STEWART ENGINEERS

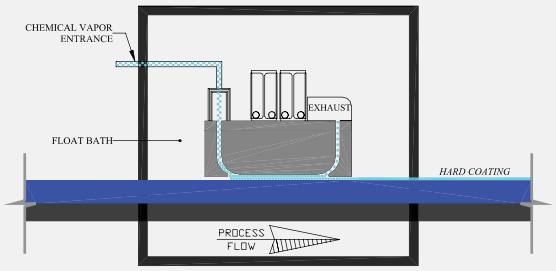
Coating Technology Comparison

Benefits of AcuraCoat® CVD versus Sputtering

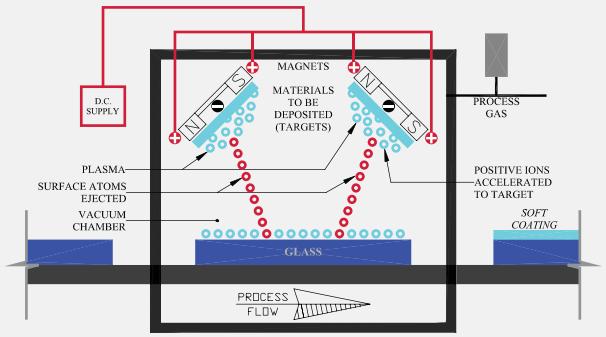
The two common methods of depositing thin films on flat glass are **chemical vapor deposition (CVD)** and **magnetron sputtering**. CVD ceramic coatings are called **'hard coatings'** because of their unmatched mechanical and chemical durability. Sputtered coatings are called **'soft coatings'** as they are damaged from exposure to air and normal handling.

Both types of coatings have advantages and disadvantages; however, CVD coatings outperform sputtered soft coatings in investment payback, durability, and reliability.

Typical CVD Process



Typical Sputter Process



CVD - Hard Coatings

- Lowest capital investment
- Lowest operating and overhead costs
- Reliably profitable coated products
- Online process with shortest product lead time
- Easily integrated into existing float glass manufacturing line
- Available for use in single-pane, monolithic applications
- Easiest color matching of products
- Virtually unlimited shelf-life with no special packaging required
- Superior durability from covalent thin-film bonds
- Suitable for high-temperature glass applications (e.g. oven doors, fireplace screens)
- No special handling required
- No perimeter edge-deletion required
- Deposition at atmospheric pressure
- Easily tempered and stable through tempering process
- Easily store custom cut-size products

Sputtered - Soft Coatings

- 5X capital cost for equivalent CVD production capacity
- 4X increase in operating cost compared to CVD
- 6X more manpower than CVD
- Exorbitantly high maintenance costs
- Highest coating material cost
- Longest product lead time due to offline process
- Cannot be used monolithically
- Short shelf-life due to damage from exposure to air – special sealed desiccated packaging required
- Weakly bonded coating results in defects from abrasions
- Not suitable for high-temperature glass applications (e.g. oven doors, fireplace screens)
- Perimeter edge-deletion of coating required
- Expensive high vacuum atmosphere required during coating deposition
- Color variation through tempering while requiring unusual tempering process skills
- Greater risk of off-angle color variation
- Offline processing nearly doubles handling and shipping costs