

A World of Art, No Longer Invisible

By KELLY COMPTON



Just as digital photography has completely transformed the way most people take snapshots, so it is now overturning our assumptions about the creation and condition of important historical paintings. Leading this revolution is Lumiere Technology (LT), a “multi-spectral” digitization technology that centers on a camera developed by the French photographer Pascal Cotte through a research program funded by the European Union. Cotte has also created, with his colleague Jean Penicaut, a Paris-based firm, also called Lumiere Technology, to promote and sell this remarkable method worldwide.

Over a period of just 50-90 minutes, Cotte’s LT camera projects a ray of white light that passes multiple times across the surface of the painting being studied. During this process, the light spectrum is split, resulting in 13 different scans ranging all the way from ultra-violets to infra-reds. These scans show us different aspects of the same painting, many not visible to the naked eye or even through a microscope.

LT scans are unprecedented in their faithfulness to the original painting’s actual appearance because the number of digital pixels employed is an astounding 240 million, 12 times more than the 20



ALL PHOTOS DEPICT: LEONARDO DA VINCI (1452-1519); *Portrait of Cecilia Gallerani (The Lady with the Ermine)*; 1490, Oil on Panel, 21 ²/₃ x 15 ³/₄ IN.; © PRINCES CZARTORYSKI FOUNDATION & LUMIERE TECHNOLOGY



million pixels obtained with the next most sophisticated camera. These scans can be printed onto paper and even other materials such as silk, or transferred onto disks that can be viewed on high-definition screens anywhere in the world.

THE IMPLICATIONS FOR ART

LT's 240 million pixels and 13 types of lighting ensure that nothing on or under the painted surface goes unnoticed. Since 2004, when the Musée du Louvre first permitted LT to examine Leonardo da Vinci's *Mona Lisa*, scholars have discerned in various pictures such details as the compositions of the brushes used (betrayed by the brushstrokes themselves), and have recognized previously undetected pigments, underdrawings, inscriptions, repairs, changes, and imperfections in the panel or canvas.

Perhaps the most excited constituency are art conservators, who sometimes spend decades debating how to clean dirty and discolored paintings. A key benefit of LT is "virtual restoration," which uses mathematical calculations to adjust the computerized scans to show us how the painting will appear once its varnish is removed, or once it is properly conserved. Until recently, conservators were compelled to extract pieces of pigment from the painting to study under a microscope, and it is now likely that this harmful practice will eventually disappear. Even if a picture owner decides that a "real" cleaning is too risky, he or she will have LT's virtual scan to consult.

The Paris-based conservator William Whitney noted recently that LT's images may well "keep us from making hasty or radical decisions ... such as directly removing the varnish without first attempting to analyze it layer by layer." He is also excited that LT can "measure, store, and reproduce pigment wavelengths," thus helping researchers to create and share information about paints used worldwide.

LT's findings will also ultimately benefit working artists (who often wonder how their forerunners made something); teachers of art and art history; dealers, auctioneers, collectors, and insurers performing due

diligence before financial transactions; publishers seeking to illustrate their books and magazines with more accurate images; and of course the general public, to whom these advances will eventually trickle down.

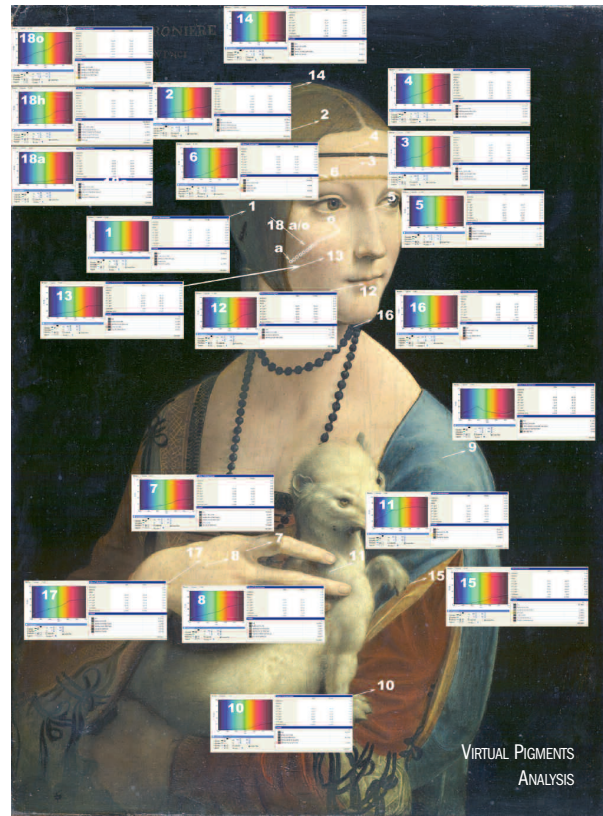
RECENT SUCCESSES

Although paintings can be brought to LT's headquarters for examination, the camera has — thus far in its existence — more often been brought into museums seeking deeper knowledge of their own collections. In September 2007, for example, the Princes Czartoryski Museum in Krakow, Poland, permitted LT to study several of its most important paintings, including Leonardo's renowned portrait of Cecilia Gallerani, better known as *The Lady with the Ermine*. The research team's findings were presented to the public two months later, and an explanatory exhibition is now on view at the museum through May 15.

As Pascal Cotte was photographing this portrait, it was also being examined by the French expert on Leonardo, Jacques Franck. The attribution of this painting has long concerned scholars because of its uncharacteristically heavy black background. Defenders of its authenticity have argued that the lady was, like other Leonardo figures, originally surrounded by a bluish grey, shaded gradually from left to right in order to convey the impression of perspectival depth. Indeed, LT and Franck detected traces of such pigment under the black overpainting, which has also obscured Leonardo's famously subtle contours, especially where the flesh meets the background.

The research team also confirmed that, over the centuries, the lower section has been repainted substantially and the entire surface infilled with tiny areas of repainting due to minor losses. Most intriguingly, LT and Franck found that Leonardo used his fingers to apply paint near the lady's cleavage, producing his distinctively smooth transitions from light to shadow.

Although LT's "virtual restoration" of *The Lady with the Ermine* is thrilling for its new sense of recession, Franck has wisely cautioned



that “only cleaning tests done on the original surface would allow restorers to assess whether a *real* cleaning might supply something close, or even analogous to this virtual cleaning.” Cotte and Penicaut remain deeply interested in Leonardo and hope to digitize his other works in the Louvre later this year.

Another artist important to LT is Vincent van Gogh. More than a dozen of his pictures have been photographed at Amsterdam’s Van Gogh Museum, including *Bedroom at Arles*, and the LT team will soon visit Paris’s Musée d’Orsay and the Art Institute of Chicago to compare their versions of this same motif. Last July, LT digitized 13 different Van Gogh paintings at the Kröller-Müller Museum in Otterlo, Holland, and curators there were delighted to learn that some brushstrokes that had always appeared to be the same green were actually different pigments.

Still another fascinating discovery occurred at the Palais des Beaux-Arts de Lille in France, which permitted LT to examine a range of its masterworks. Last September, director Alain Tapié reported that LT had located on the surface of Hans Holbein’s portrait of his wife and children a number of musical notes and Gothic characters not revealed so clearly by previous x-rays.

LOOKING FORWARD

Although Pascal Cotte and Jean Penicaut have already worked with several major museums and are now negotiating with many more, their medium-term hope is to establish a charitable foundation that would enable LT to digitize paintings in museums around the world and maintain the resulting scans in a secure database. If enough donations were secured, museums would not be charged for this service, and the photography would be conducted behind a glass wall so that the public could observe the procedure.

In the short term, Lumiere Technology will again be presenting its groundbreaking technology to the more than 70,000 visitors attending this March’s *TEFAF* fair at Maastricht in Holland. LT will also be made available to this prestigious fair’s vetting committee of 140 experts should they require more information about problematic pictures. Indeed, the usefulness of LT will surely grow more apparent as time goes by, just as that of photography once did. ■

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