

Henkel

A Brand like a friend

Adhesive Design Considerations

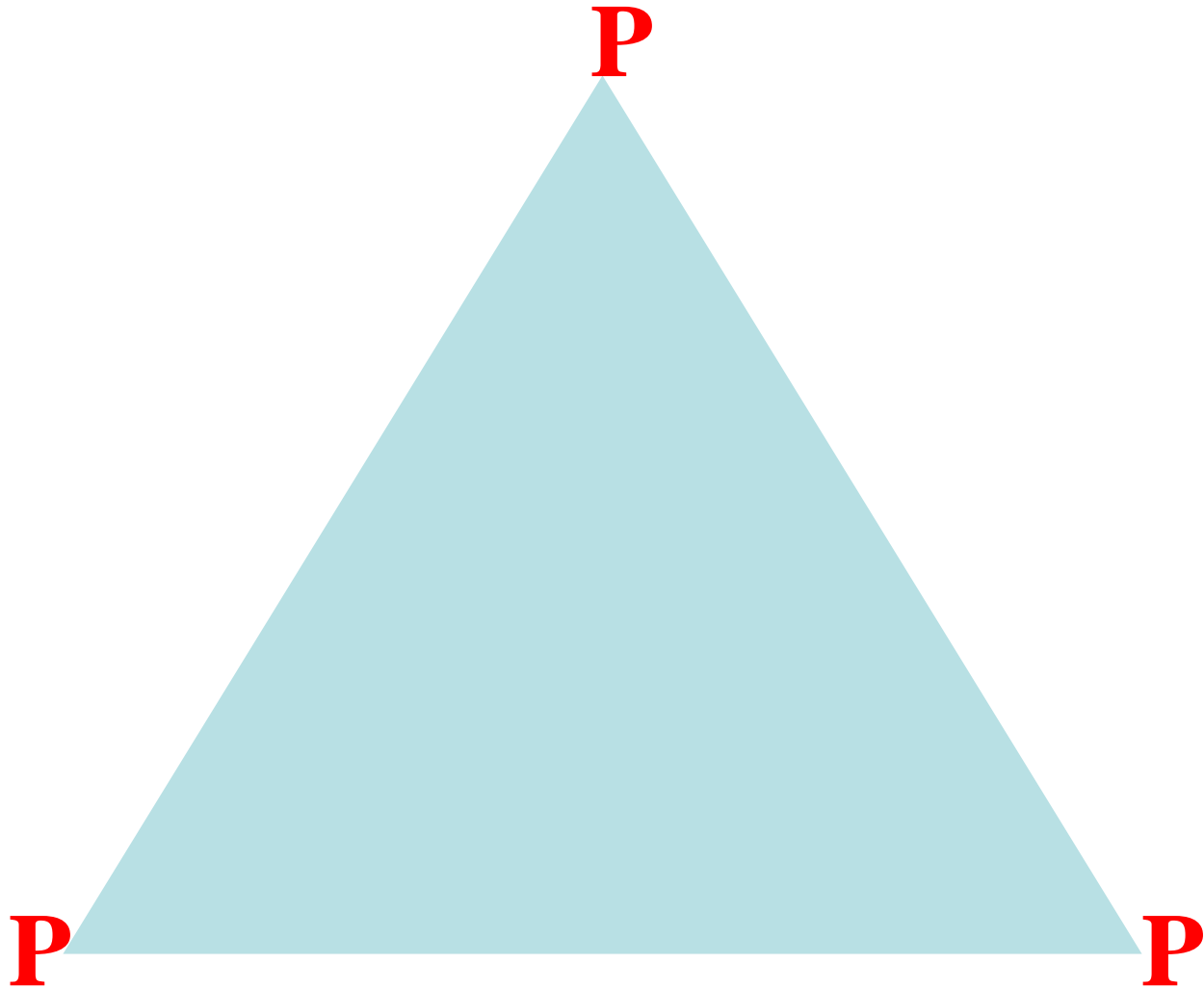
Edward Fisher
Application Chemist

LOCTITE®

Henkel Technologies

Agenda

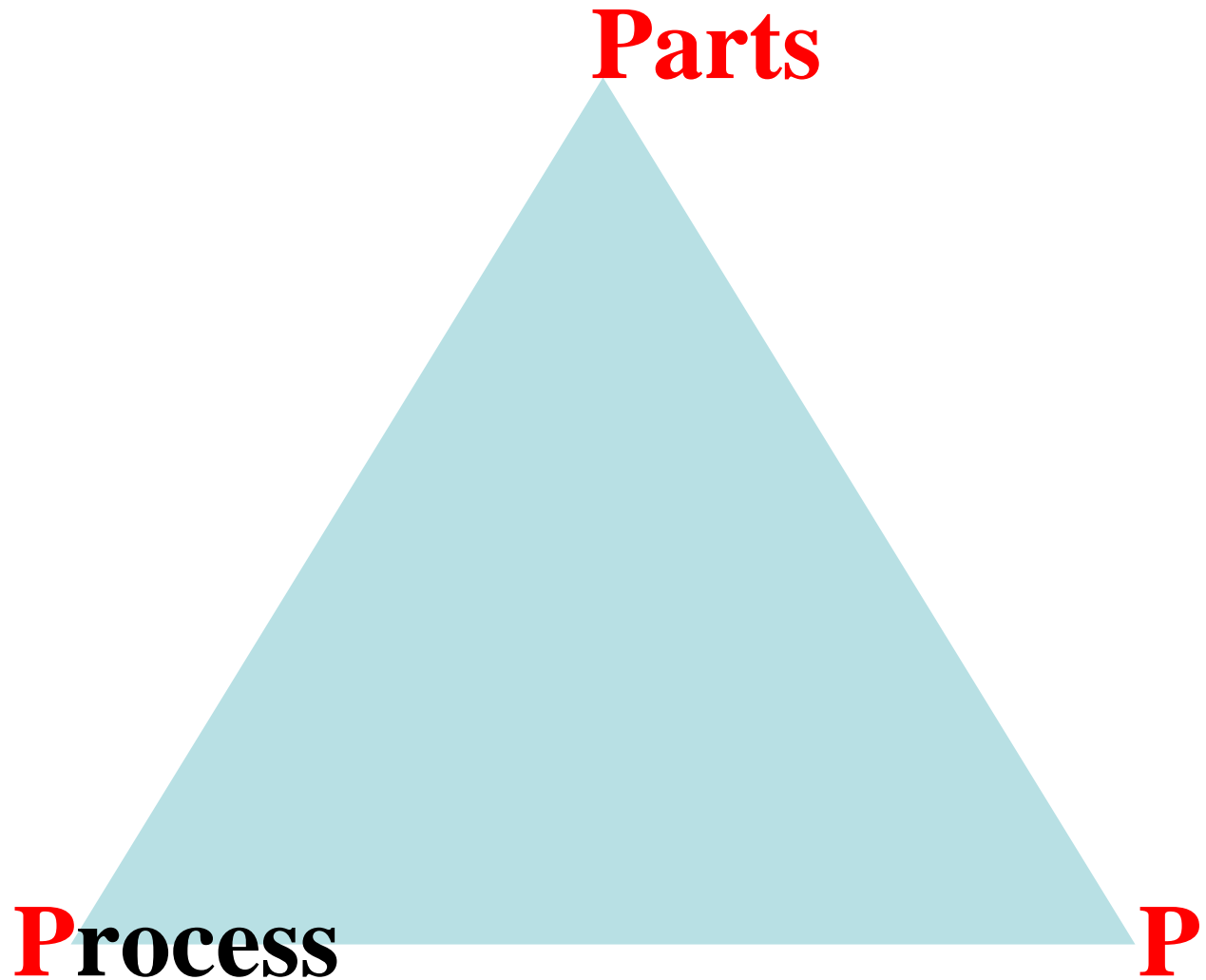
- **The Three “P’s”**
- **Types of Force**
- **Width vs. Overlap**
- **Effect of Gap**
- **Adhesive Selection Questions**

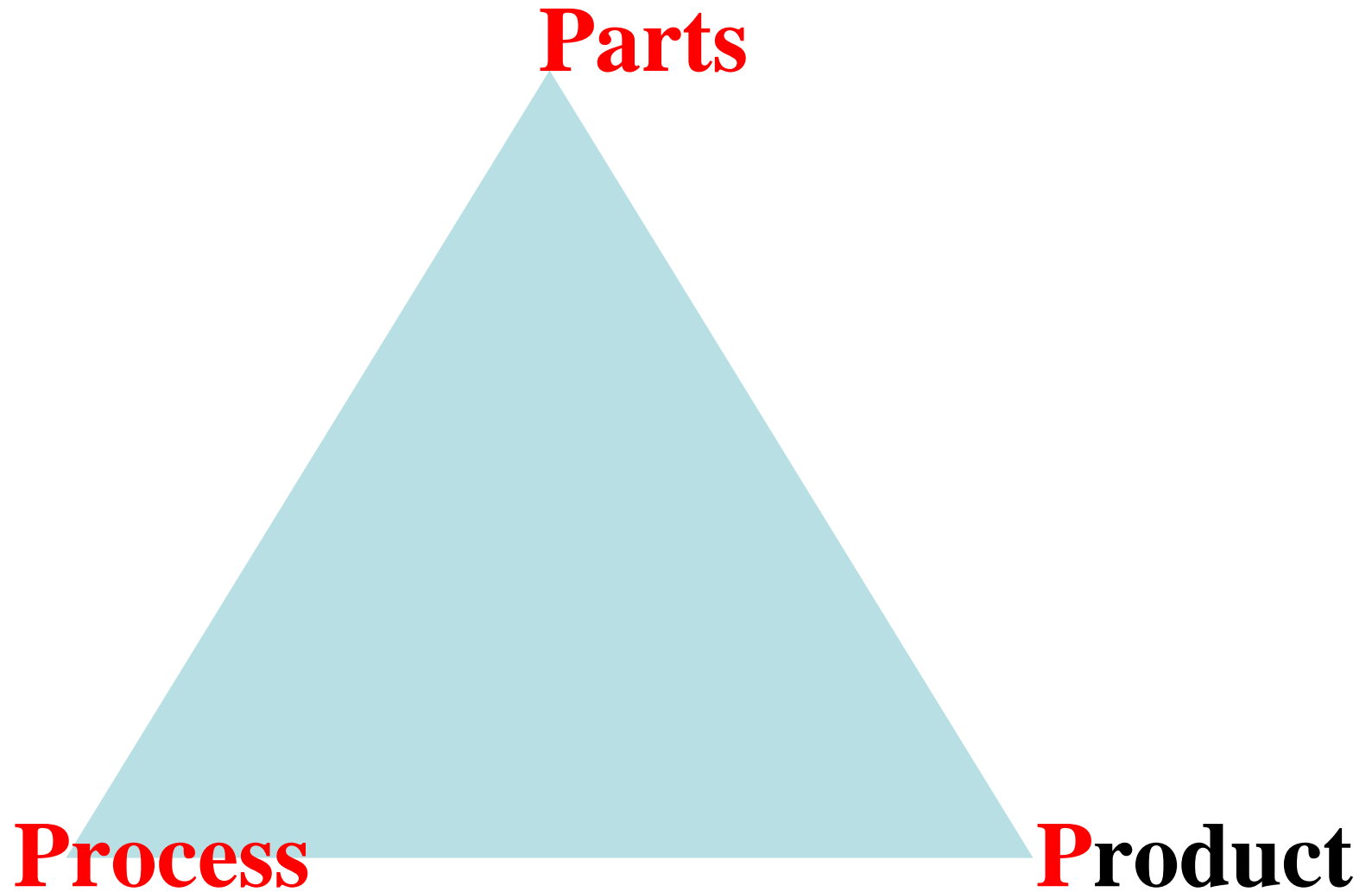


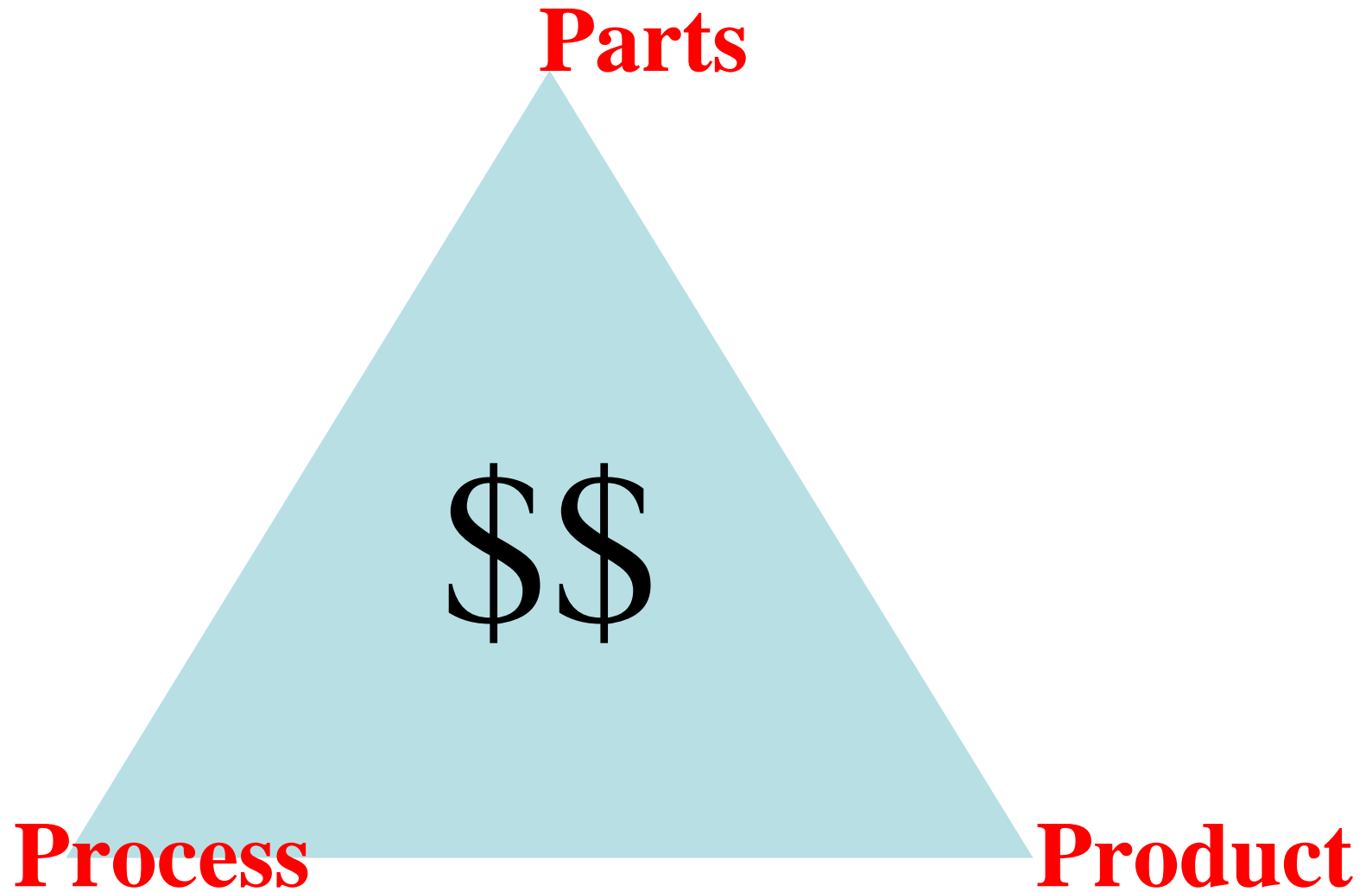
Parts

P

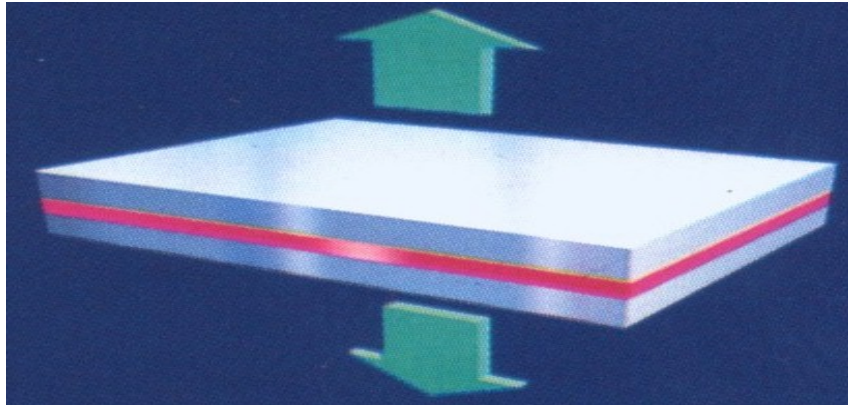
P



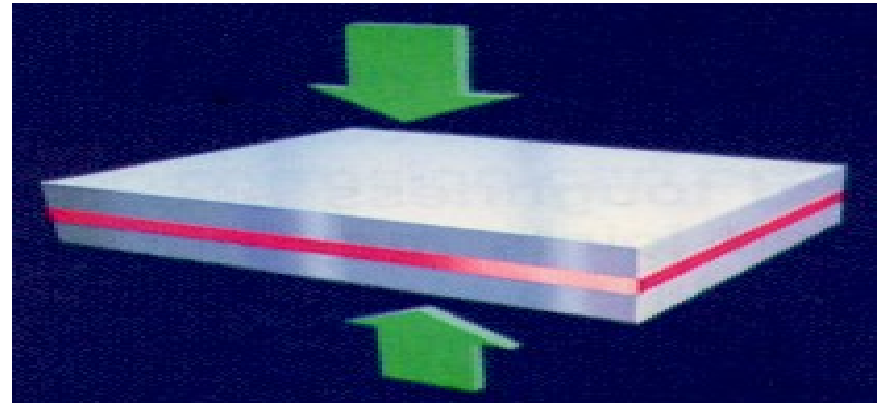




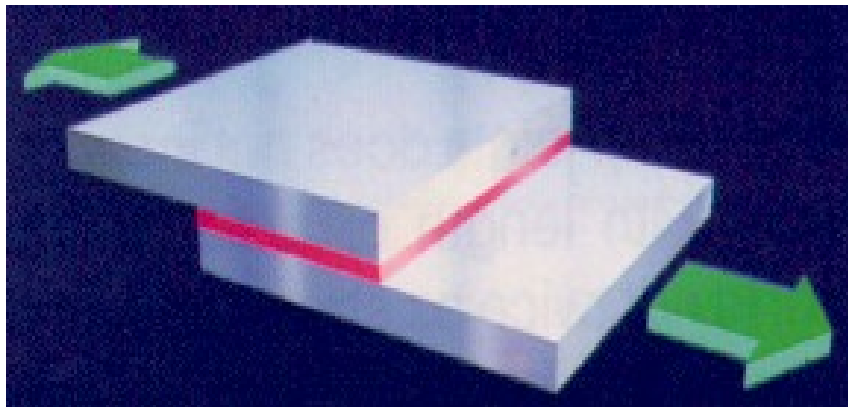
Type of Forces



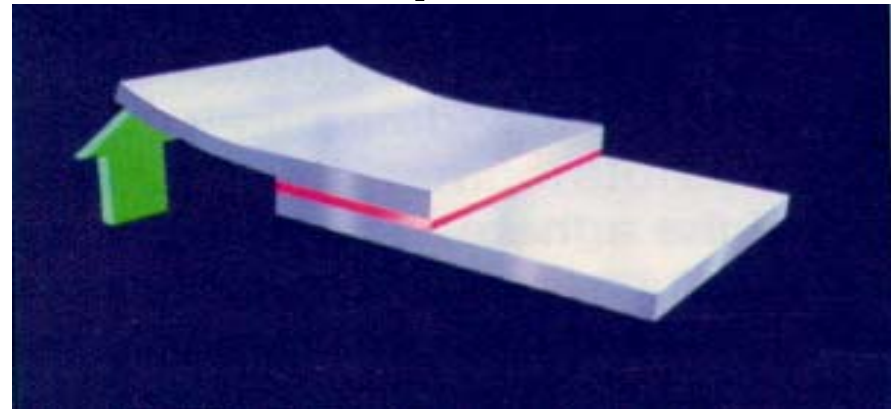
Tensile



Compressive

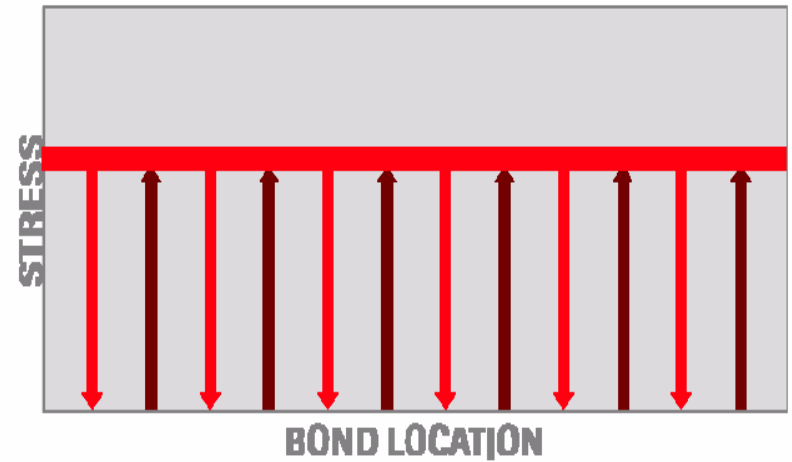
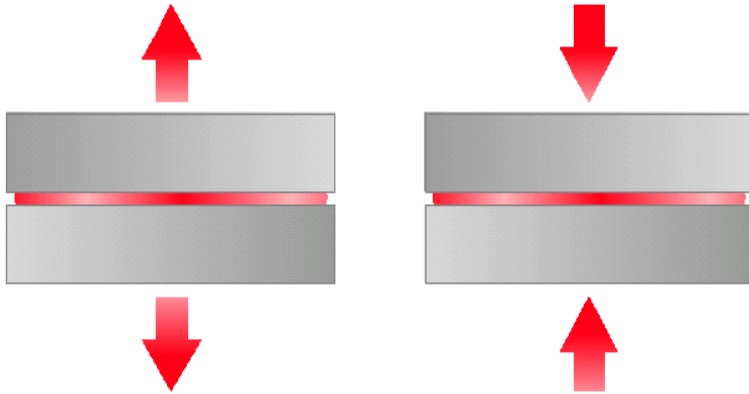


Shear

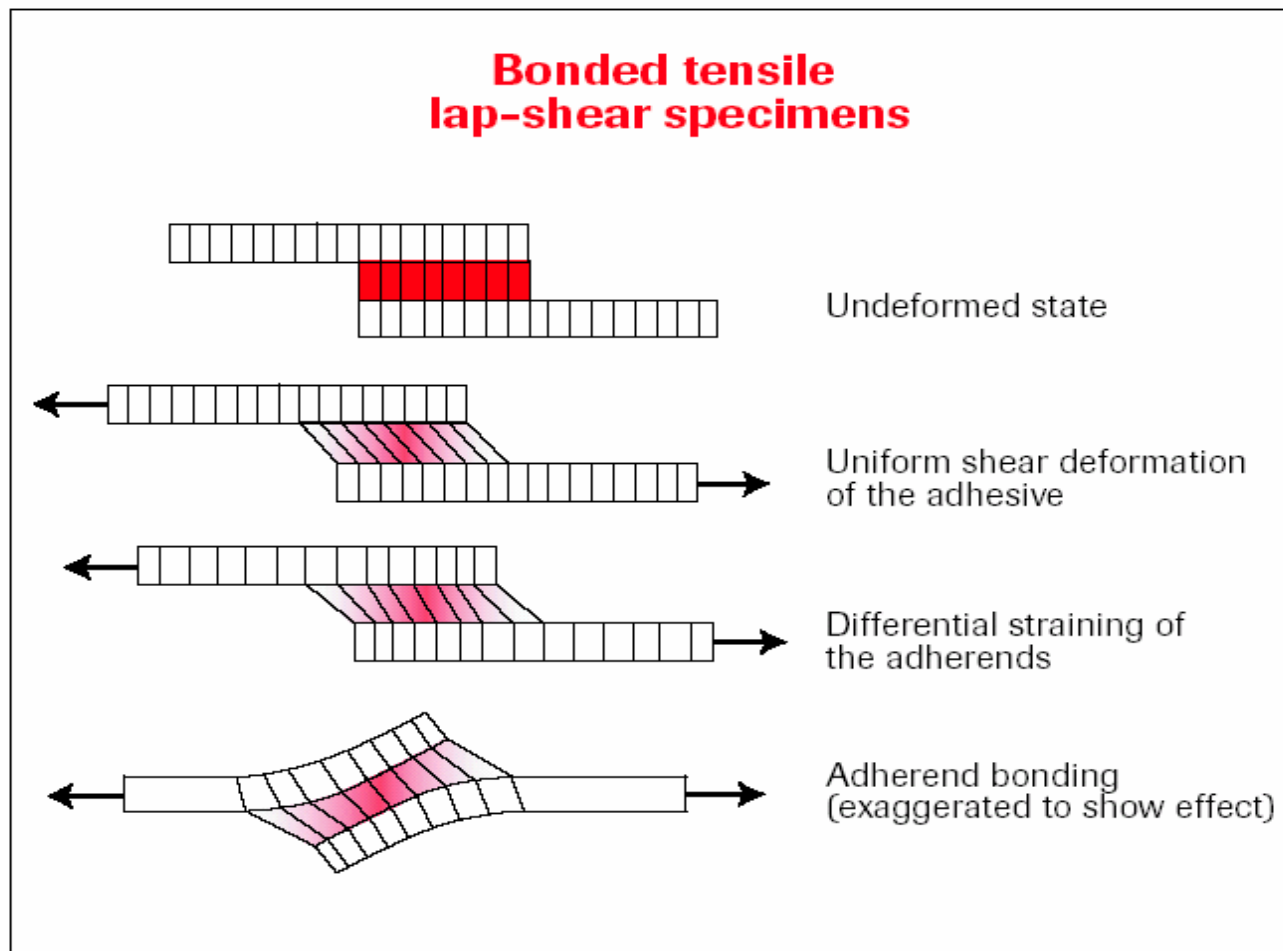


Peel

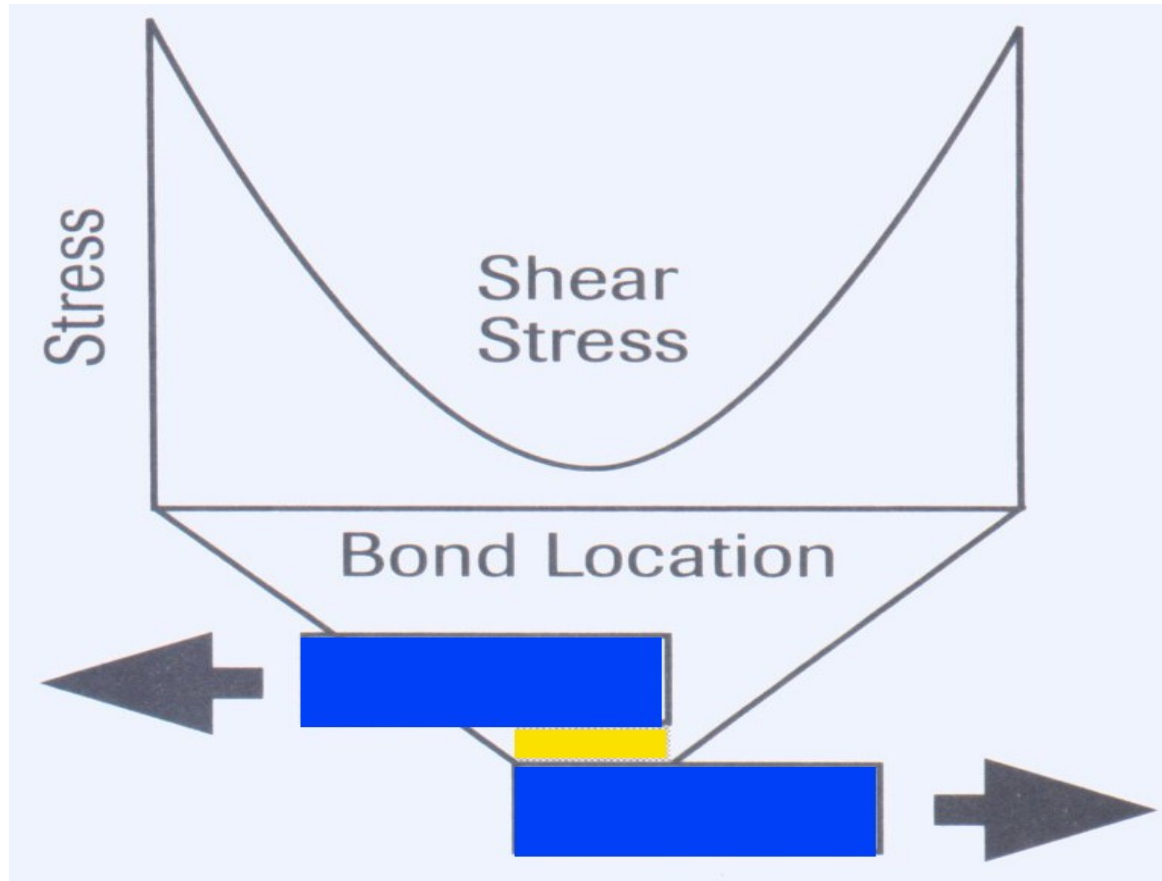
Stress Distribution: *Tensile and Compressive Forces*



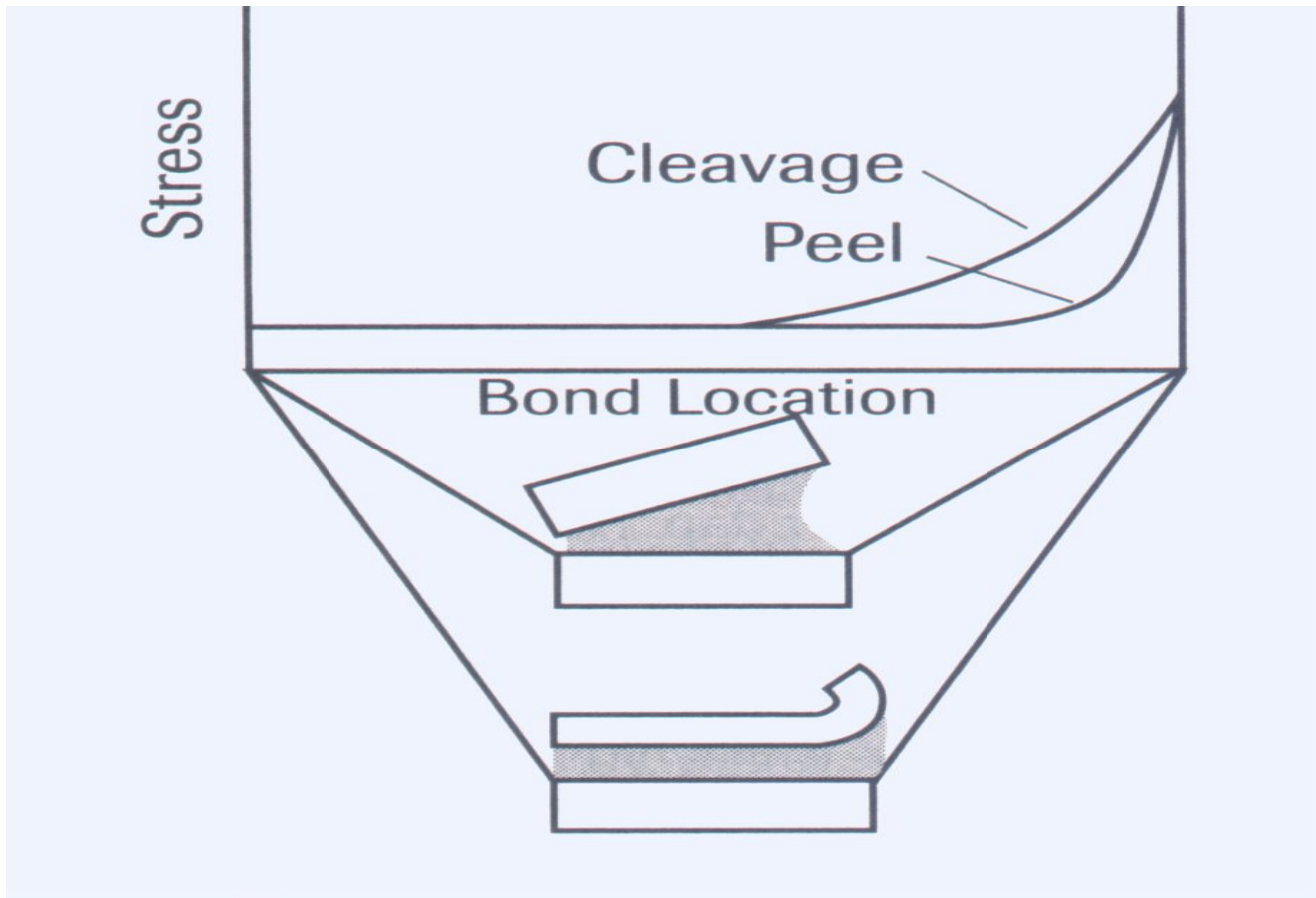
Stress Distribution: *Shear Forces*



Stress Distribution: *Shear Forces*



Stress Distribution: *Peel and Cleavage Forces*



What Have We Learned?

- **Maximize...**

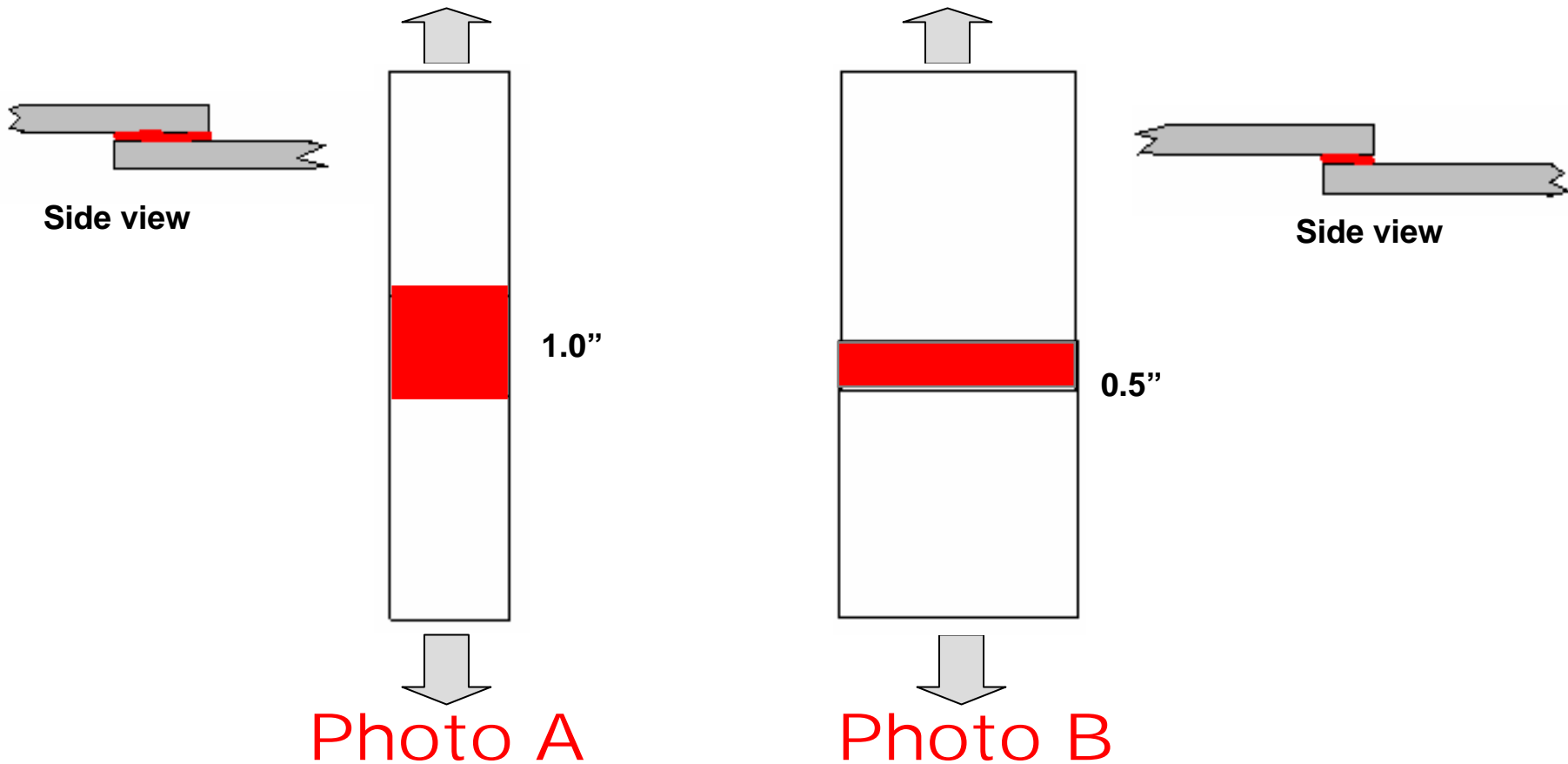
- **Minimize...**

What Have We Learned?

- Maximize...
 - Tension, Shear & Compression
- Minimize...
 - Peel and Cleavage



Joint Area - Width vs. Overlap



Bond Area = 1 sq in

FORCE = Shear

Which joint can handle a higher load? Why?

What Have We Learned?

- **Joint Overlap**

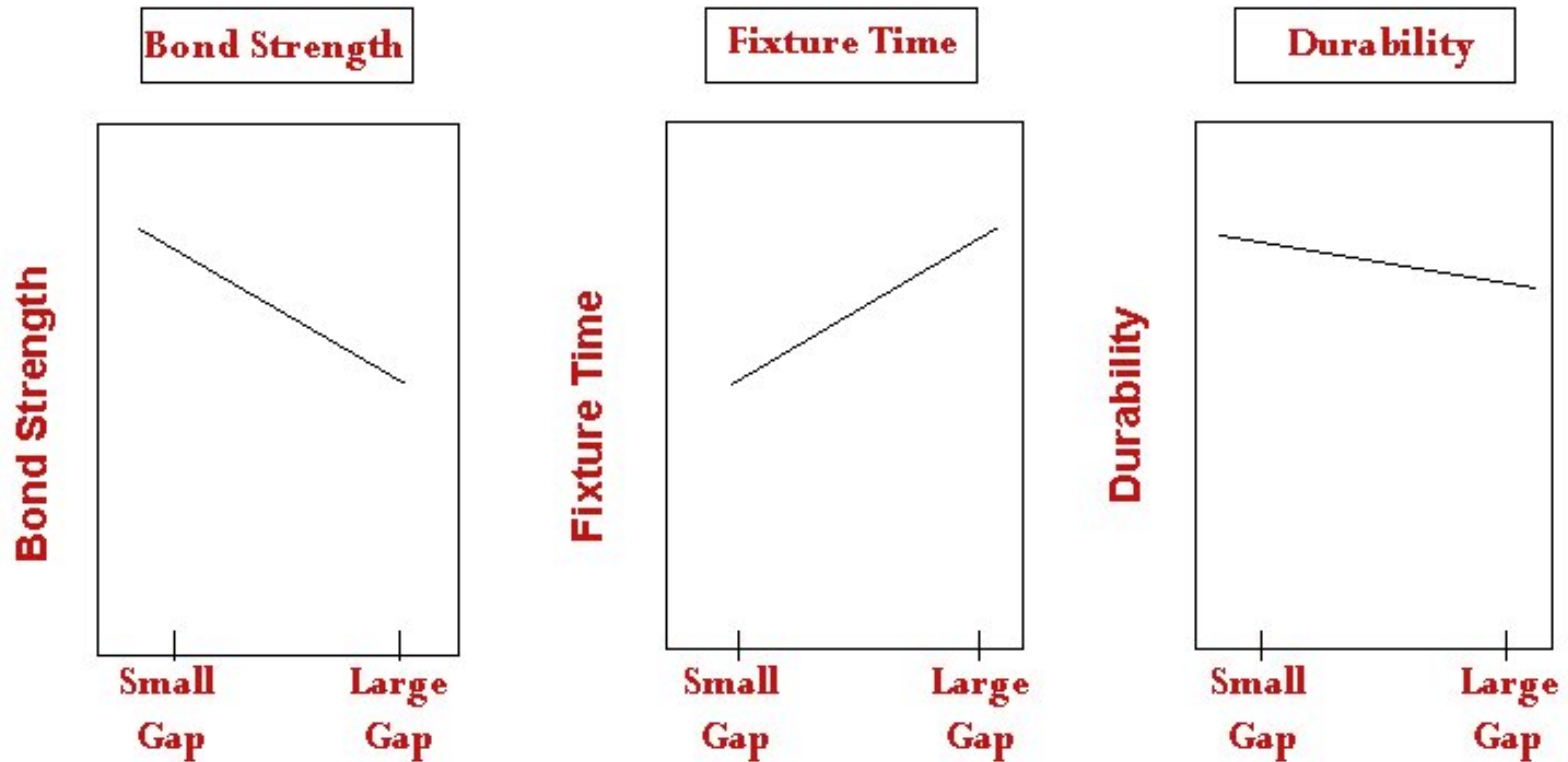
What Have We Learned?

- Joint Overlap
 - Wider is Better



Joint Design

Effect of Gap / Thickness



What Have We Learned?

- **Gap: What's Better?**

What Have We Learned?

- **Gap: What's Better?**
 - **Smaller**



ADHESIVE SELECTION:

Question #1

What are the Substrates?

- If at least one surface is **NOT** Metal, then forget Anaerobics (all others OK)
- If plastic, try to avoid Anaerobics, Silicones & Epoxies
- If glass, forget CA's and Anaerobics
- If rubber, forget Acrylics, avoid Hot Melts & Epoxies
- If wood, avoid Silicones & Urethanes
- Unless 1 surface is transparent, Light Cure will **NOT** work
- Try to **avoid POLYOLEFINS!** Your options will be limited!

ADHESIVE SELECTION:

Question #2

What is the Joint Design Geometry?

- If it **WILL NOT** hold w/o adhesive, then forget Anaerobics
- If need High Strength, avoid Hot Melts & Silicones
- If need High Durability, avoid CA's
- If need High Flexibility, use Hot Melts, Silicones, Urethanes, or 2part Acrylics
- If only some Flexibility needed, try Epoxies, and Acrylics
- Unless 1 surface is transparent, Light Cure will **NOT** work

ADHESIVE SELECTION:

Question #3

What is the Service Environment?

- If Temp > 200°F, avoid CA's
- If Temp > 250°F, avoid Hot Melts & Urethanes
- If Temp > 300°F, avoid Epoxy & Acrylics
- If Temp > 400°F, try Silicones ONLY

REFER to the Technical Data Sheet

- there are always exceptions to the rule!

Joint Design Guidelines

- **Maximize These Forces**
 - Shear, Tension, & Compression
- **Minimize These Forces**
 - Peel, Cleavage
- **Increase Bond Area**
 - Wider is better (than Overlap)
- **Minimize Thickness (Gap)**

Questions?

