The New Benchmark:
How Vilber optics are revolutionizing gel and blot imaging for researchers

Introduction

Whether detecting DNA, RNA, or proteins, it is challenging to find many biological publications today not using some form of gel and/or western blot documentation in their findings. While the imaging of high amounts of nucleic acids or proteins should not ever be a challenge for a documentation system, researchers more often find themselves needing to resolve small amounts of these end products. For these researchers and these types of experiments, high end optics with intelligent analysis software will make a difference in resolving all signals from the bold and bright to the small and faint. Missing bands means potentially missing key data points which can greatly augment vital findings of an experiment. Regardless of budgetary restraints, researchers should have the capabilities to resolve all bands in each and every experiment they do.

This note will review how Vilber gel and western blot documentation technologies have been designed to provide the most advanced optics and analysis for every level of funding. The first part of this overview will focus on the optics within Vilber Gel Documentation systems. Next, we will delve into the optics and features that differentiate Vilber Fusion systems for those interested in western blot analysis (including chemiluminescence and multiplex fluorescence applications). Lastly, we will run through some key features outside of imaging that make the Vilber systems stand out in a crowded field of nucleic acid or protein documentation systems.

In the end, you should come away with an understanding of how Vilber has differentiated itself from other systems based on its outstanding optics, software, and features and offers reliable solutions that are the most capable of completing any application at hand.

Vilber Gel Documentation Systems

16-bit Scientific Camera

Vilber assembles their optics and camera components in-house, meaning they have been precisely and specifically designed for the sole purpose of imaging gels within their systems. So, what makes these cameras different than what you may see in other comparable systems? For starters, the cameras used in all Vilber imaging systems are true 16-bit cameras. This means the systems can detect 65,536 grey levels as opposed to the industry-standard 12-bit cameras that only perceive 4,096 grey levels. That represents a 16X increase in the native grey levels and naturally increases the ability to pick up small levels of nucleic acids and resolve close bands.

Beyond that, 65,536 grey levels provide more information for the Vilber software to work with. This notably helps determine the outer limits of all bands, thus increasing confidence in quantitative data analysis.

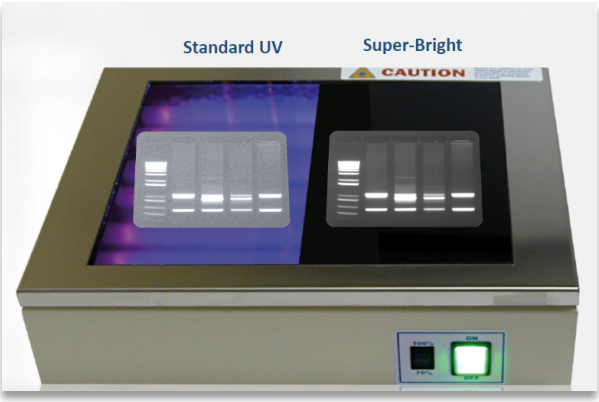
Lastly, for data export purposes, it is also pertinent to keep in mind Vilber generates a native 16-bit tiff image. This is drastically different from what is seen when using 12-bit cameras, as additional software is always needed to post-process and convert those images into 16-bit (publication standard). This is not particularly relevant as these algorithms add grey levels that may or may not be there. All in all, a 16-bit camera provides researchers the confidence in knowing they are obtaining the most precise and accurate results possible.

Image Resolution

The proprietary optics of Vilber Gel Documentation systems also deliver the highest resolution in the industry. Whereas most systems offer an upper resolution of 1 to 5 megapixels, the Vilber systems standard configuration has an **upper resolution of 20 megapixels.** What this means for researchers is all bands will be as sharp and crystal clear as possible, allowing for close bands to be distinguished and for all information to be as quantitatively accurate as possible. The higher resolution further allows better performance in pattern recognition within the software.

Super-Bright UV Transilluminator

For those needing to use UV transillumination, Vilber has engineered pad technology in the form of the **Super-Bright transilluminator**. This illuminator has a unique filter coating, which makes UV tubes appear invisible. What this means for users of the system is they will see no background light and have enhanced signal images leading better results than using a standard UV transilluminator. It is evident in the image below how much easier it is to distinguish bands from one another and view faint bands on the Super-Bright UV background.



As a side point, blue and white light pads are also available for researchers needing other light sources for their gel applications. For those with multiple gel imaging applications, conversion screens can also change UV into white or blue light.

Highlights

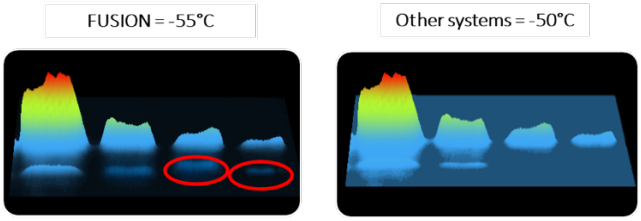
- True 16-bit Scientific Camera
- 20 Megapixel Image Resolution
- Super-Bright UV Transilluminator

Vilber Fusion Chemiluminescence and Fluorescence Systems

Deepest Cooled Camera

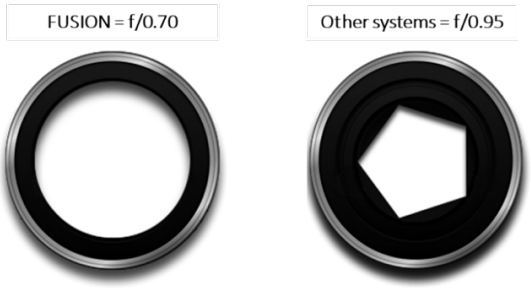
The Fusion, like all major imaging systems that document western blots, uses a 16-bit CCD camera. While the Vilber Fusion cameras continue to offer leading optics in resolution, more importantly, they also lead the industry in the cooling provided to the CCD cameras themselves. Why is this important? Well, cameras generate heat, and heat creates noise in images, affecting the ability to detect the faintest of signals. In order to better distinguish signals from noise, the Fusion's premier camera is cooled to -90°C to ensure the best signal-to-noise ratio. Even for those researchers needing a more budget-friendly option, the Fusion can be equipped with a **-55°C camera** which still tops the industry-standard -50°C.

As you can see below, even a 5°C change is enough to help the Fusion system resolve extremely faint bands.



Widest Lens in the Industry

The primary function of a camera lens is to collect light and the lens aperture represents its capability to collect as much light as possible in a given period. The sensitivity is usually expressed by a range of f-stops. A lower f-number denotes a greater aperture opening, which allows more light to reach the CCD sensor. The Fusion **lens's aperture is f/0.70**, providing the best sensitivity and speed to reach the lowest limits of detection compared to systems with smaller aperture openings.



Broadest Dynamic Range Possible

Dynamic range, in a general sense, describes the ratio between the maximum and minimum measurable light intensities. When we refer to imaging of western blots, we refer to how weak signals can be captured without saturating bold bright ones. The Vilber Fusion system's **optical density range of 4.8** is industry-leading and means researchers can get optimal images of high and low abundance proteins together.

Highlights

- Deepest Cooled Camera at -55°C
- Widest Lens at f/0.70
- Broadest Dynamic Range at 4.8

What Else Sets Vilber Apart?

Intuitive Software is Always Free

For image editing and analysis, the license-free software offers plenty of enhanced features to make publication-ready images easily.

The included image analysis package consists of a **quantification module**, a **molecular weight module**, a **distance (Rf) calculation module** and **even a colony counting module**. The system has a simple 1-click export to excel or PDF, making it simple to move and save data to whatever platform is needed.

High Quality and Robust Systems

Building a system with high-quality components ensures systems are long-lived and can handle day-to-day usage. While most systems are made primarily of plastic, Vilber has designed its systems from **stainless steel, aluminum, and epoxy painted** their components to ensure they can handle the daily wear and tear. Even the touch screen models have been designed with magnesium reinforced protective glass to ensure the screen can handle a bump.

Customized to Meet Needs and Budgets

Researchers have different needs and desires when it comes to imaging their nucleic acids and proteins. Vilber fully understands this and has designed several systems that will provide the best performance at **all levels of funding or class of system** a researcher is interested in. Many components within the system can be customized, so researchers get exactly what they need, without having to pay for additional items they may never use. Many Vilber systems are even engineered to be able to be upgraded over time should research needs and goals change.

*Come see why more than 20,000 labs worldwide trust Vilber as a leader in the molecular imaging sector. To see the documentation systems that Vilber offers please visit our Vilber webpage here or feel free to reach out to us via email at info@scintica.com or by phone at **832-548-0895** and we would be glad to assist you.*