



Barco TruePix

**unmatched control
room ergonomics for
24/7 applications**

BARCO

天府国际机场联合运控



Barco TruePix: unmatched control room ergonomics for 24/7 applications

With the introduction of Barco's TruePix LED video wall platform, the control room market has the ultimate direct-view LED solution it has been waiting for.

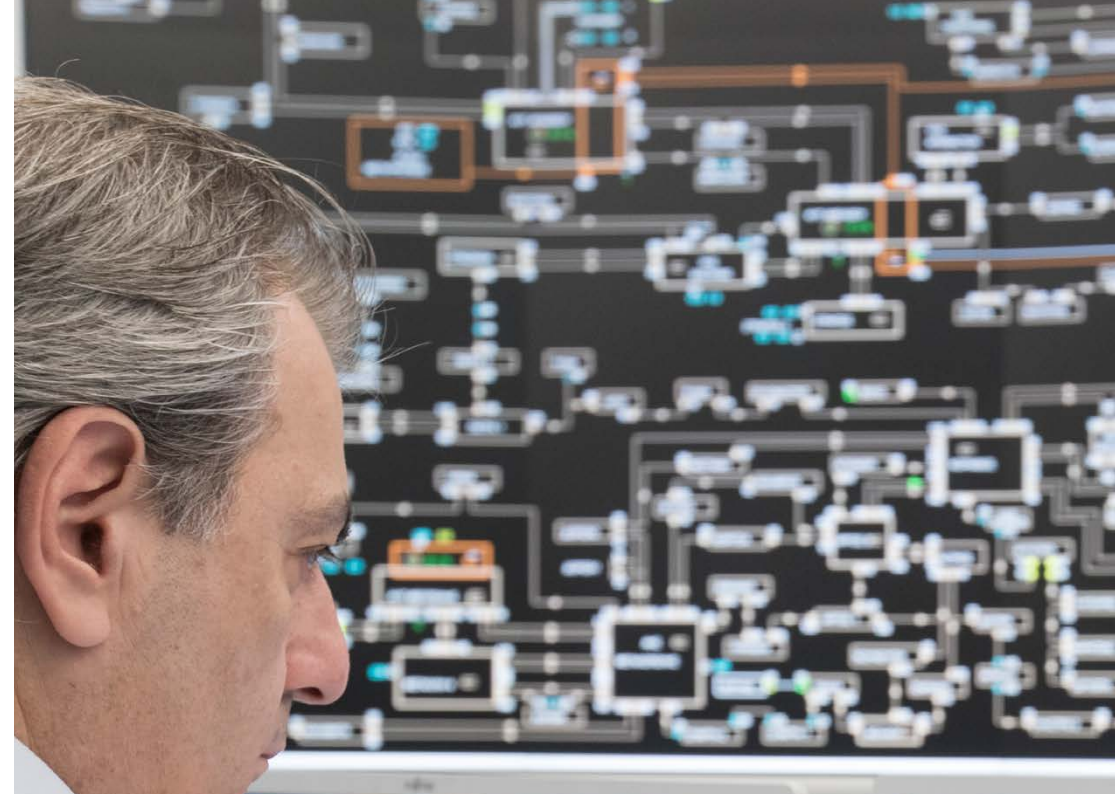
TruePix offers the perfect overview display for effective and fast decision-making, ensuring a fully accurate representation of all critical applications and processes. But does it also offer the ergonomics features that operators in highly critical control room environments need?

There's no question that workplace ergonomics lead to better health and work benefits for office workers. In control rooms, where the job can even be more demanding, improved ergonomics is business-critical: **it enables operators to make better and faster decisions.**

Monitoring a large video wall for long periods of time can be visually demanding. Operators sometimes need to work with large overview displays and their personal screens for 8 to 12-hours, sometimes longer during

crisis situations. This explains why video walls need to be designed for endurance. As a result of working long shifts monitoring content, operators can get physically drained. This can cause a state of impaired alertness, which may result in decreased efficiency and slower reaction times. That's why it is important to keep staff motivated and set up the control room video wall for maximum ergonomics and visual comfort.

The ergonomics of today's LED video walls



Control room ergonomics is about much more than the video wall alone. **Ergonomics includes correct lighting, acoustics, seating and furniture, and the design of the operator workspace as well.**

However, the video wall remains a crucial tool for collaborative decision-making in many modern control rooms, which is why large screen ergonomics remains important for the operator's wellbeing.

There are different aspects of LED video wall ergonomics that need to be considered.

1. Seamless viewing	2. Brightness and dimming	3. Viewing angles
4. Viewing distances	5. Colors	6. Contrast



Seamless viewing

The seams or mechanical gaps between the different building blocks of a video wall are an important aspect of visual ergonomics. Seams can hinder images over multiple screens. **Critical content may even get lost or misread behind the seams or bezels.** Minimizing these interruptions in the large video wall canvas has therefore become a major effort in video wall display design.

With LCD and rear-projection video walls, to a certain extent, there still is a visible seam between the different modules, because of the mechanical gaps between LCD and rear-projection cubes. **Direct-view LED video walls on the other hand have no screen gaps because the LED diodes can be spread over the entire tile, up to the edges.**

However, there is always the difficulty of dealing with site conditions: the

surface is never 100% flat and walls are never completely even. And with pixel pitches becoming smaller for LED video walls, it has become even more challenging to perfectly align different modules mechanically.

These higher mechanical demands that come with smaller pixel pitches, are addressed with the smart engineering system by TruePix. **Smart engineering is a revolutionary way to achieve true seamlessness for narrow pixel pitch LED.**

With TruePix, adjacent modules are automatically aligned without interrupting the diode pattern and site imperfections are absorbed. This ensures a predictable installation process and a perfectly flat video wall and uniform image, this way, it's impossible to miss crucial content.



Up to **70% of the time**, an average person is watching an **overview display**.

Brightness and dimming

In the past, control rooms were typically very dark environments. The brightness levels of video walls were not as high as today's standards, and therefore lights in the control room were dimmed and daylight or high ambient lighting were avoided at all costs. This turned the workplace into a gloomy and ergonomically unpleasant working environment. As the brightness of video walls improved, light was increasingly welcomed into the room, which improved the overall operator ergonomics.

Today, a good brightness setting for control rooms is 500 Lux. Barco offers a wide portfolio of LED solutions with the right brightness for every environment, even video walls with higher brightness for high ambient light environments such as traffic control centers.

Direct-view LED provides plenty of brightness, with great contrast and increased viewing angles.

The high brightness of today's LEDs needs to be fully controlled by enhanced dimming technology. This is critical for night-time operation or windowless control rooms and has an impact on power consumption.

However, dimming should not result in reduced sharpness, legibility or color changes, because this could lead to operators making slower or even wrong decisions. As discussed further in this document, **Barco's TruePix video walls and Infinipix® Gen2 image processing platform, incorporates patented driver algorithms which will preserve all true details of the image, even when the display system is dimmed to extreme values.**

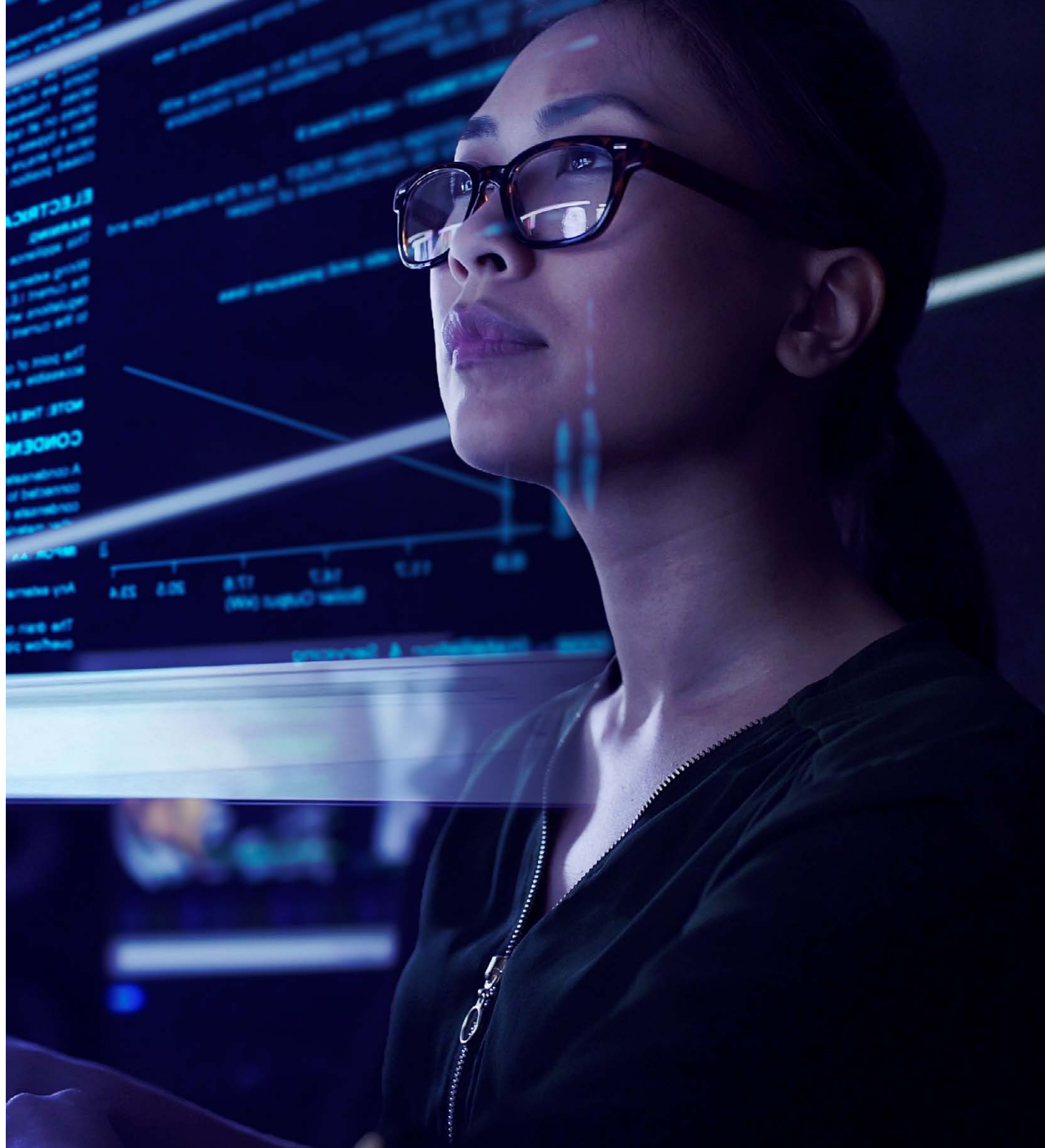
Over **90% of indoor applications** uses the LED display at **less than 1/3rd of the maximum brightness.**

Viewing angles

The nature of an on-screen image will change when viewed under different angles, both horizontally and vertically. **The viewing angle influences the brightness, the color accuracy and the gamma curve of the image.** For control rooms, the viewing angles are typically most important for operators sitting at the first few rows.

They may look at the screen from the steepest angle and may have difficulties to properly see all details. **Therefore, it is very important to calculate the viewing angles before installing the complete room to ensure the best ergonomics.** Compared to rear-projection cubes for example, direct-view LED will have better viewing angles.

A **sight line** from the bottom of the monitor to the eye of the viewer should form an angle of **not more than 30°** with the standard horizontal line of sight.



Viewing distances

The most important decision you need to make with direct-view LED is what pixel pitch to choose. The pixel pitch is the center-to-center distance between two pixels, usually measured in millimeters. For example, a 1.5 mm pixel pitch means that the distance from the center of one pixel to the center of the adjacent pixel is 1.5 millimeter. Tiles with lower pixel pitches have a smaller distance between two different LED clusters. That is less empty space and, thus, more pixels available

on the LED module. This increased pixel density leads to higher resolutions and more content.

Different applications need different pixel pitches. **It is key to find the Optimal Viewing Distance (OVD) for your video wall environment. The rule of thumb for OVD is pixel pitch times 2 (in meters).** However, in control room applications, such as SCADA or where readability is essential, this can increase so correct evaluation is critical.

For the **Optimal Viewing Distance** (OVD) for your video wall environment, the rule of thumb is **pixel pitch times 2** (in meters).

Colors

For control room video walls, it is very important to show the colors with utmost accuracy, so they look the way they are meant to be. The challenge is to maintain a constant brightness and calibrated colors over the entire video wall over time. A color mismatch between different display modules may result in a checkerboard pattern of different colors and brightness levels. Especially color-critical applications/identifications need to be displayed correctly.

TruePix video walls and the Infinipix® Gen2 image processing platform achieves this by providing full colour balancing and auto calibration based on the input signal. Instead of only being able to fine tune Red, Green and Blue. The TruePix Platform can adjust 8 target points, white + black + primary (3) + secondary (3) colors.

This allows total tuning of the video wall perfectly to any needs, especially important in control rooms, broadcast or content design.

Over 80% of applications require **special resolutions, framerates or colors.**



Contrast

Contrast is the ratio between the highest and the lowest luminance. **It is a very important aspect of a display's image quality as it drives the dynamics of the video wall content.**

Especially in today's content-rich control rooms, where data, text and images are combined, a high-contrast video wall

will improve readability, speed up recognition of the information displayed and reduce eye strain. LED is the best performing technology when it comes to contrast. Especially in dimly lit rooms, LED has an extremely high contrast, which cannot be reached by LCD or rear-projection technology.

For **good visual conditions**, it is better to **increase the object's size and contrast** rather than increasing the light intensity.

TruePix raises the bar for operator ergonomics

The evolution towards smaller pixel pitches has made LED more suitable for mid-sized to large video walls in control rooms. LED manufacturers have succeeded in minimizing the size of the LEDs, which has made it possible to reduce the pixel pitch. This allows operators to view content from a shorter distance, which has resulted in a better viewing experience.

With the introduction of Barco's TruePix video wall platform, the bar has been raised even higher in terms of viewer ergonomics.

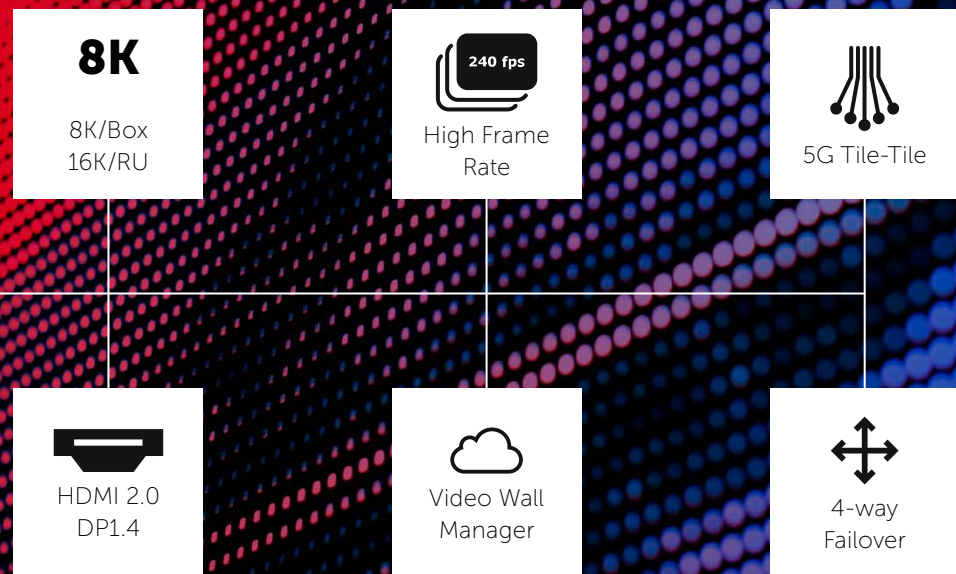
TruePix offers reduced eye-fatigue features, wide viewing angles and perfect brightness control for day/night operations, making it the ideal video wall platform for 24/7 critical operations.

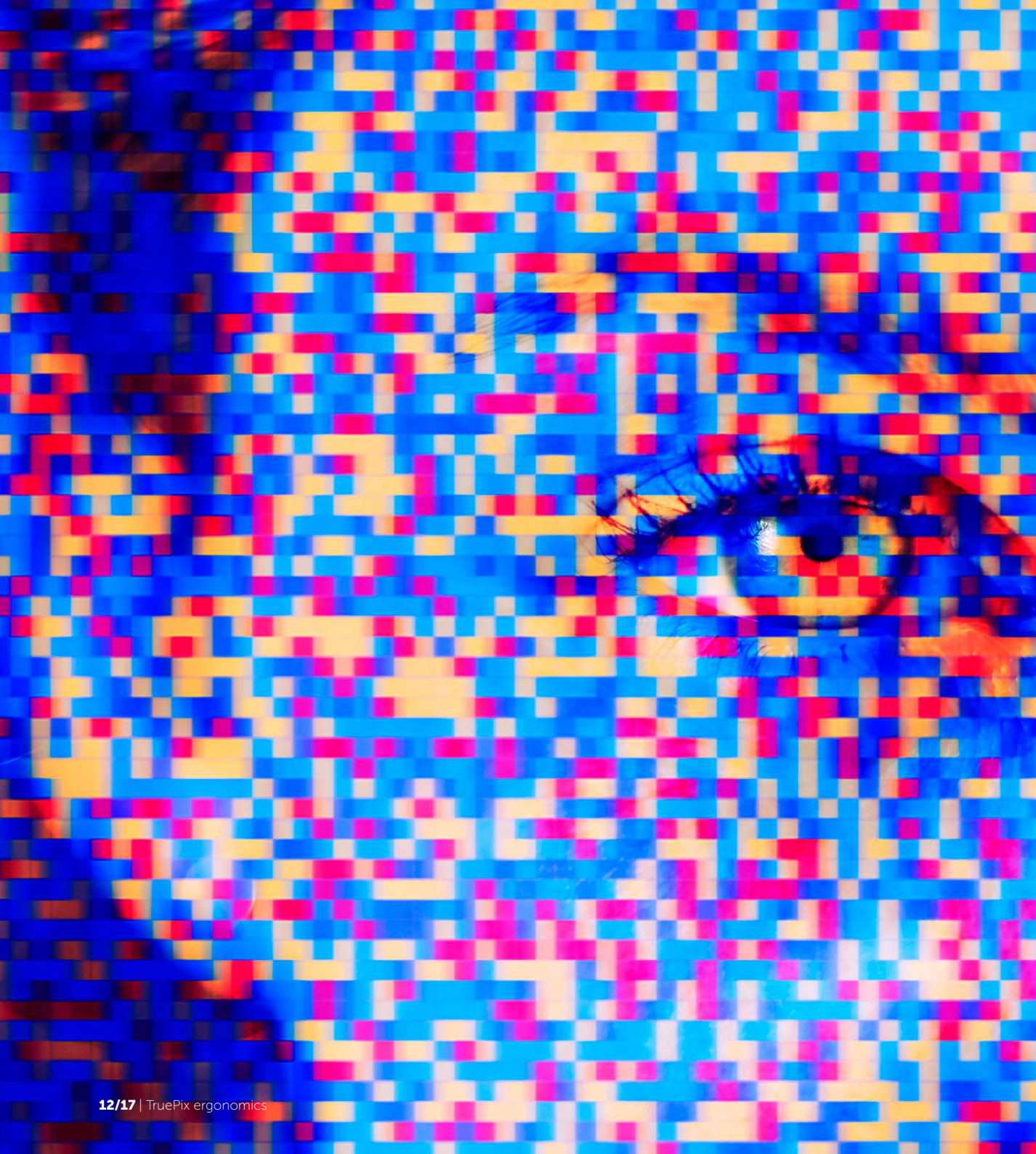
Infinipix® Gen2

dedicated image
processing for TruePix

Control room video walls typically have large resolutions, often exceeding present-day interface standards (HDMI, DisplayPort). With a video wall, you will therefore need to stack multiple image processors that provide the video wall's input signals. Synchronization problems between those stacked im-

age processing units can result in visible distortions of the image, often referred to as tearing. The effects are more prominent on fast moving images across the display. **Barco Infinipix™ will guarantee perfect synchronization on the input without sacrificing latency.**





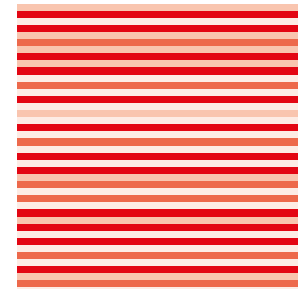
Steadyview

reduced
eye fatigue

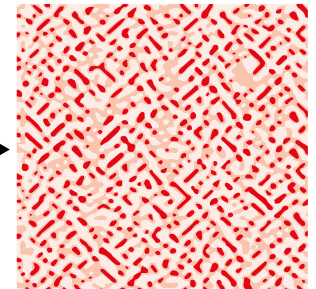
Control room operators are typically expected to monitor the video wall intensely for long periods of time. This can cause eye fatigue, especially when the LED wall is dimmed.

Steadyview, a unique feature of Barco's TruePix, reduces the perceivable interlaced scan lines which could become problematic when the LED display is dimmed. SteadyView significantly reduces eye fatigue for operators.

Interlacing can cause
eye-fatigue



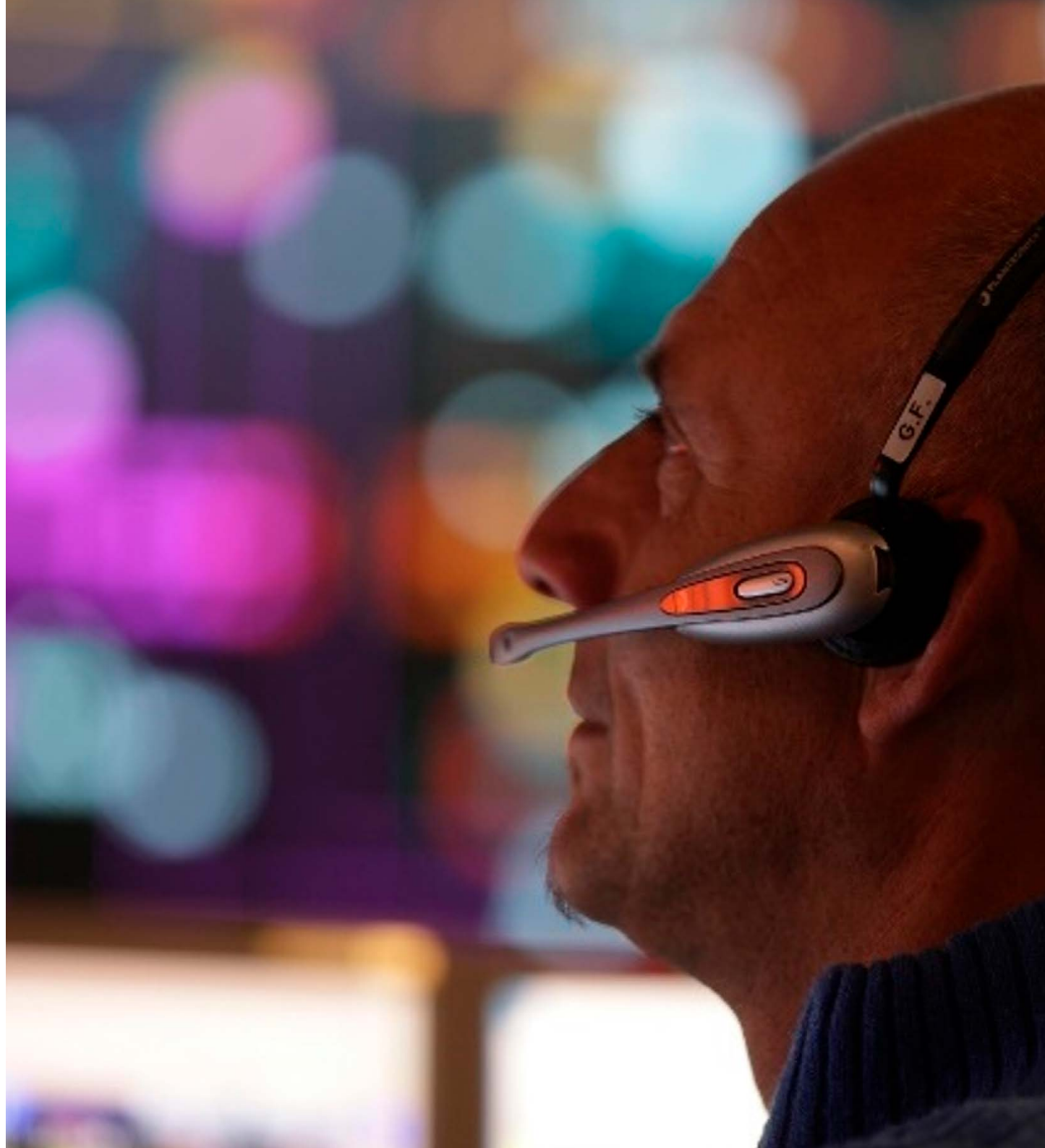
Barco's Infinipix™ Gen2
reduces eye-fatigue



True dynamic range

A video wall should be fully adaptable to the control room's lighting condition. It should display the same colors and level of detail when operating in dimmed mode as it does at full brightness. However, the dimming mechanisms of most LED products reduce the dynamic range of the colors. Images lose gray scale levels, details in the black values will disappear, or grayscale images will start to show a green haze.

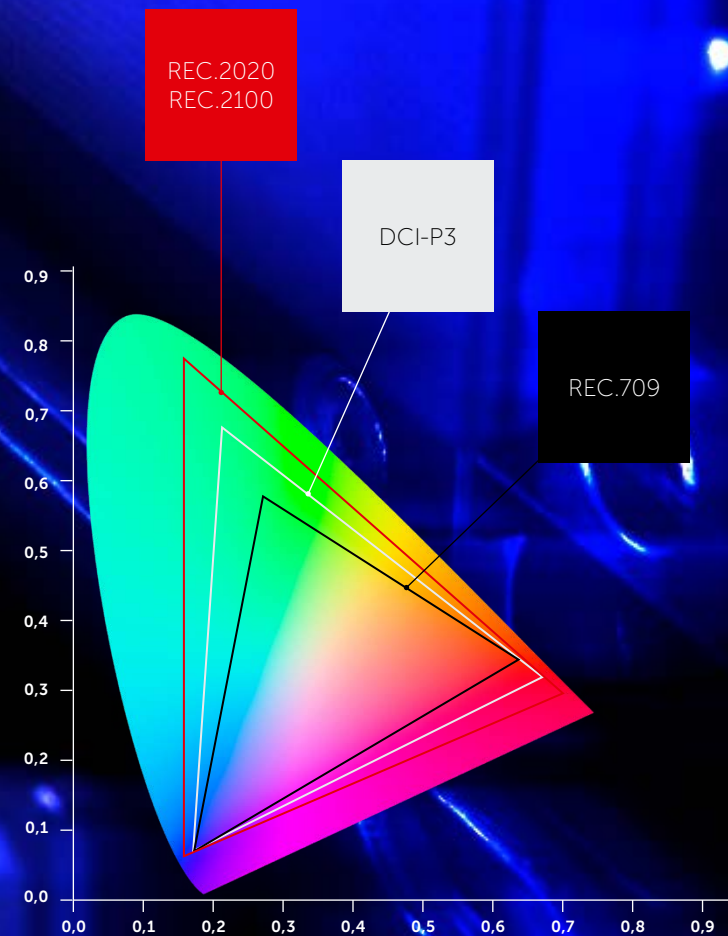
Barco's TruePix video walls and Infinipix™ image processing incorporate patented and proprietary driver algorithms which keep all details of the original image, even when the display system is dimmed to extreme values. As a result, **the LED display shows the same color tone, color bit depth, grayscale and level of detail when operating in dimmed mode as it does at full brightness.**



Wide color gamut and smart calibration

The color gamut of an LED display is limited by the characteristics of the individual LEDs. Barco's Smart Calibration is a unique way to lift these boundaries and unlock the support of wide color gamut's like DCI-P3 and even REC2020 with high accuracy. This results in deeper, more saturated hues without visual impact on uniformity in areas of the image that would otherwise fall outside of the available color space of the display.

The required calibration settings will also switch automatically and instantaneously when the color gamut of the video source changes. Barco's Smart Calibration is an essential ingredient to accurately show HDR sources of different standards like HLG and HDR10.



Operators want LED

There are many reasons why operators will prefer LED for their control room video wall. LED video walls are seamless, they offer high brightness under daylight conditions, and the reduced pixel pitches have made LED more suitable for a wider range of control room sizes.

But that's only part of the story. With the introduction of Barco's revolutionary TruePix platform, LED video walls have never offered operators so much viewing comfort. Thanks to Barco's Infinipix® Gen2 image processing system,

which is exclusively designed for Barco LED solutions like TruePix, LED has become the ideal technology for more and more control room applications.

Barco has been a trusted brand with over 25 years of experience in LED solutions. We have accumulated industry-leading experience of all aspects of LED and know exactly what our customers require. Barco's reputation in LED is second to none and the quality of our products and services is exceptional. No doubt that our TruePix platform will offer proof for that.



So, in a nutshell ...

TruePix for energy & utilities

TruePix offers a highly accurate representation of all critical applications and workflows, including SCADA, GIS, outage management systems, dispatch information, or other sources. TruePix provides uninterrupted 24/7 visualization and long-term supportability for your operations.

TruePix for command & control & government

Barco's TruePix LED video wall platform provides operators and decision-makers of command centers uninterrupted 24/7 visualization of all their critical applications and mission content, so they can maintain situational awareness and continue your operations in all confidence.

TruePix for network and security operations centers

TruePix offers an accurate, uninterrupted visualization of all business-critical applications, including network services, Remote Monitoring and Management (RMM), and Security Information and Event Management (SIEM), all of which provide insight into security-focused data streams, infrastructure and assets.



About Barco

View better, share faster, resolve quicker. That's what Barco helps control rooms achieve every day. Barco has been building control room visualization and collaboration solutions since 1994 for a variety of industries. Today, we are still the number one choice for control room professionals who want to stay on top of their situational awareness.

www.barco.com/truepix

ENABLING BRIGHT OUTCOMES

BARCO