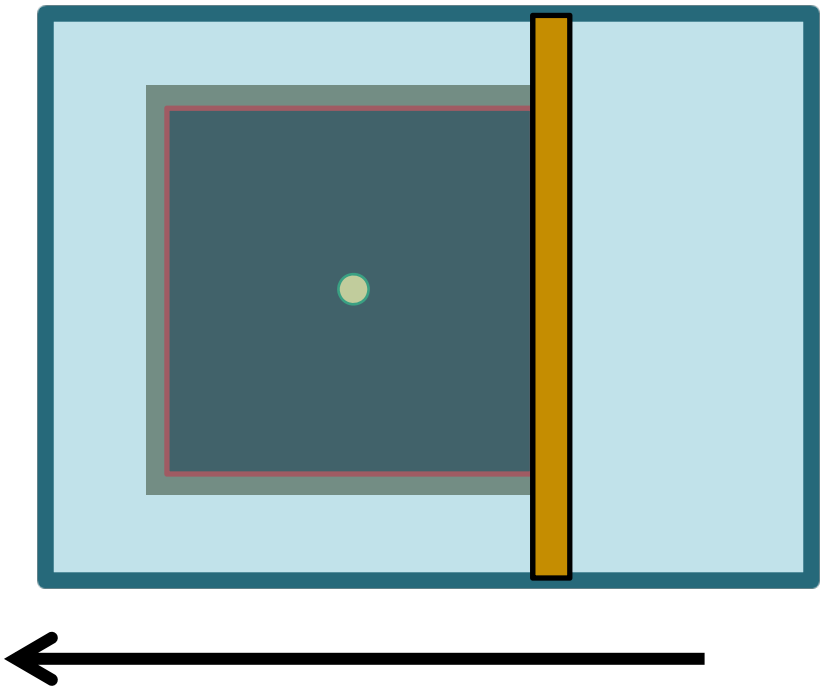

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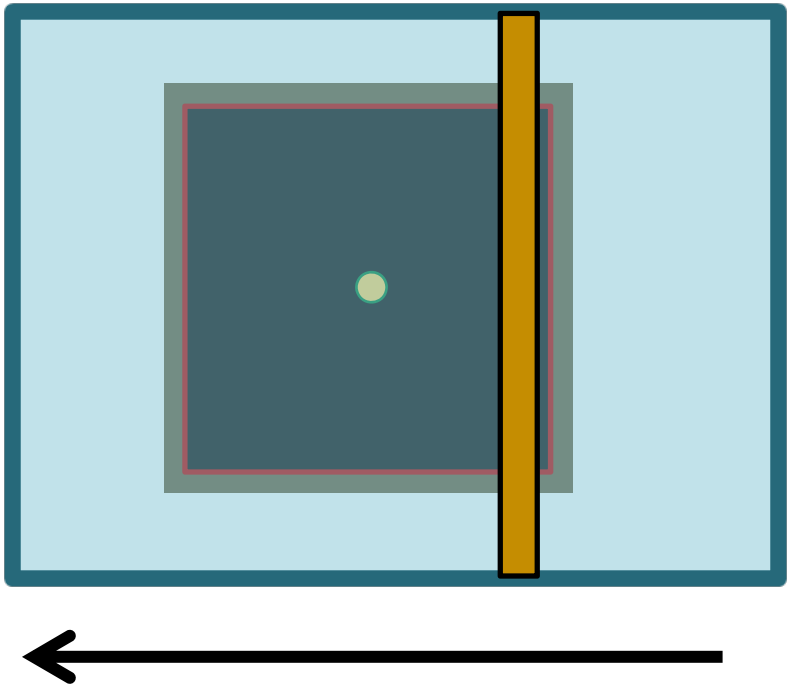

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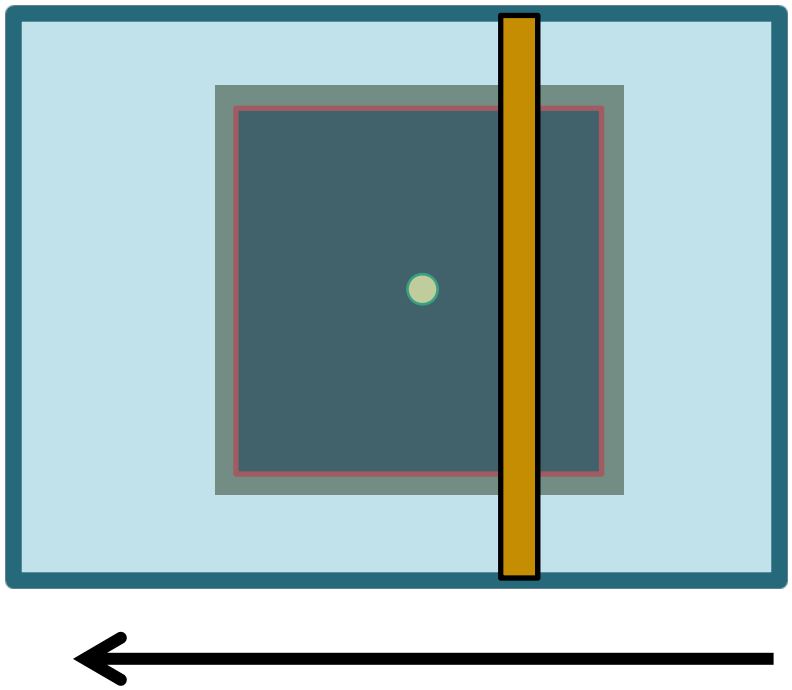

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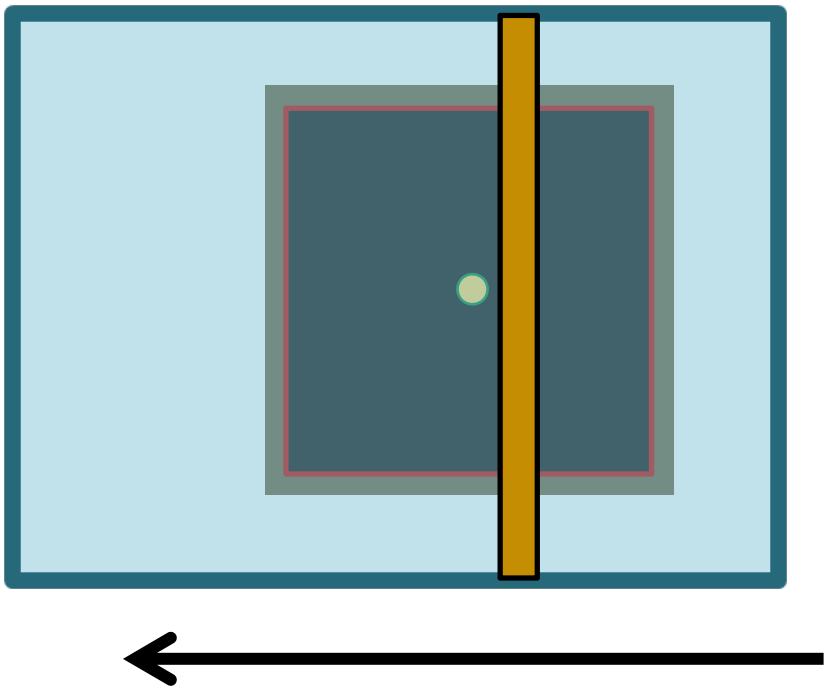

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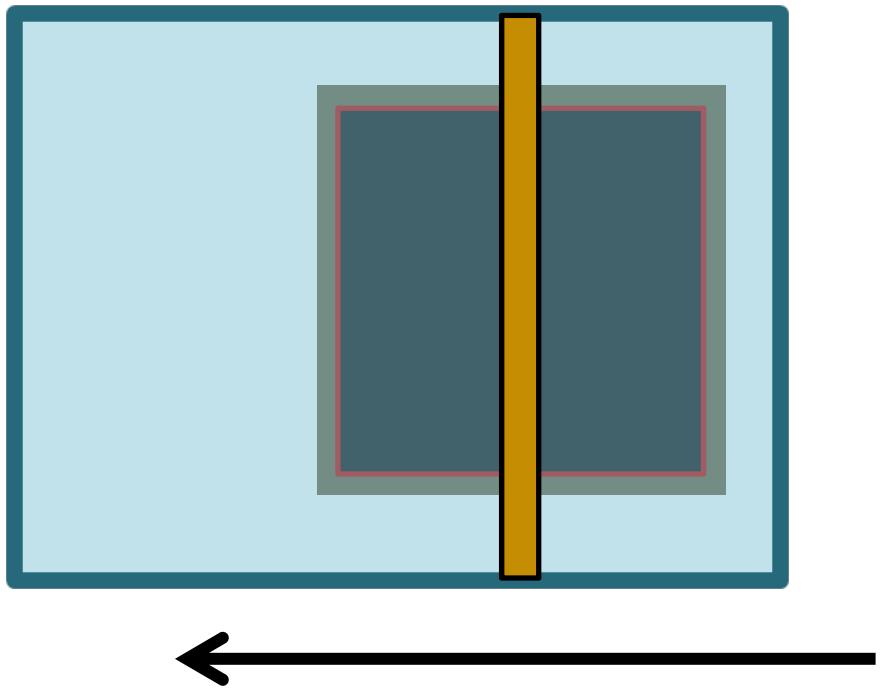

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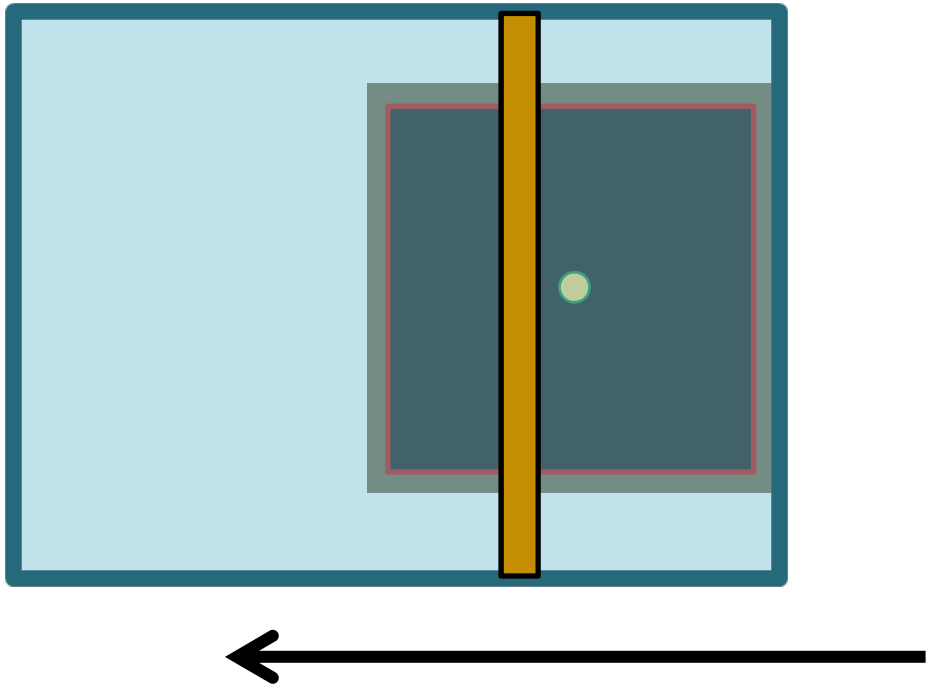

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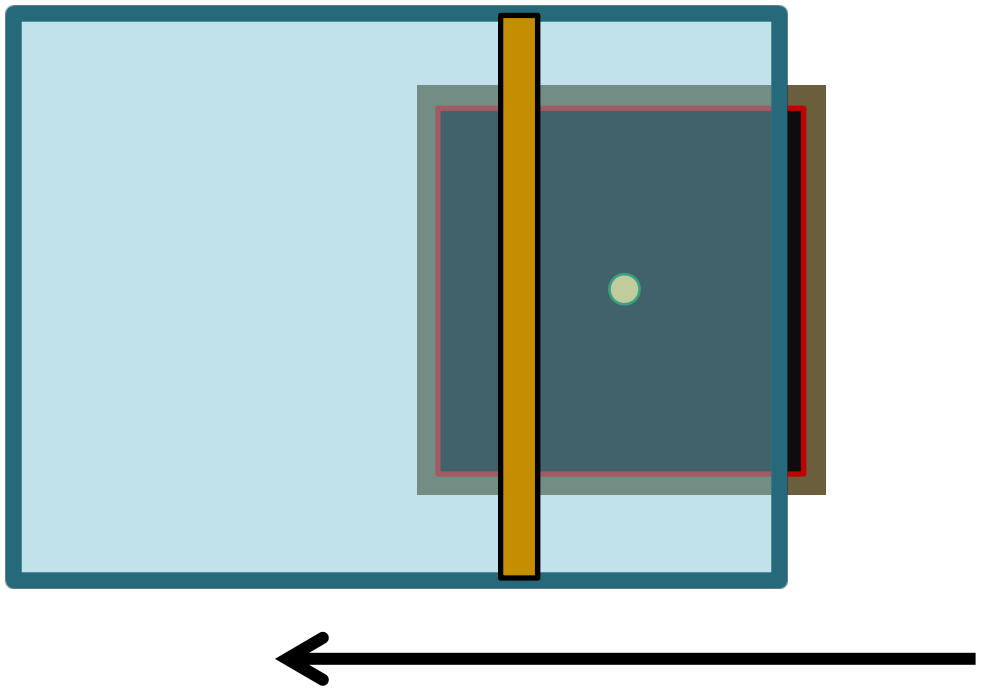

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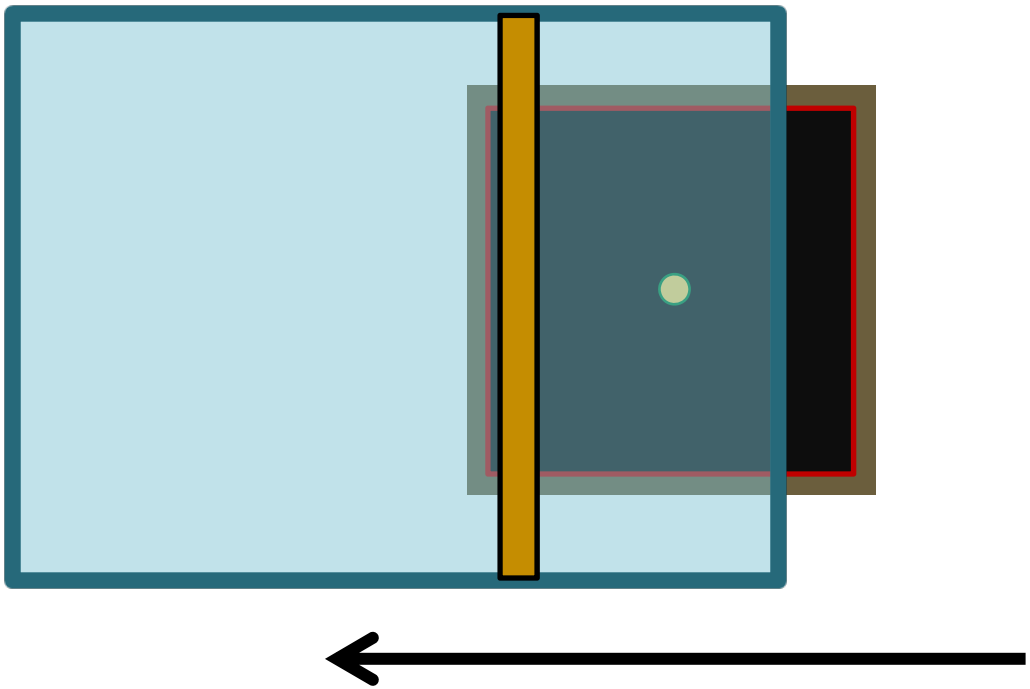

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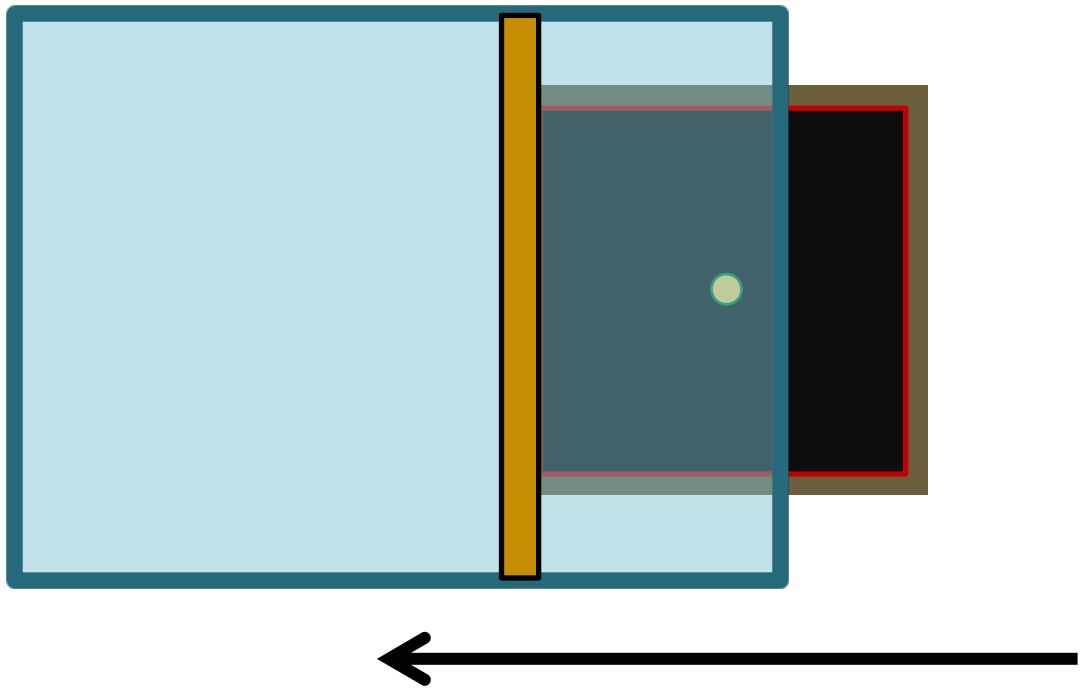
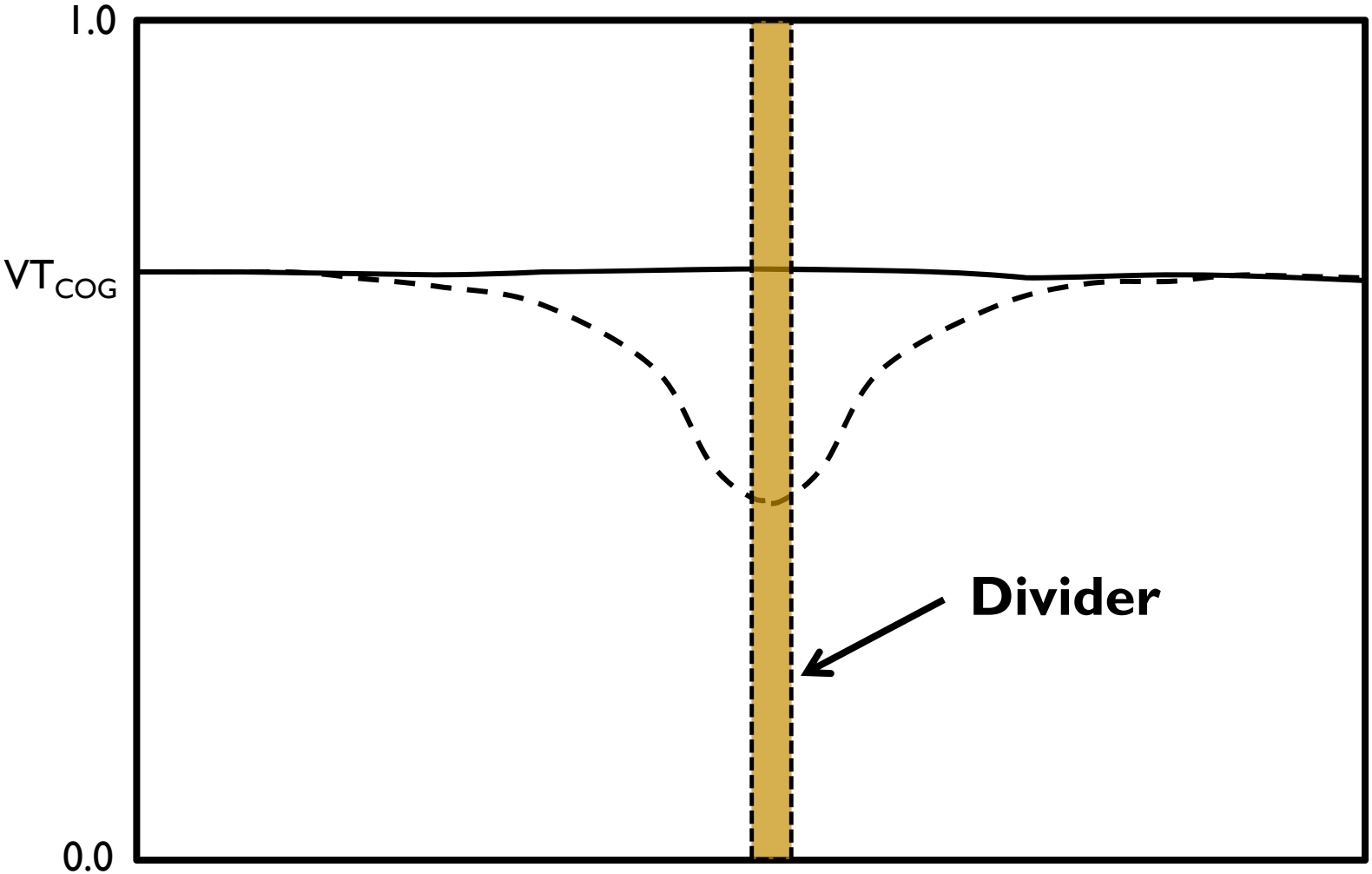
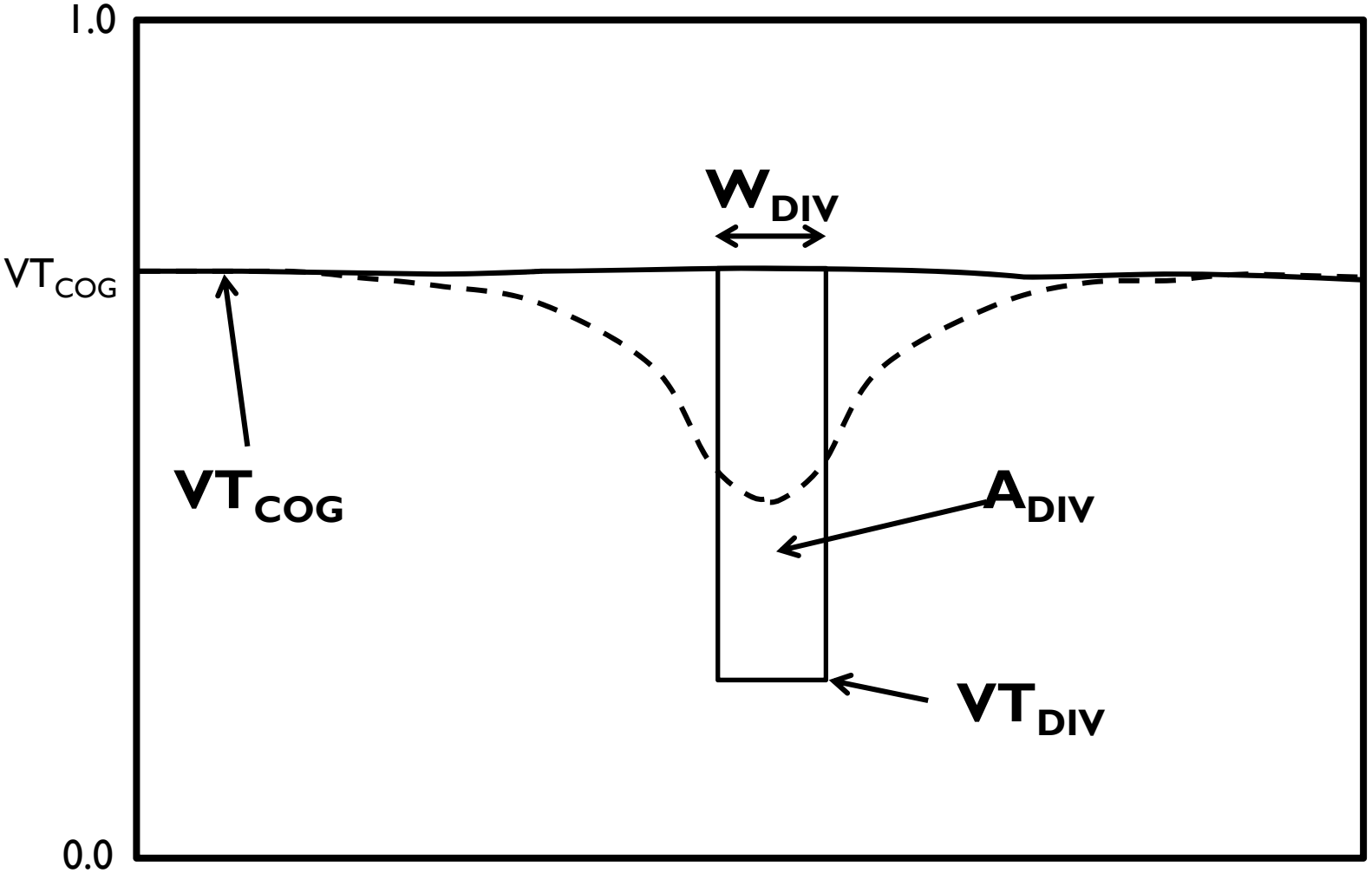


The Measurements are Plotted



Calculate the area between the solid and dashed curves

Replace the curve with an equal area rectangle



Perform an area-weighted average

A_T = Area of the total product
A_E = Product opaque edge area
A_{DIV} = Divider rectangular area as calculated from previous test
VT_{COG} = COG VT as measured
$VT_E = 0$
VT_{DIV} = Divider VT as calculated, previous slide

$$VT_{PROD} = \frac{VT_{COG}\,(A_T - A_E - A_{DIV}) + VT_E\,(A_E) + VT_{DIV}\,(A_{DIV})}{A_T}$$

Two Approaches

1. Make a sample without dividers. Measure the center of glazing VT, glazing area, edge area, divider area, and area weight the VT_{COG} , VT_{DIV}, & VT_{EDGE} (= 0)
2. Make a sample with one divider in the middle.

   Measure the VT profile across the edge and replace it with an equal area rectangular divider of measured VT

   Area weight the result