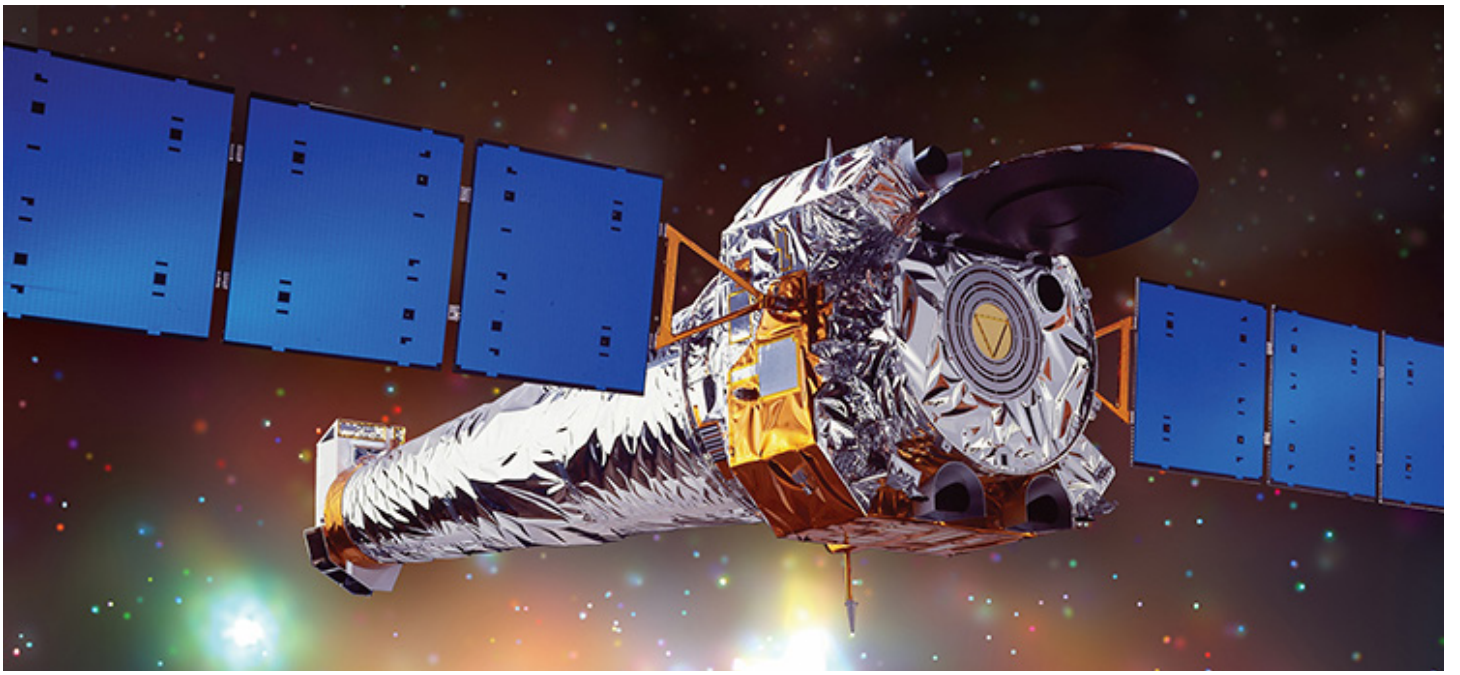
BEYOND Words
strategic communication

The Glass Experience

Interpretive Panels for the Museum of Science and Industry



The Future's So Bright, We've Got Dimmable Shades!

Already a model of fuel efficiency and passenger comfort, the soon-to-be-introduced Boeing 787 Dreamliner features dimmable windows to replace pull-down shades. "Sunglasses for an airplane." Not only are these windows 60% larger than standard, passengers can control the amount of light entering their windows at five different levels from bright to dark, and can still see outside.

How it Works

At the touch of a button, electricity darkens a middle layer between the exterior cabin window and an interior dust cover. Fighting with plastic shades is a thing of the past.

The Technology

Dimmable airline windows make their debut on the Boeing 787, but the technology (electrochromic technology), developed by the Gentex Corporation and interpreted for the airline industry by PPG Aerospace, evolved from glare-reducing, automatic-dimming rearview mirrors in cars.

Glass in Space

Window to New Worlds

Since humans first glanced upward, we have sought to understand the stars, to find out where and when the universe began, to know if there is life beyond our known world.

But, pushing the envelope takes the right kind of tool … glass.

Glass can withstand extreme temperatures; bend, focus, and reflect light; and resist air and water pressure. Its incomparable versatility and durability make it the material of choice for space exploration.

In 1609, Galileo fashioned glass into a telescope to study the night sky. Centuries later, scientists seeking to navigate black holes and examine stardust once again turned to glass.

Glass innovations inspired triple-paned space shuttle windows designed to withstand temperatures from -250°F to 1200°F. Ultra-thin glass sheets enabled an x-ray telescope flown from a balloon. Fresnel lenses (think lighthouses and car headlights) dramatically improved our observations of gamma ray and x-ray energy bands in space.

And highly polished glass ceramic segments provided telescope lenses so powerful, we may soon glimpse the beginning of the universe.

The windows to new worlds are made of glass.

What is Chandra?

Deployed by Space Shuttle Columbia in 1999, the Chandra X-ray Observatory is the most advanced x-ray telescope ever flown. From billions of light years away, Chandra observes black holes, supernovas and dark matter, providing scientists with images and information that are helping us understand what our universe looks like and how it came to be.

How does Chandra work?

Imagine being able to read a stop sign from 12 miles away! Chandra is that powerful and its images are that clear!

Chandra looks more like gigantic mirrored nesting dolls than a traditional optical telescope. That's because Chandra is an x-ray telescope, one that enables us to see scorching-hot matter, millions of degrees Fahrenheit.

Since x-rays are absorbed (not reflected) by flat mirrors, telescopes designed to observe x-ray sources must be barrel-shaped. Once reflected off the mirrors, the rays are directed to a focal plane that captures the images for astronomers to see. Chandra is comprised of four pairs of mirrors—as smooth as any ever made—nested inside one another, perfectly aligned so they are nearly parallel to incoming x-rays.

First Glass Travels

Before exploring space, Chandra's glass navigated quite a bit of Earth!

Crafted in Germany —> Ground and polished in Connecticut —> Cleaned and coated in California —> Aligned in New York —> Calibrated in Alabama —> Assembled in California —> Launched at Florida's Cape Canaveral.

Chandra's Mirror Image [artifact label]

This is a piece of the same Zerodur glass that was used to make the mirrors flying on Chandra. It is called a "mirror blank" because it has not been polished, or given its reflective coating. It was originally intended to be one of the Chandra flight mirrors but it was not used.