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Thermal Printing on Composite Media

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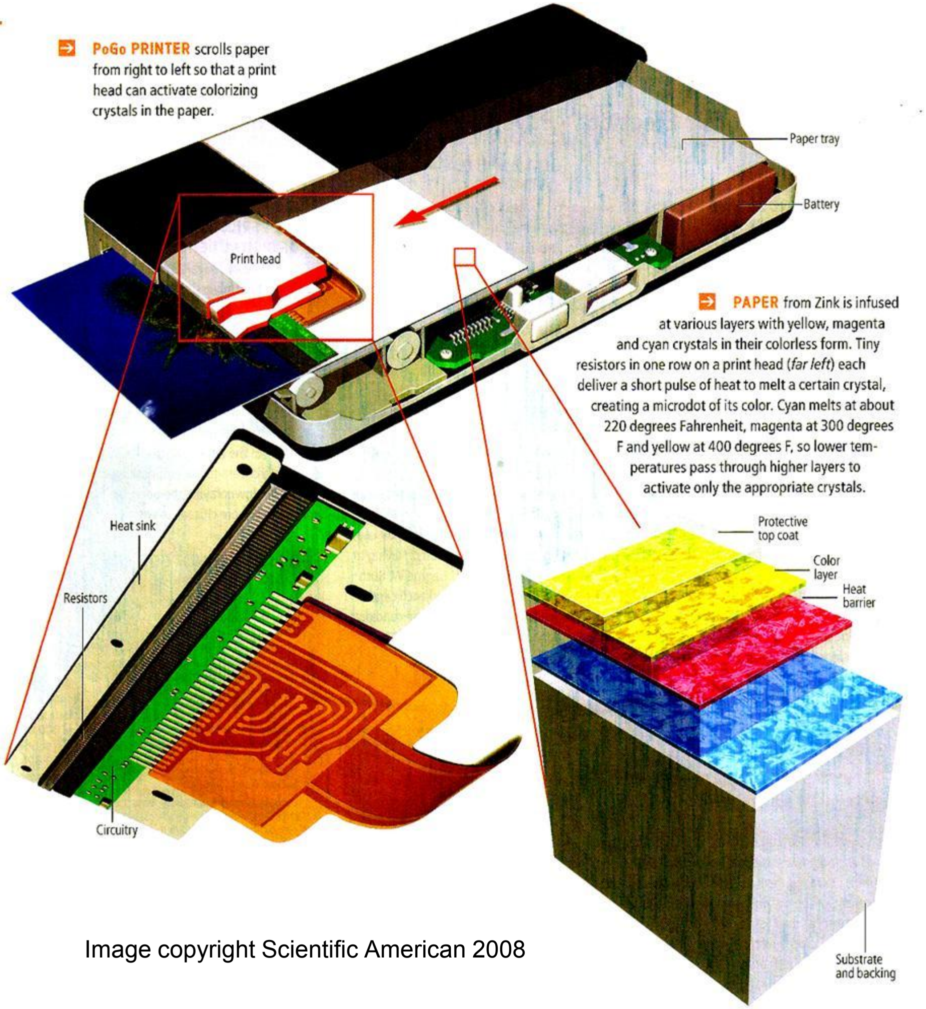
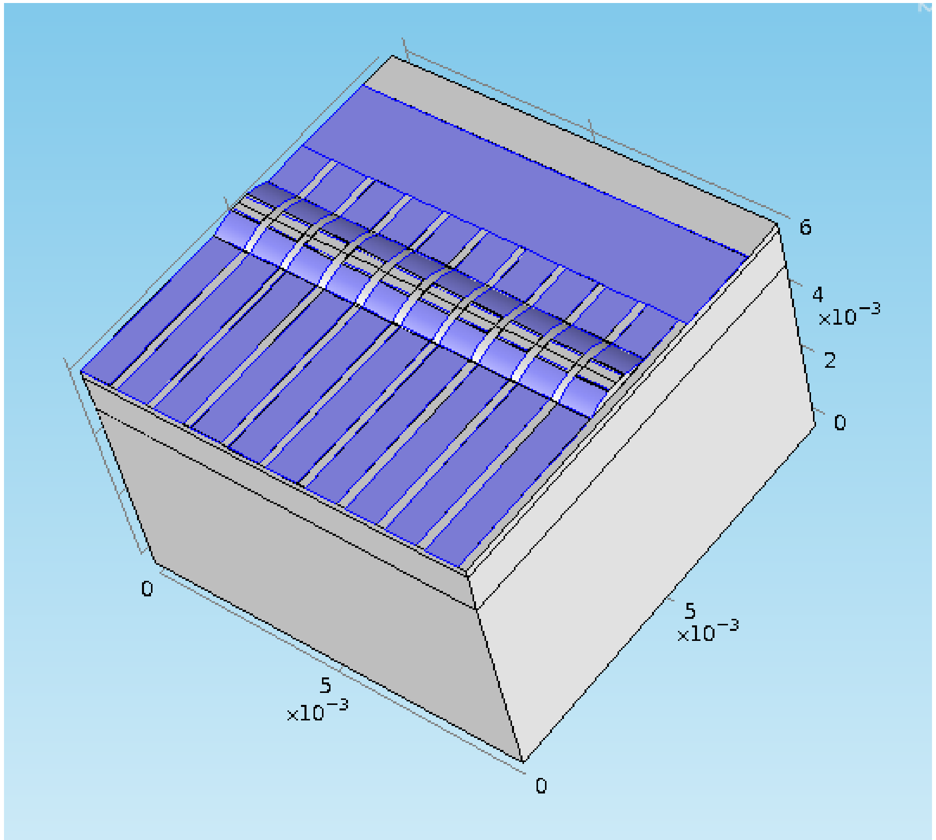
> Zink system

The Polaroid Pogo^{TM} printer with ZINK media



> Direct thermal printing

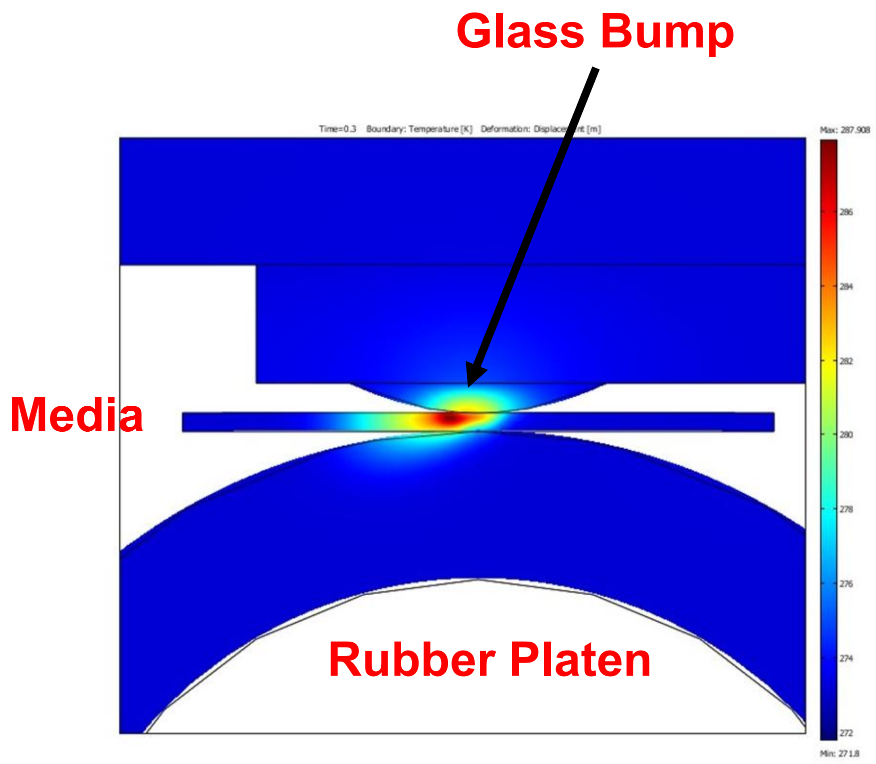


Printing is done with a linear array of heaters, usually about 300 per inch.

The individual heaters lie along a raised glass bump on the print head.

This bump is pressed against the media to get good thermal contact.

> Printing on a platen

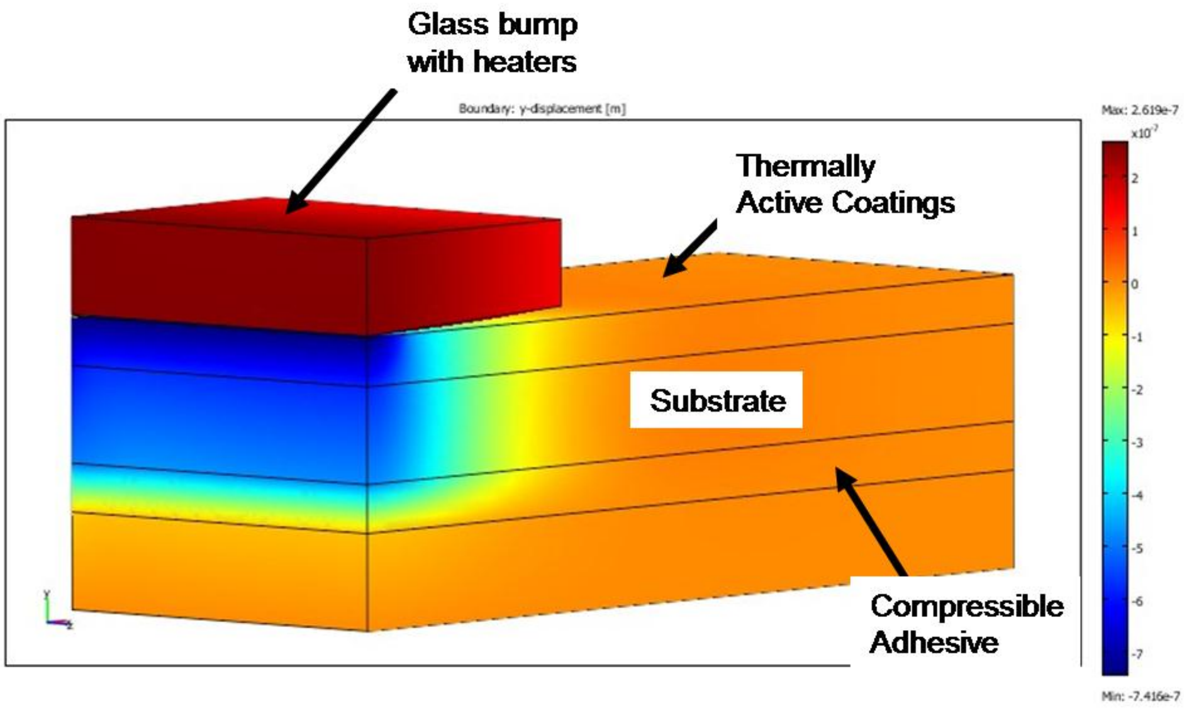


Normally, the media is supported from behind by a rotating rubber platen.

When compressed, the rubber deforms and bends the media around the glass bump.

This provides intimate thermal contact between the media and heaters.

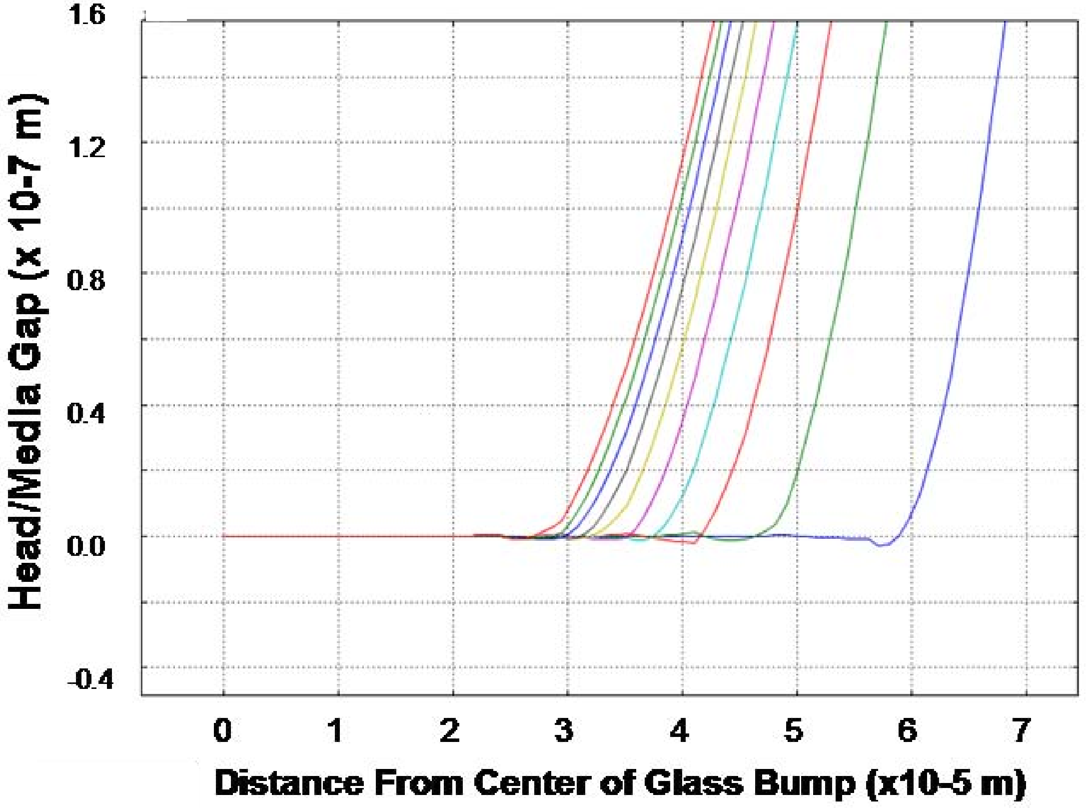
> Printing without a platen



Some applications cannot use a platen (e.g. printing on a stiff ID card).

Then the media itself must provide the compliance to wrap the media around the glass bump.

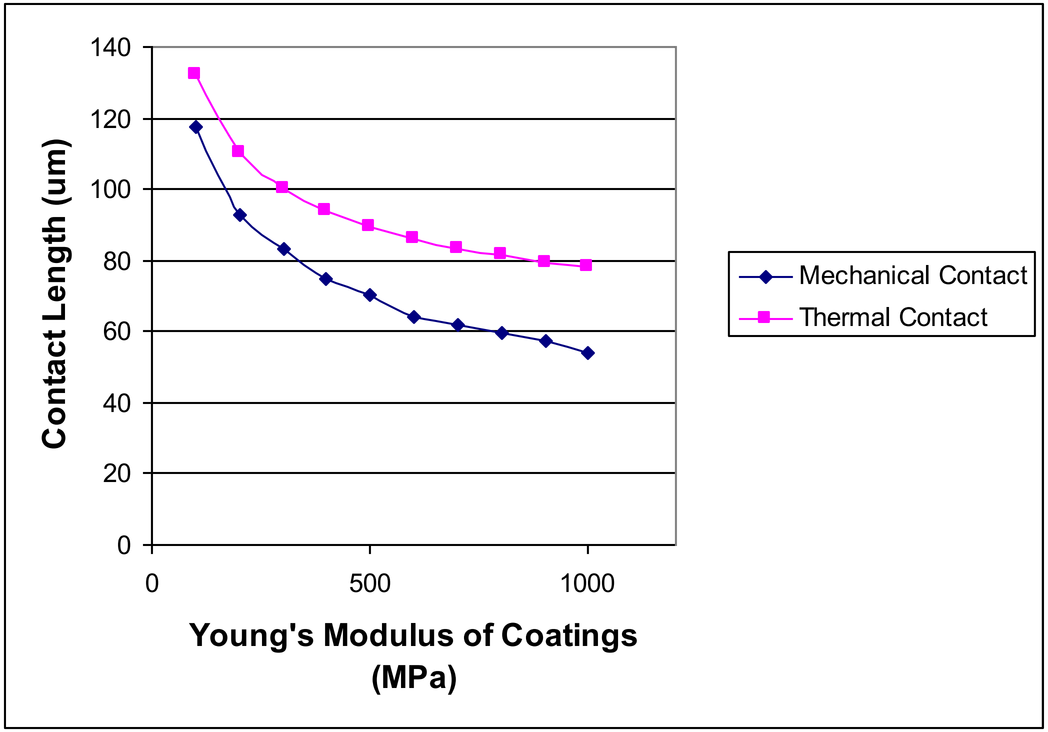
> Typical results, head/media gap



Each curve represents a different Young's modulus for the active coatings.

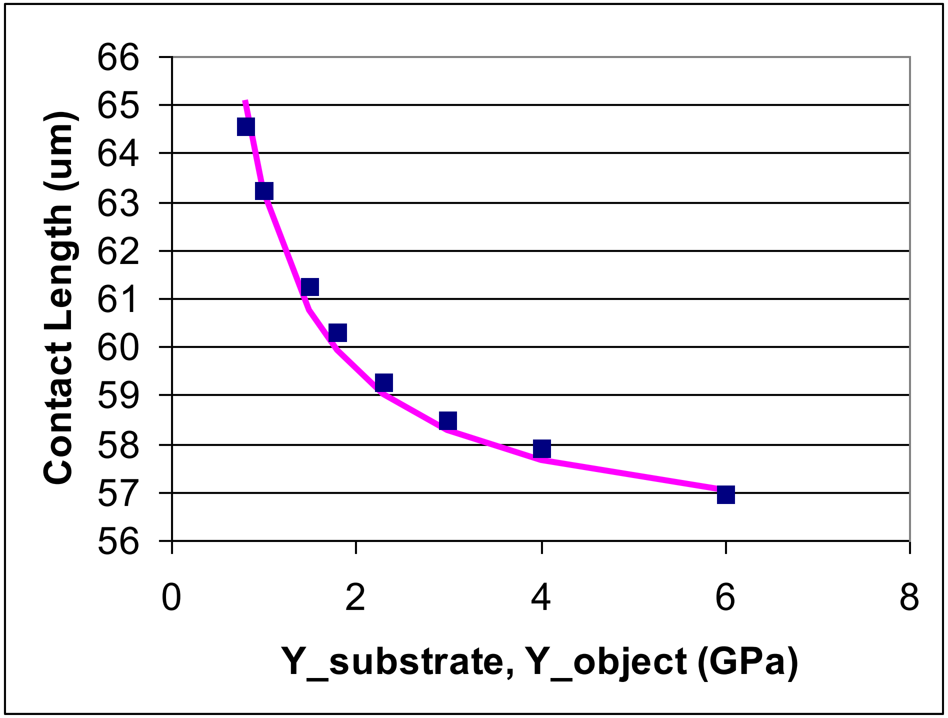
Y_coatings = 0.1-1 GPa, from right to left.

> Contact length vs Y_coatings



We would like to achieve contact lengths in excess of 100 um, which is possible only with relatively soft coatings.

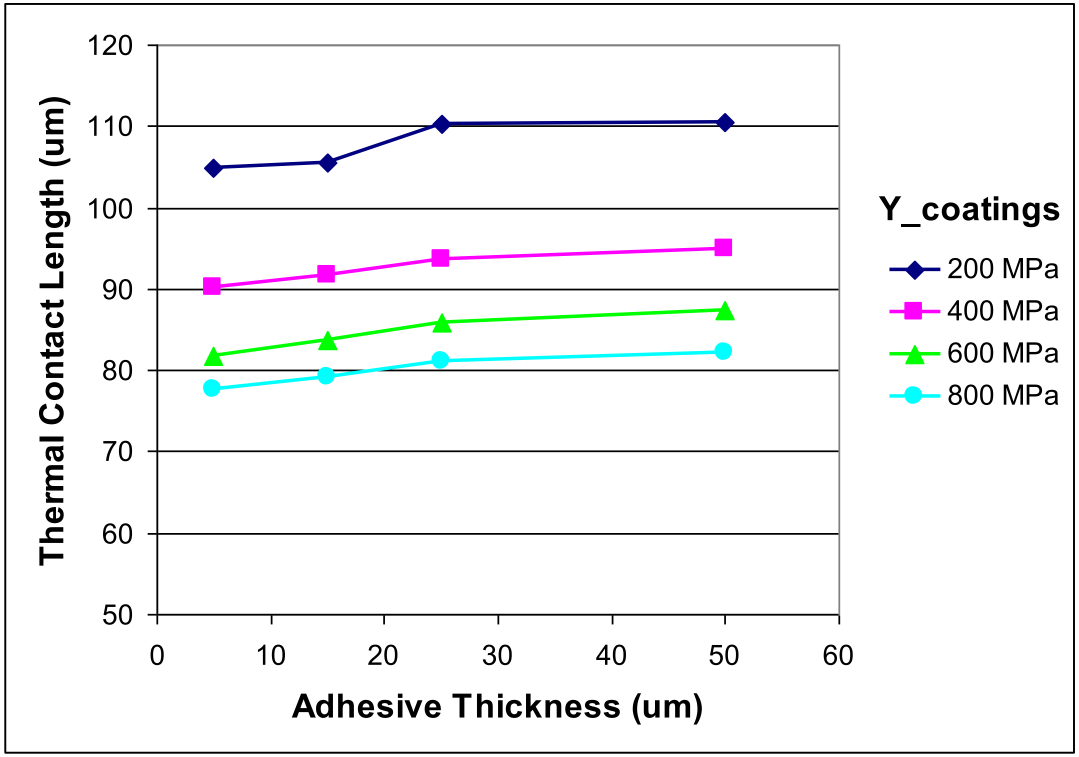
> Contact length vs Y_substrate



The coating substrate can also affect the contact over a range of ~10%.

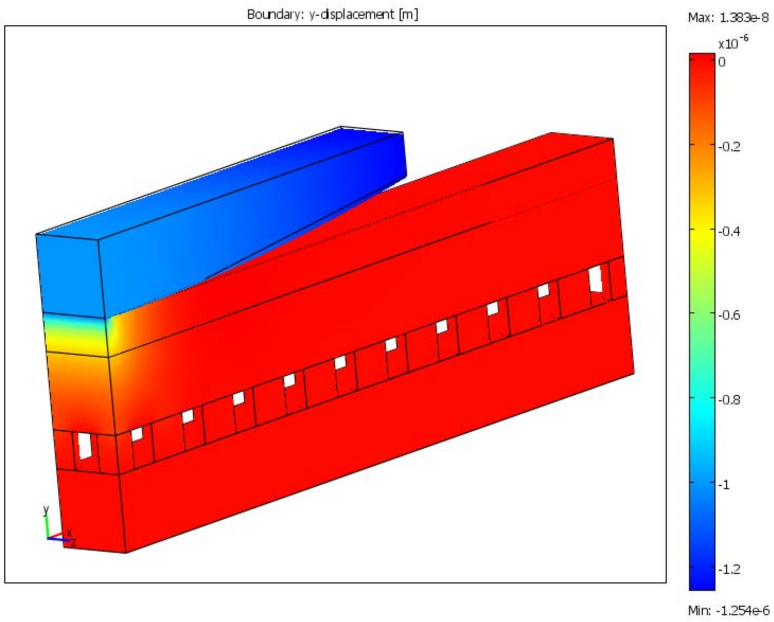
However, conventional coating substrates are in a narrow range around Y ~ 2 GPa.

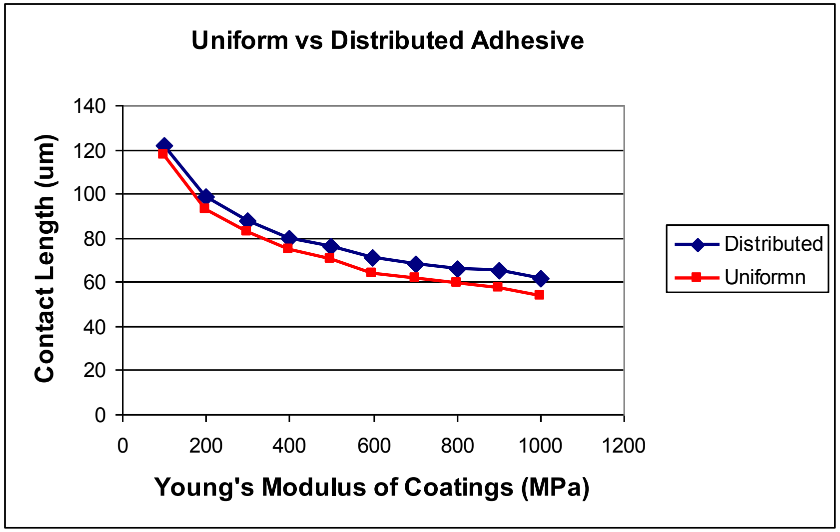
> Contact length vs adhesive thickness



Adhesive thickness and stiffness have very little effect on the thermal contact length.

> Distributed adhesive





This is true even in the extreme in which we distribute the adhesive to make it more compliant.

> Summary

- The following lessons were learned:
  - Biggest impact => keep the active coatings as compliant as possible
  - The next biggest effect is the stiffness of the substrate
    - This can make ~10% changes in contact length
  - The adhesive thickness and stiffness are usually irrelevant.
    - Changes the compressibility of the media, but has little effect on the contact length.
    - Acts like the "box-spring" for a mattress