Jon Fauer ASC www.fdtimes.com Cine Gear Edition - June 2018 Issue 88

FILM AND DIGITAL TIMES

Art, Technique and Technology in Motion Picture Production Worldwide

FILM AND DIGITAL TIMES

Art, Technique and Technology

Film and Digital Times is the guide to technique and technology, tools and how-tos for Cinematographers, Photographers, Directors, Producers, Studio Executives, Camera Assistants, Camera Operators, Grips, Gaffers, Crews, Rental Houses, and Manufacturers.

It's written, edited, and published by Jon Fauer, ASC, an award-winning Cinematographer and Director. He is the author of 14 bestselling books—over 120,000 in print—famous for their user-friendly way of explaining things. With inside-the-industry "secrets-of the-pros" information, *Film and Digital Times* is delivered to you by subscription or invitation, online or on paper. We don't take ads and are supported by readers and sponsors.

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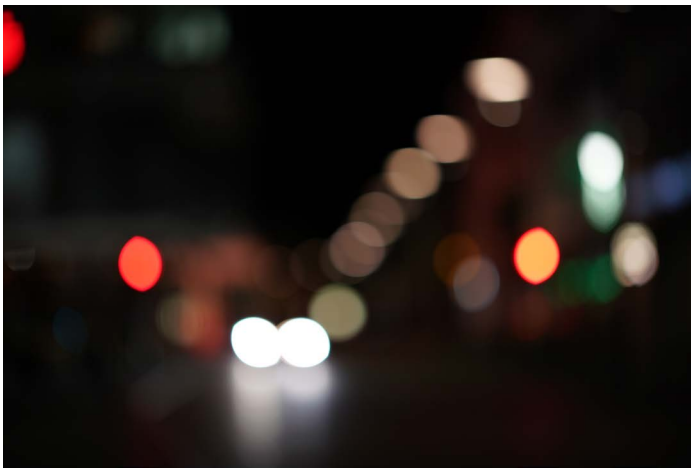
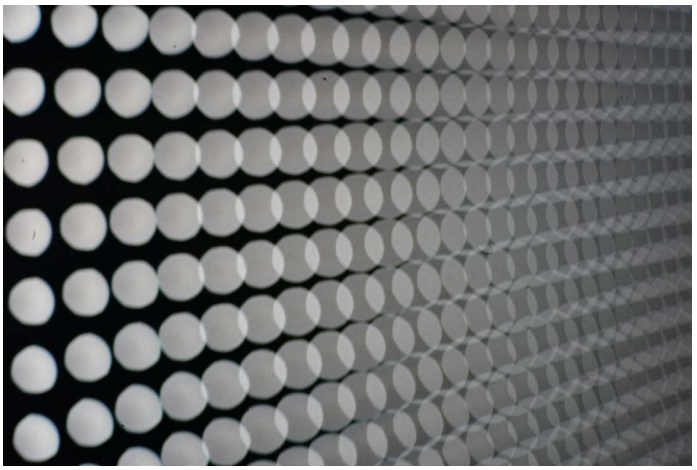




The Supremes

Everyone has heard The Supremes.

"Where Did Our Love Go" (1964), "Baby Love" (1964)
"Stop! In The Name of Love" (1965), "I Hear a Symphony" (1965)
"You Keep Me Hangin' On" (1966), "Reflections" (1967)

Rolling Stone said it best:

"With 12 #1 pop singles, numerous gold recordings, sold-out concerts, and regular television appearances, the Supremes were not only the most commercially successful female group of the '60s but among the top 5 pop/rock/soul acts of that decade.

"Diana Ross, Mary Wilson, and Florence Ballard comprised Motown's flagship group, Berry Gordy Jr.'s pop music crossover group that paved the way from rock radio hits and package bus tours to Las Vegas showrooms and Royal Command Performances.

"Fronted by Diana Ross during their peak years, they epitomized the classic Motown sound and the label's sophisticated style. Beautiful, musically versatile, and unique, the original Supremes were America's sweethearts, setting standards and records that no group has yet equaled.

"Diana Ross, Mary Wilson, and Florence Ballard met while each was living in Detroit's Brewster housing project. They began singing together in their teens. While still in high school, they became the Primettes. In January 1961, Berry Gordy signed the group to Motown and suggested that they change their name. Ballard suggested the Supremes."

Photo of Supremes by Michael Ochs Archives, Getty Images

Supreme

Supreme is a trendy skate culture fashion brand. The first Supreme store opened in 1994 on Lafayette Street in New York City. It had a large central area that was easy for skaters to ride in and look at the merchandise arranged around the perimeter. The original staff were local neighborhood kids, skaters and artists.

Supreme now has 11 locations worldwide: 1 in Los Angeles, London and Paris, 2 in New York and 6 in Japan.

Supreme makes shoes, clothing, accessories and skateboards. Products often sell out within seconds of being introduced and there is a jaw-dropping secondary speculative market with Supreme T-shirts going for more than $1,300 each.

In 1995, Supreme released a skateboarding promo video called "A Love Supreme." In 2014, they released a first full-length skate video called "cherry."

In 2017, Louis Vuitton announced a collaboration with Supreme.

Supreme copywriters write, "Over 24 years, Supreme has expanded from its New York City origins into a global community working with artists, photographers, designers, musicians, filmmakers and writers who defied conventions and contributed to its unique identity and attitude."

ZEISS Supremes

And now we have new Supremes. ZEISS Supreme Primes.

Full Frame

ZEISS Supreme Primes cover an image area up to 46.3 mm diagonal. They are incredibly small, lightweight and fast. The focus barrel has a unique, advanced square helical thread that is as smooth as cams and even more rugged. There are 13 lenses planned so far.

Lens Mounts

ZEISS Supreme Primes have a user-interchangeable lens mount system. Like the CP.2, CP.3 and CZ.2 lenses, it is quite simple to swap mounts in the field. The mount can be exchanged by the user, rental house, DP or the camera assistant.

Initially, the Supreme Primes will come with PL lens mounts. ARRI's new LPL mount and the Canon EF mount will also be supported.

Lens Metadata

Supreme lens mounts will communicate Cooke /i and ZEISS Xtended Data to the camera. A new concept is that a Canon EF mount can communicate with the camera. It essentially translates the /i data into EF data. So you will be able to see aperture and focus settings in an EF-equipped camera's viewfinder.

Delivery and Price

Delivery of the Supreme Primes begins in June with the initial core set of 5 focal lengths: from 25, 29, 35, 50, 85—all T1.5. The 100 mm will arrive in December 2018. The 65 mm should deliver in spring of 2019, followed by the 21 mm in summer, and the 135 and 150 mm later that year. The 15, 18 and 200 mm will be released in 2020.

Approximate price will be 90,000€ (US $112,500) for the initial set of 6 lenses (25, 29, 35, 50, 85 and 100 mm). That works out to about 15,000€ (US $18,750) per lens.

ZEISS Supreme Primes

Lens	Release	Aperture	Close focus	Length	Front Diameter	Weight	AoV FF	AoV S35
15 mm	2020	T1.8 to T22	0.35 m / 14"		114 mm / 4.5"		100°	79.4°
18 mm	2020	T1.5 to T22	0.35 m / 14"		114 mm / 4.5"		90°	69.3°
21 mm	Q2 / 2019	T1.5 to T22	0.35 m / 14"	119 mm / 4.7"	95 mm / 3.7"		79.5°	59.8°
25 mm	May 2018	T1.5 to T22	0.26 m / 10"	119 mm / 4.7"	95 mm / 3.7"	1.42 kg / 3.13 lb	70.8°	52.3°
29 mm	May 2018	T1.5 to T22	0.33 m / 13"	121 mm / 4.8"	95 mm / 3.7"	1.61 kg / 3.55 lb	64°	46.8°
35 mm	May 2018	T1.5 to T22	0.32 m / 13"	119 mm / 4.7"	95 mm / 3.7"	1.40 kg / 3.09 lb	55°	39.6°
50 mm	May 2018	T1.5 to T22	0.45 m / 18"	119 mm / 4.7"	95 mm / 3.7"	1.22 kg / 2.69 lb	39°	27.5°
65 mm	Q2 / 2019	T1.5 to T22	0.6 m / 2'	121 mm / 4.8"	95 mm / 3.7"	1.63 kg / 3.59 lb	30.5°	21.3°
85 mm	May 2018	T1.5 to T22	0.84 m / 2'9"	119 mm / 4.7"	95 mm / 3.7"	1.42 kg / 3.13 lb	24°	16.7°
100 mm	Dec 2018	T1.5 to T22	1.1 m / 3'9"	119 mm / 4.7"	95 mm / 3.7"		20,4°	14,2°
135 mm	Aug 2019	T1.5 to T22	1.35 m / 4'5"	160 mm / 6.3"	114 mm / 4.5"		15.6°	10.9°
150 mm	Q4 / 2019	T1.8 to T22	1.5 m / 4'11"	160 mm / 6.3"	114 mm / 4.5"		13.7°	9.5°
200 mm	2020	T2.1 to T22	2 m / 6'7"		114 mm / 4.5"		10.3°	7.1°

Image diagonal: 46.3 mm Focus Barrel Rotation: 300° AoV = Angle of View Initial Set shown in Gray Rows

ZEISS Supremes

Core Set of Supreme Primes (Full Frame) Ready in May 2018

Lens	Ready	Aperture	Close focus	Length	Front ∅	Weight	AoV FF	AoV S35
25 mm	May 2018	T1.5 - T22	0.26 m / 10''	119 mm / 4.7''	95 mm / 3.7''	1.42 kg / 3.13 lb	70.8°	52.3°
29 mm	May 2018	T1.5 - T22	0.33 m / 13''	121 mm / 4.8''	95 mm / 3.7''	1.61 kg / 3.55 lb	64°	46.8°
35 mm	May 2018	T1.5 - T22	0.32 m / 13''	119 mm / 4.7''	95 mm / 3.7''	1.40 kg / 3.09 lb	55°	39.6°
50 mm	May 2018	T1.5 - T22	0.45 m / 18''	119 mm / 4.7''	95 mm / 3.7''	1.22 kg / 2.69 lb	39°	27.5°
85 mm	May 2018	T1.5 - T22	0.84 m / 2'9''	119 mm / 4.7''	95 mm / 3.7''	1.42 kg / 3.13 lb	24°	16.7°

ZEISS Full Frame Supreme Primes

Akira Sako, JSC on ZEISS Supreme Primes

Location stills and text by Arato Ogura

In early April 2018, Akira Sako, JSC and crew tested Supreme Primes in the mountain area of Shimane prefecture, western Japan. Their short film was about the people, art and craft behind *Iwami Kagura*, a regional traditional art performed at shrines to give thanks and pray for good health and a bountiful harvest. The Kagura performances are popular as entertainment, with sound and smoke effects helping audiences, even little children, to better understand the story.

FDT: Tell us about the film.

Akira SAKO JSC : In early March, I was approached by ZEISS, asking me to shoot a short film using their new cinema lenses. They did not tell me the details then, but just mentioned the lenses were large format, high speed and high resolution. ZEISS said they were contacting several DPs around the world to make a diverse collection of films, and I felt honored to be chosen as a representative of Japan.

Why did you choose this traditional subject?

When I accepted the offer to shoot a short film, I learned that the film would be screened at Cine Gear and also on the web to be seen worldwide. So I decided to pick something cultural and historic in Japan, and came up with an idea to highlight the arts and crafts around *Iwami Kagura*—which is actually the origin of the famous Kabuki performances. I aimed to show cinematically how the handcrafted masks and costumes are made, and also illustrate how the performances are passed down to younger generations.

Tell us about the equipment setup.

For lenses, I had 2 sets of production model ZEISS Supreme Primes, each set consisting of 25, 29, 35, 50 and 85 mm focal lengths. These SP primes are amazingly well balanced lenses in terms of size and optical performance, and I loved the fact they can go very close to the subject without using diopters —especially the 25mm and 29mm. Using fast, wide angle lenses close-up with large format cameras was a fresh experience, and I totally enjoyed it.

Our Camera Assistants liked the Supreme Primes because they are smaller than other full frame primes. Also, the eXtended lens data readout made the focus pullers' lives a bit easier.

I have used ARRI cameras all though my career, but for this project I tried 2 brand new Sony VENICE cameras. In April, all the VENICE cameras in Japan were locked to 24p and EI 500 because of the firmware, but luckily Sony helped by installing beta firmware so I could try shooting at EI 2500 and EI 10,000. I also wished to shoot at higher frame rates, but it was explained that there was no chance to use 60p or higher before their next major firmware updates.

For lighting, I got the help from my long-time buddy Hiro Kase from Fuji Media Technology. His team created beautiful atmospheric lighting at each location, such as the one seen in the mask craftsman's atelier. As I did not want to make the film a documentary, I asked him to experiment with dramatic lighting to emphasize the image. He used several ARRISUN 1.8Kw heads as window keys, and also Kino Celebs and ARRI Skypanels for fill and also to create dramatic lighting inside the shrine.

How was it like to shoot a brand new Full Format camera with a new generation of Full Format lenses?

From the film days, I always wanted to shoot on a larger format, such as 65mm. I love that special feeling of depth captured on large format. For this reason, Full Format cameras and lenses get me one step closer to my ideal image.

When shooting film or digital on Super35 format, I often go for Anamorphic lenses so I can achieve a very wide angle of view. But, in order to capture fine details of a wide landscape and deliver that feeling to audiences, I stop down to T8, T11 or even smaller to get everything sharp. However using such small T-stops was difficult on film, especially in low light, and also quite a challenge even on modern digital sensors.

But with SONY VENICE, I was quite comfortable to work at EI 2500 at dusk and dawn, and this was a great revelation in terms of T-stop choices. I also must mention that we used the VENICE's built-in ND filters a lot. It's a very convenient and dust-free way of changing filters, and I think every serious camera should have these built-in like the VENICE.

To me, large format and fast lenses are not about shallow depth of field—in fact the opposite—its about having the freedom of using higher T-stops, emphasizing small details in the frame and creating the real "depth" in the picture. Of course, there is no question about the benefit of having T1.5, but it is the freedom to use any T-stop between T1.5 and T22 that really appeals to me. I remember in the old days when I stopped down to T16 or smaller, the image quality quickly dropped, and as a cinematographer I needed to know the character of each lens as to its usable T-stop ranges.

But the ZEISS Supreme Primes are very sharp, as we all expect from ZEISS. Having that resolving power in a compact 95mm diameter barrel and still cover FF+ is simply amazing. Together with VENICE's high ISO and built-in ND filters, I enjoyed thinking about when and what T-stop of Supreme Primes I should use to tell the story in the most effective way, and not worry about the image quality at all.

"Tsunageru" (meaning succession and inheritance) is a short film directed and photographed by Akira Sako, JSC.

Equipment: Sony Business Solutions, NAC Rental, Video Service.

Camera: SONY VENICE.

Lenses: ZEISS Supreme Prime (SP) 25mm, 29mm, 35mm, 50mm, 85mm.

Lighting: ARRISUN, ARRI Skypanel, Kinflo Celeb, Kobold DW, ETC Source Four.

Paul Cameron, ASC on ZEISS Supreme Primes

I spoke with Paul Cameron after he completed his short film using Supreme Primes. The conversation lasted more than an hour and it is all fascinating. However, it would take up another 40 pages, and since most readers will be carrying this edition around Cine Gear, I will spare aching backs and publish it in a future edition.

JON FAUER: You were one of the lucky ones to be first to try the new Supreme Primes.

PAUL CAMERON: I just recently shot a promo and a short film for ZEISS with the Supremes. With the five existing core set lenses that they have. And I shot it on a Sony VENICE supplied by Keslow Camera. We captured 6K, Full Frame, 2.39:1.

Laura Stabilini, my wife, directed the short. It's about a day in the life of a young mother who is in the process of bringing her son back to the boy's estranged father. And it intercuts with the dad and follows the day in the life of both.

JON FAUER: Please describe the sensibility about spherical Large Format that you like.

PAUL CAMERON: It feels more like photography to me. The depth of field feels more natural. I think we've just seen the opposite over the last decade: wide open, overly sharp and overly shallow depth of field movies. We kind of lost some of our craft in terms of the psychology of depth of field and managing it consciously. The whole reality of Large Format shooting is con-trolling depth of field.

So you're managing the out of focus characteristics of a close up and then matching that to a wider shot?

Exactly. Narrowing the depth of field on a couple lines of a scene can really isolate a character on a couple of cuts. Suddenly, you are two stops more open. I used to do this on anamorphics hows all the time. It's kind of an old school approach. But I think cin-ematographers should think about depth of field instead of just putting the ISO on 1250 and shooting wide open, here we go.

What were your impressions of the Supremes?

We had no rehearsals and two 10-hour days. We had a 12-year-old kid in every shot. It was a kind of guerilla style. But, my focus puller, Thomas Barrios, once he got the rhythm of these lenses, was very happy with them. The focus scales are done well. Your 2-foot to 10-foot cary-pull of an actor is intuitive.

There's minimal breathing. By nature of them being Large Format lenses, they just seem more natural. You feel the shift in focus. The engineering is quite incredible. They're beautiful lenses. There was no drop off in density. Just a clean, beautiful lens. I'm always looking for a lens that renders a face very well. They have a very authentic personality. It just feels very authentic to me. They're a very elegant, creamy, beautiful set of lenses. I think I'm going to buy a set.

Production stills by Danna Kinsky.

Christian Bannert - Vice President Development & Manufacturing

Christian Bannert is Vice President, Development & Manufacturing, Consumer Products at ZEISS. Photographed with Supreme Prime 85mm at T1.5.

JON FAUER: ZEISS introduced Full Frame Compact Primes at a time when the format barely existed in cinema.

CHRISTIAN BANNERT: We had a feeling that Full Frame would enter the cinema market. Of course, since we do not make cameras, so it was kind of a bet. Our Compact Primes addressed that--Full Frame still cameras capable of shooting video, but not dedicated cine cameras. Everybody was talking about a shift from Super 35 to Full Frame at the high end. Everybody was guessing. It was like the chicken and egg dilemma. Who's first? But we were sure what happens in the photo industry will also apply to the cinema industry. It took a bit longer than we expected. However, now in 2018, it looks like we finally arrived. So we're more than happy to introduce the Full Format Supreme Primes.

And then we decided to just do it because you can use a Full Format lens for a Super35 anyway. It's an investment that you can use also for many years to come.

Why were you convinced it would happen?

Several reasons. One is from the artistic approach. Shallow depth of field gives you more opportunities. You have more opportunities with Full Frame.

The other reason is that the cine camera manufacturers might see an opportunity in lowering the Full Format sensor costs.

What is the differentiator in the future? I'm not really sure whether it's still the pixel race or the dynamic range of the sensors. They're becoming more similar. It's a guess, but if you look at smartphones, we started with 2 Megapixels and went up to 13 MP and more. Now the technology is changing. You see two or even three cameras in a smartphone. You can see the clever combination of black and white, a tele lens and a wide lens. If you make a clever combinations, it looks like you have a zoom lens. You have a higher resolution because you add some information from the black and white into the color picture. With good software, you can achieve great images. You could not achieve this by just adding more pixels to a single sensor.

How does this relate to cine?

Let's wait and see. I think we need to have a deeper look. Resolution is one thing. 2K is history and now we have 4K. Maybe 8K. And dynamic has always been a very important issue, even more than pure resolution. To be creative with Full Format, I think it is more than just resolution. It's about the artistic feeling and the color and the tones. Therefore, I could imagine that the pure hardware sensor is not so important in the future as is it might have been at the beginning in the digital area.

Does ZEISS have a philosophy on how lenses should be designed and look? Is there an overall theme?

Yes, there is. We try to provide an almost natural window on reality, with fewer effects and artifacts. It starts with distortion and color. Our over-arching philosophy is to provide a lens that frees the artist, the cinematographer, to add effects and looks rather than "baking" those artifacts into the design.

We listened to customers who said that some of our lenses have been clinical or too sharp. Actually, our new Supreme Primes are as sharp, if not sharper than, previous lenses. However, even though

they are sharp, they also have beautiful skin tones and a gentle focus fall-off. This is the result of the decades we have been making cinema lenses, balancing high resolution and forgiving depth of field and smooth skin tones. We don't want to force a look upon the user. We're trying to give cinematographers the greatest creative freedom with light and depth, using filters, atmosphere, composition and all the artistic tools available for beautiful images.

How did you start at ZEISS?

I started as a mechanical designer. Then I was project leader and mechanical designer for the Ultra Primes. At that time, the Super Speeds and Standards had the focus ring at the back. The iris ring was at the front of the lens, but the actual iris leaves were at the back. I don't know why it was so. It might have been a legacy of when the cameras had blimps and you had rabbit ears on the focus ring. But everybody was complaining. We changed this for the first time, as far as I remember, with the Ultra Primes.

The Ultra Primes were a break-through for us. It was a way to compete with Panavision. Today we have 16 Ultra Primes, from the 8mm T2.8 Rectilinear to 180 T1.9.

After the success of Ultra Primes, we were convinced, together with ARRI, that a new set of high speed lenses would be appreciated by users. That's why we decided to make the Master Primes.

Most ZEISS Cine lenses were done with ARRI. Why did you go out on your own with the Supremes?

ARRI and ZEISS both stand for high quality and reliability. Both companies have been working very well and successfully together for over 80 years.

As part of a joint effort with ZEISS in terms of design and development, ARRI launched the Master Anamorphic, Master Prime and Ultra Prime lens families. We received an excellent response from our customers. We are delighted about this success. ARRI will continue to offer these products and the service that goes with them.

The partnership is not exclusive: ARRI and ZEISS have both pursued their own projects concurrently. ARRI teamed up with other partners to develop the Alura Zooms and the ARRI Signature Primes. ZEISS launched the Compact Primes, Cinema Zooms and the Lightweight Zoom on its own. The ZEISS Supreme Primes are another lens range that ZEISS is pursuing independently.

ZEISS and ARRI will, of course, continue to pursue joint projects together.

Choice is an excellent thing. What about Supreme Zooms to go along with your Supreme Primes?

We already have our Full Frame Cinema Zooms. We think they are an excellent match.

These are the lenses formerly known as Compact Zooms: 15-30mm, 28-80mm and 70-200mm? They were ahead of their time—Full Frame, all T2.9.

I think the Cinema Zooms are becoming more popular now that users are asking for Full Frame zooms and discover what they are.

ZEISS Full Format Cinema Zooms CZ.2

ZEISS CZ.2 (Full Frame)

Lens	Aperture	MOD [1]	Length [2]	Front Ø	Wgt
15-30mm	T 2.9 to T 22	0.55m 1'10"	252mm 9.92"	114mm 4.5"	2.6kg 5.7lb
28-80mm	T 2.9 to T 22	0.83 m 2'8"	196mm 7.72"	95mm 3.7"	2.5kg 5.5lb
70-200mm	T 2.9 to T 22	1.52 m 5'	250mm 9.84"	95mm 3.7"	2.8kg 6.2lb

[1] Close focus distance (MOD) is measured from the image plane
[2] Front to PL mount flange

CZ.2 Equivalent Field of View for FF vs S35

CZ.2 lenses used in Full Frame (36x24 mm)	Equivalent focal lengths for same field of view in Super35 (24x18 mm)
CZ.2 15 mm – 30 mm	9.8 mm – 19.6 mm
CZ.2 28 mm – 80 mm	18.3 mm – 52.3 mm
CZ.2 70 mm – 200 mm	45.7 mm – 130.7 mm

Calculated using the crop factor between both sensors. For example, with Sony VENICE, there is a 1.5x crop factor between its Large Format (36.1 mm wide) sensor and a Super35 Sony F55 (24 mm wide) sensor.

Christophe Casenave is the ZEISS Product Manager for Cinema Lenses. He is responsible for planning new products and marketing existing lenses. His job involves talking with cinematographers, rental houses, customers, and users. He constantly analyzes what's missing in the market, what cinematographers aspire to have and what new technologies would be useful. Photographed with 85mm Supreme Prime.

JON FAUER: You were in charge of planning the ZEISS Supreme lenses. When was the first spark of that idea?

CHRISTOPHE CASENAVE: It began with a lot of discussions we had with different people. You for example. But also with many other cinematographers, assistants, rental houses and dealers. That was three years ago. Full Frame was still not really here. The only Full Frame cinema camera was the RED 8K VV, introduced in April 2015. They were not delivering very many, but this camera did something that everyone started to think about. (ARRI Alexa 65 had been introduced in September 2014, but it was rental-only, and at 54.12 x 25.59 mm, was larger than Full Frame 36 x 24 mm.)

But ZEISS Compact Primes had been around since April 2009.

We made these Full Frame lenses for completely different users: cross-over DSLR-video shooters, owner-operators, for corporate or lower budget films. Then we looked into what to do next at the high end. At the time, we made a bet on Full Frame. Based on the feedback I received, it came very clear what was missing. I would not call it an Ultra Prime or Master Prime Full Frame lens, but rather a lens series with high quality, affordability, and reliability—all combined in the Full Frame format.

How would you describe the "look" of the Supremes?

Gentle sharpness. We insisted on a look that is versatile and flexible. It's not a vintage lens. It's not a specialized look. We do not dictate a look to the cinematographers. We make a lens to the best of our abilities so that all possibilities are open. It allows you to have sharpness where you need it, but has also has very smooth skin tones and textures.

Take us along a timeline of the design process: optical, mechanical, production.

The most important thing is the optical design. It is an area where I, as product manager, get very involved. Optical designers are normally people who like physics and perfection. Without resistance, they will design a perfect lens, but maybe it will not provide the kind of images that cinematographers like to have.

It's a very interesting part of the project because you know

approximately what you want to achieve and, in your head, you see images. Cinematographers are able talk about a look, an image, a feeling. But you need to translate these artistic concepts into numbers and mathematical formulas. You need to take what the DP wants and explain it by quantifying the amount of contrast, micro contrast and distortion as numerical values.

Who is the translator from DP-speak to lens designer language?

Basically that's me, with the help of some of our engineers who have years of experience shooting with all kinds of lenses. I try to find out what DPs like by discussing different topics with them. Based on experience, I try to translate those concepts into numbers that will result in the kind of images that we agree upon. Then the optical designer will use these numbers to develop an assembly of different lens elements, and the lens is conceived.

Are you a physicist?

I studied physics and I'm an engineer. Even if I am not a developer, I understand, a bit, the things that optical designers do. I can read the formulas and I can imagine how, if we have a certain value, we might get a certain kind of image.

This is fascinating. How do you translate a DP's verbal and artistic terms into a lens design? For example, what does it mean when a DP says, "Oh, I like a vintage look?"

I have a theory about vintage lenses. It's relevant for all the manufacturers because the techniques have been improved so much in the past few years that almost anybody could make a perfect lens. The difference is that in the past no one was deliberately designing vintage lenses. They did the best they could at that time, building what we nowadays call vintage. Now, we not only have to do the best we can, but we also have to consider the artistic ingredients.

In the film days, lens makers were always trying to go better and sharper because the film was bouncing around in the gate, in the contact printer and again in projection.

Today, we take care to provide looks that are beautiful. Getting back to the question of how we translate a cinematographer's aspirations into lens design—it depends on a number of things. Is it chromatic aberration? Is it just sharpness or low sharpness or where do you get sharpness in this lens? Or is it distortion? Some might say an old ZEISS Super Speed has a vintage look but others might find them too sharp. Personally I don't think they are so vintage. The old Kowas, I would say, are really vintage. They have quite a lot of chromatic and spherical aberration. They are soft. Same with the Canon K-35.

The ZEISS Super Speeds have a nice characteristic of looking a little soft when you open them to full aperture. But when you close them down a bit, they will be very sharp. If you defined the mathematics of this, you would see that the MTF at T1.3 would be a bit lower. So you get less contrast, but as soon as you close down, you notice how the MTF shoots up to almost 100 percent.

Master Primes are completely different. They are very sharp, even at T1.3. Some people love them, but some say they are too sharp or the transition from in-focus to out-of-focus is abrupt. So, with Supreme Primes, we try to keep the sharpness, but make a nicer transition.

We wanted to give the DP more flexibility. To soften the image, you can use filters, nets or diffusion. But when you need to have it sharp, then you can have it sharp. We worked hard on the Supreme Primes to achieve the sharpness of the Master Primes, but on the other hand, to have a more smooth fall-off. We made the transitions between the areas in-focus and out-of-focus, between the sharp and the un-sharp parts, much smoother.

How do you achieve that?

The optical designers worked on having a wider zone of sharpness. It's not a sudden change from sharp to soft.

But the depth of field of a Master Prime is visually (maybe not mathematically in the DoF tables) much shallower than, let's say, an Ultra Prime at the same T-stop.

Yes. But the Depth of Field of a Master Prime is not only shallower, it's also how fast it goes out of focus. All the people who tried the Supreme Primes said that the fall-off was much smoother, much gentler. This is good when you consider that DPs confront actors' and actresses' faces 80 percent of the time, so [laugh] clearly this helps a lot—because eyelashes are sharp, but the face is silky smooth.

Supreme Primes are also a bit more forgiving for the camera assistants. This is a big issue now with the larger format. Full Format depth of field is normally shallower than S35 for the same angle of view at the same distance and aperture. For camera assistants, the job gets harder and harder. Having a smoother fall-off helps a lot.

The second area where we paid a lot of attention was chromatic aberration. If you look at some old lenses, they have huge chromatic aberration, with red edges that are not pretty. The Supreme Primes are well corrected. Some people may like red edges in the picture, but then the image can appear harsh. I find it more disturbing. Eliminating chromatic aberration was something very important for us.

In summary, the Supreme Primes look how?

The Supreme Primes are not vintage. They are sharp. But forgiving. The transition from sharp to un-sharp is smooth. They have very pleasing skin tones. They are lenses with artistic competence.

Is this a first time for ZEISS?

Some optical designers would have made the lens even sharper and more of a demonstration of physics prowess, but we all worked very hard to move in the direction of making an artistically beautiful lens set.

Earlier, we were talking about the timeline. Please continue the journey.

We had the optical design. We integrated XD (eXtended Data) metadata technology. Then we worked on the mechanical designs with an emphasis on the ergonomics. It was very important to have the same smooth focusing as we have on the Master Primes. This is what we are known for and we didn't want to make any sacrifices.

We are also known for a high level of reliability. On top of that, we wanted to have the Supremes smaller than Master Primes. This required a completely new technology for the inner mechanics. If we had used the same technology as the Master Primes, then everything would have been much bigger. We've seen that camera systems are getting smaller and people want to use those smaller cameras. Cameras are no longer restricted to a dolly, tripod or crane. Camera operators are working with Steadicam, stabilizers, rigs, gimbals, handheld, sometimes passing the camera from one person to another. And we wanted to support this with light weight and small size.

So, our optical designers had to refrain from using too many optical elements. Our mechanical designers had to find a completely new ways of supporting these elements inside the lens. It took a significant amount of time. A good thing was that our colleague, Helmut Lenhof, had been working on this technology for more than five years, even before the Supreme Primes. We already had a big part of the puzzle ready to make the lenses lighter and smaller.

Is it the same helical thread technology that Helmut showed me last year on the CP.3?

The basic technological principle is similar. What you saw last year was a much more basic version made for the CP.3. For the Supreme Primes, the precision is much higher and the tolerances much tighter. I like to say that the most expensive things are often not visible. We had to step up the precision of all the parts inside the lens in order to achieve the constraints of the larger and more demanding optics. The mechanics and optics work together.

Then we started building pre-prototypes and last year, prototypes. At ZEISS, we are passionate about the consistency of quality. The process from concept to product takes a very long time because making five prototypes by hand is one thing, but then our engineers put those prototypes through a huge battery of tests. We want to ensure that each lens comes out of production at the same quality level. We don't accept any variation.

Do you shoot tests with these prototypes?

Yes. Of course. Optically, the prototypes are usually fine. But, there's a big difference between producing five prototypes where the engineer assembles all the components and takes one week to adjust everything compared to getting the same quality with mass production.

After the prototypes, what happens next?

We do a pre-production run of about 50 lenses. The idea is to have the lenses built on a production line where the technicians can also learn how to assemble them. That way, we can see if everything is working well. That's where we find out if certain things might be too complex to produce or if there is any risk of variation within the production. We don't accept any variation between one cinema lens and the next one. This is the stage at which we can correct things. Finally, if everything is going well, we start with production.

Where do you grind and polish the lens elements?

We work a lot with our sister company, Carl Zeiss Jena, about 360 km northeast of here. They can produce and polish virtually any type of lens element, including aspheric elements. They are even able to supply some of the sub-assemblies.

How did you come up with the name "Supreme?"

It was a very long discussion with my colleague Isabel Winter. We wanted a name that was easy to remember and also that reflects what the cinematographer should be. It's not the lens that's supreme. It's the DP.

You wanted to keep it in the ZEISS family of greatness like Super, Ultra, Master and now Supreme?

Not really. It was based more on a gut feeling. We wanted to find a name that describes the DP and not the product itself. Let's say that we wanted to express the respect that we, poor scientific people, have for artists. For us, they are Supreme! By September 2017, we finally had the name.

Talk about how you see eXtended data being used with the new Supremes.

I think the Supreme Primes will be the sweet spot for eXtended data. They integrate well with visual effects and CGI. You can also trim the look (distortion, shading) electronically. Until now, when you knew that your film had a lot of CGI integration, you needed to shoot distortion mapping grids for post-production. Now you don't need to shoot grids anymore. Post-production gets all the metadata and pre-calculated distortion mapping information. The VFX artists can use these distortion maps to correct or calculate for compositing, match-moving and so on. Post-production becomes much easier.

At the moment, Supreme Primes with eXtended data can remove distortion (or add more) and adjust shading. What else?

We plan to be able to electronically remove the very small amount of breathing that some of the lenses have.

What an exciting journey. And here you are, three years later, launching the Supreme Primes.

Before starting this project, I did a long study about what people wanted to see from ZEISS. It was quite interesting because what they think about our lenses most is reliability. Camera crews rely on ZEISS knowing they will not be stuck somewhere in the desert with a lens that is broken or whose focus scale is off in very hot or cold weather. We build on the trust that our equipment is really solid and reliable. We are engineers. The artists are the cinematographers, but they don't need an artistic product that doesn't work. That is what we want to provide: lenses you can trust.

So here we are now, in production on the Supreme Primes —and actually a bit ahead of schedule.

Josef Stöhr - Project Manager

Josef Stöhr is the Project Manager of the Supreme Primes. Photographed with 85mm Supreme Prime.

JON FAUER: What is the difference between a Product Manager and a Project Manager?

JOSEF STÖHR: Christophe Casenave once described it well: the Product Manager says what *needs* to be done and the Project Manager figures out *how* can we do it.

At what point did you decide Supremes were going to be T1.5?

In the concept phase, at the very beginning.

What would have happened if you said, "Come on guys, that's going to be way too difficult or we can't make it that small?"

That's why we have the concept phase. The good thing here is we have many years of experience working together. We can agree on these parameters quickly. When the concept comes close to being finalized, I start drawing up a timeline and planning schedule.

You deal with the suppliers and delivery schedules as well?

Yes. I am in very close contact with the suppliers and each team member. We all meet at the beginning of each workday to discuss our progress and to define the next steps. Then I update our schedules and notes in an Excel file for everyone on the team to see.

By the way, I am working with additional teams on parallel projects at the same time—for example, Milvus and Otus still lenses, and CP.3.

How many designers worked on the Supremes?

Around five optical and five mechanical designers.

François Truffaut said that shooting a movie was like a stagecoach ride in the Wild West. At first you hope for a nice ride. Then you just hope to reach your destination. Is it like that when designing a lens, where at some point you get worried that it's going to take longer than you thought or may be more difficult?

Sometimes it is that way. That's why it's very important to plan very carefully from the beginning.

Did the Supremes go according to plan?

Yes. Doing many simulations beforehand helped. We calculated the tolerances of the lens elements in advance and excluded concepts that could not be built later on. Furthermore, from the beginning, we included the manufacturing, electronic, testing and service teams.

Servicing the lens easily and quickly is also important. Rental houses do not want any downtime. If a front lens element is broken on location, they'd like to replace it immediately.

One thing, actually, was not planned at the beginning. The feedback from customers was so positive that we had to recalculate for increased sales. This necessitated investing in another high-precision machine to increase capacity for milling the focus barrels.

With this additional production capacity, we hope to have a delivery time of four weeks between the time a customer orders a lens and it is delivered.

Who does that? Seriously? That quickly?

Yes. Even if the orders are doubled, it should work. This means that once we ordered the new machine, we had to inform all our suppliers to double their quantities.

How do you get the suppliers to double their output?

We discuss and negotiate. Remember, however, that most of our suppliers are based nearby in our local region, which I would call Precision Valley—just as you have your Silicon Valley.

Whose initial idea was it to develop Supremes?

It was Christophe's idea, but also the cinematographers and rental houses he talked with. That idea was nurtured by an entire team, more than 50 people, including assembly. We brought the idea to Winfried Scherle. He always has believed in following instinct, guided by gut feelings. He had similar faith in Full Frame. When the concept was presented, he said, "Why should we not do it?"

It has been a wonderful team effort and an exciting project. I think we built up a wonderful team to make the Supreme Primes a reality.

Was it risky embarking on this project?

It's also a task of a Project Manager—to keep the costs under control. When we started, I had to calculate the development costs and then work on the business plan. We even established the prices in the concept phase.

At this point, Christophe Casenave interrupted: Josef is very humble. You are talking to "Mr. I Deliver on Date at Cost Promised." Three years ago, he projected delivery in August 2018. Here he is, delivering three months early and at the costs he determined.

Josef, your job sounds like the Production Manager on a film—the person they pay to worry.

I guess I learned doing precision engineering at Mercedes and Nokia. When a product is launched worldwide, you have to deliver it on time. You cannot say that you'll deliver it two weeks later.

One of your designers once said that introducing new lenses is almost like attending a movie premiere. On the date it's released, you are hoping it will be accepted by cinematographers and will be a success. Are you nervous?

Of course. A Project Manager is always nervous.

But now that we are close to releasing this first set of five lenses, everything is working pretty much as we planned. So, I'm not so nervous anymore.

The large portraits (gentle sharpness — sharp eyes and smooth skin tones) in this article were photographed with Supreme Prime lenses on a Sony α9 Full Frame camera using a Vocas PL to E-mount Adapter.

Sandro Förster, Director of R&D

Sandro Förster is ZEISS Senior Director of Product Development, responsible for the R&D department, pre-development and main development of camera and cine lenses. Photographed with 85mm Supreme Prime.

JON FAUER: Take us through the process of developing the Supreme Primes from the beginning.

SANDRO FÖRSTER: We have several phases and several milestones. One of our biggest tasks is to write down the requirement specifications and then run in one direction. We want to be very sure what the goal is, what kind of lens the customers want. The Product Manager is responsible for a deep understanding of the customers' needs and we are responsible to transfer these ideas into a realistic specifications that are also manufacturable at reasonable costs, as light as possible, with the desired optical qualities.

We decide on the real essence of what is necessary for the lens and write the requirement specifications in a book. *[Sandro holds up a book with more than 50 pages.]* We tried to make it shorter.

Is it written in scientific terms or in broad generalities?

It is a kind of science to transfer cinematographers' thoughts about a nice and beautiful look into technical values as to geometrical aberrations and so on.

Interesting. So, you're almost like a translation service?

Yes. This is very difficult because you can't measure beautiful images. You see it in the results. But the work is done before. We start with pre-development where we try to reduce risk in the main phase. We start with the optical designers. Then we find out what is really possible in terms of size, resolution, aperture and front diameter.

The optical design is very hard work because there are so many parameters you can change: what kind of glass, how many elements, radius, distance between the elements. In the end, it's a very high dimensional mathematical problem you have to solve. We have experts to do this. They have a lot of experience and also special programs.

There are some commercial programs, like Code 5 or ZMax. Here at ZEISS, we have the advantage, because we are a big company with 27,000 employees, of having the chance to develop our own optical program. It's called "Oase," which means Oasis.

Optical design is searching for the solution to a problem where you don't even know if the solution exists.

Sometimes it is a mathematical problem with more than 200 dimensions.

The next step is simulation. We have special programs to simulate stray light, ghosting and flares. For instance, what happens if you have a strong headlights from a car in front of you? It illuminates the lens at night. What kinds of reflections and flares do you see?

And then you decide which coating is meaningful for each surface. You also have to consider mechanical parts, because you can

also get ghosting from mechanical parts. These days, HDR is very important, so reducing stray light is essential. We have an expert in ghosting and stray light simulation.

Really? You have a flare expert? Dr. Flare?

Some call him Dr. Ghost. You'll talk with him tomorrow.

When we finish the simulation phase, we start mechanical design. But to be honest, mechanical design starts earlier, because it's an interaction between the optical and the mechanical. You have to hold the lens elements inside the barrel. Tolerances are very important because you want every lens in the series to behave the same way. The complete system is then described as a CAD model. At this point, we order the components, the lens elements and the metal parts. And then we have to wait a little bit, because it takes a while to do the tooling and prepare the lenses. After several weeks or sometimes months, we get the parts and prototyping begins.

We build prototypes to see the results—not to see mistakes but to reduce the number of issues that may come up later. This is the goal of front-loading simulation: do the simulations as much as possible in the early phases, and then you save time and budget during production.

Do you ever discover things when you make the prototype that you implement in the manufacturing?

The prototype is a verification of the design phase. It's not the case that we try to design something, then build it, see how it looks and then decide if it is usable or not. But sometimes we see flares or other imperfections. Sometimes we can simply make mistakes. And we don't want to give these mistakes to the customer. Therefore, it's very useful to do prototypes and test them for image quality and consistency of specifications. We ensure that we don't have a change of image quality, bokeh, sharpness or quality of skin tones.

Do you go out and shoot real life test images as well?

It's the next step. If the prototype meets our specifications and passes the environmental and reliability tests, we hand over the first prototypes to the product manager and he tests the lens by himself, and, of course, with cinematographers. We get feedback. Hopefully the feedback is the same as in the beginning where the cinematographers described their dreams and aspirations. It's a wonderful thing if they say, "I would love to be able to have a lens like this." Even better is when, after one and a half years, Christophe can say, "Here it is. I have a little surprise for you. I hope this is the lens you had in mind."

It sounds stressful.

We are usually convinced that the lens we are making is good because we had feedback from the cinematographers from the beginning and that influenced the specifications. But in the end, there is always a little bit of mental stress. Our team members are all passionate about making pictures, if not cinematography, then stills. And we all love to go to the movies.

Dr. Benjamin Völker (Dr. Ghost) Optical Simulation

Benjamin Völker is a member of the ZEISS the optical design team doing optical simulations. Photographed with Supreme Prime 85mm, flared and ghosted by iPhone LED shining into lens.

JON FAUER: So, you're Ghost. Or do you prefer Dr. Flare?

BENJAMIN VÖLKER: Dr. Stray Light.

Dr. Strange, tell us about your optical simulations.

My job is to take care of all the unwanted light. Optical designers try to find an optical formula that brings you the best-looking picture on the image sensor. They live in a very ideal world in which all the light just hits the front of the lens, goes through all the elements without any reflections or stray incidents on the mechanical inside of the lens, and then just hits the sensor. But it's not an ideal world. And I take care of everything else that can happen—and, believe me, a lot can happen inside a lens.

And then you try to reduce stray light and artifacts?

Based on the kind of stray light we have, we take different steps in the development process. The first step is to find the optical formula, which I do together with the optical designer, and then I take care of all the ghosts.

What exactly is a ghost—an optical ghost?

A ghost is a reflection between two optical surfaces. It's seen as a double image. You can reduce it with coatings or by changing the optical formula.

What is narcissism—optical, not presidential?

Narcissism is a double image between the image center and the glass elements. The most severe comes from light reflecting off the image sensor onto the rear element. It depends on the kind of camera you have, but we've seen reflection values between 2 and almost 10 percent. And this is really a lot compared to an optical surface, which is at its highest is .5 percent.

How do you reduce the reflection from the sensor?

We have two strategies. If you have a really focused ghost, then you try to change the curvature of the lens element or the glass type. You never change that for one single element. You always have to change the whole thing, because it still needs to focus the usable light. The other strategy is to put a good coating on.

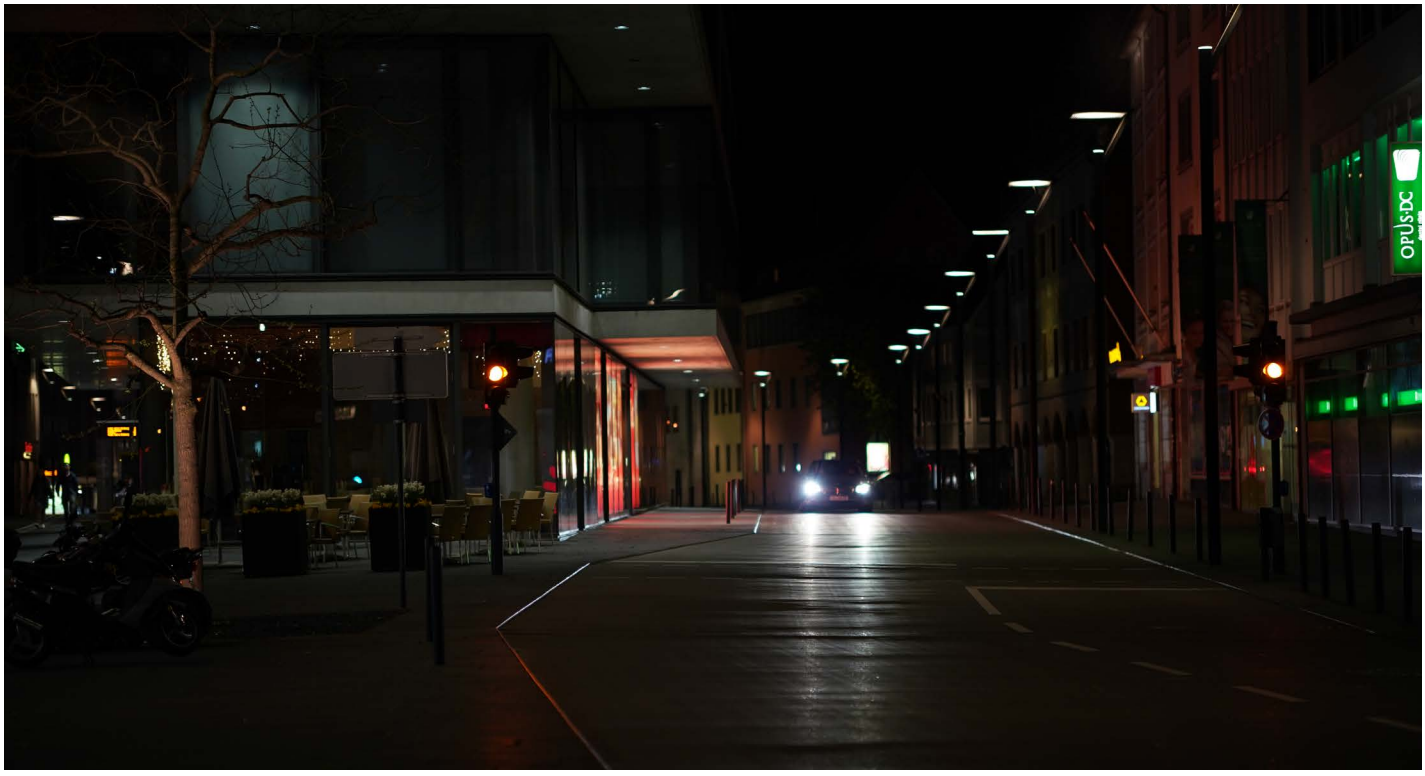
What about flares? I heard you're the guy who goes out at night shooting headlights. *(photo: next page.)*

Yes, I'm the one. But, now I would like to ask you a question. How would you define the difference between ghost and flare? You DPs have a really complicated vocabulary for naming all the diferent kinds of stray light. Everyone uses a different name.

I think of ghost a double image from an internal reflection and flare is from an external light source like the sun or a light.

Okay. That's interesting, because I have a different point of view. I think of three or four kinds of stray light. One is what we just talked about, what I call ghost. Ghost, for me, is a double reflection between optical surfaces—a mild reflection. Today we consider double reflections. But in the future, as cameras get more sensitive, it might be necessary to also consider quadruple reflections.

Ghosts and flares, for me, are the same thing, because it doesn't really matter if the light source is in field or out of field—as long as the light reaches the sensor by a double bounce. Narcissism, for me, is the same as a ghost. From a simulation point of view, this is the easy one to take care of. You have a defined light ray going in. You have a reflection. You can calculate that as well. You have another reflection and you have a defined place where the light reaches the sensor. It is very easy to calculate because in the simulation you always know the next surface that the light ray will hit. It can only hit the optical elements.



Can it hit the inside of the lens and then bounce off the barrel?

That would be the other kind of stray light that I'm considering. For the ghost simulation, this is all covered with just two or four reflections between optical elements. It is called Snell's Law. This is easy and very quick to calculate. From a calculating point of view, the more interesting simulation is stray light from mechanical parts, which we call scattering.

Scattering can be more tricky. Light goes through the optical elements and hits the mechanical interior of the lens, and then the light gets scattered. In which direction, you can't say. In the worst case, light scatters in a full half sphere. If you want to calculate that, you have one ray going in, hitting a mechanical surface, and then you have to generate 10,000 rays bouncing out from there in every direction. You see that as internal barrel flare where dark shadow areas become foggy and black becomes milky.

You probably hear a lot of DPs talking about how they often love flares. You probably hate them.

I love photography and cinematography. I do it in my spare time as well, keeping in mind that with flares, I always lose information.

So, basically, you're trying to get rid of the flares to have the best possible image. I'm getting the feeling that the design philosophy at ZEISS is that if somebody wants flares, they can use filters, aim small lights into the lens, shoot through plexi rods, or add flares in post with Davinci Resolve flare plugins.

Yes. Dynamic range suffers with flares. If you take a picture into the sun, you see two or three really focused ghost images. These are not the ones that kill your dynamic range. It's the 500 others that go in there. If you consider a lens like the Supreme Prime 29mm, for example, just do the math. There are 16 optical elements inside, but there may be 530 ghosts in there, all at the same time. Shooting into the sun, you maybe see the top 10, because they are focused. But it's the 520 remaining ghosts that are the ones killing your dynamic range, lowering your contrast.

And when you simulate, do you also take still pictures and then introduce ghosts on those real life pictures?

We take pictures in the lab and see how close we come. And we come really close. So, with photographic simulation, I really would say that we are now able to predict the complete look on the actual prototype with a 95 percent chance of it looking exactly like the actual prototype later on.

Talk about car headlights, because in almost every movie, there's usually a shot of the car at night coming towards the camera. I assume that you also tune the lens to handle those nicely so it doesn't milk out the whole image?

Yes. The thing is to control them. We reduce them, but we can't bring them to zero. It's physics: there always will be a remaining reflection from every element. We get better with better coatings. It won't be zero unless you pay a huge amount of money.

When you talk about the look of the Supreme Primes, what words would you use to describe how they look? Some have called it "Gentle sharpness."

I would agree with that. I had the privilege to test most of the Supremes outside the lab, on location. We calculated the design. We tested the real prototypes. Because the ghosting calculation has a lot of parameters going on, it can look different for every lighting condition you can think of, at different apertures, for different light sources, different focal lengths and so on. So, normally I take home the prototype and take a lot of pictures with still cameras and a PL adapter—like you're doing.

I really like the color rendering of the Supremes. This has something to do with the coatings we use. In terms of color rendering, we go for a neutral look. This is what I personally

Benjamin with an uncoated lens (top) and coated lens (bottom).
Ghosts courtesy of iPhone LED shining into 85mm Supreme Prime.

like most in post-production, because you then can do anything you want. You can make the image a little warmer or cooler. We developed the coatings to reduce the reflectivity, but we also tried to mix and match the coatings on all the elements so that the overall transmission gets as neutral as possible.

What other words could we use to describe the Supremes besides gentle sharpness? Tame your ghosts?

Repeatable and reproducible. One of my tasks is to ensure that we get the same look throughout the entire family of lenses.

What kind of tests did you do for the Supremes?

I try to provoke the ghosts. With backlight.

Often, you need extreme lighting setups, directly against the sun. Sunset is a good example. I try to do the most severe things you can do in terms of flares. I look for something really dark that is not illuminated. All the light comes from behind, for example, a black object with fine detail, and all the stray sunlight is entering our Supreme Prime lens and hitting the mechanical barrels and housings.

Will you be heartbroken when DPs ask for uncoated Supremes?

No, but they should remember they would lose a lot of light – up to several stops. Also, you would have to keep the lens in the dark, because without any coating, sunlight damages the front element. The uncoated elements would become gray after a few weeks. People talk about uncoated, but often there is some kind of coating, but it's just coated differently.

As a photographer myself, I think a lot about look. And then I go back to our lab and try to quantify stray light and ghosting as numbers. Sometimes we fail, because it's very complicated to put real numbers on it.

We can define ghosts as a point or an arc or a rainbow. But maybe you don't like the ghosts as rainbows so much, but would prefer one color. We do simulations of the image as it will look later on, with the prototype. We do simulations for different apertures, photo distances, light source positions, and we compare. We try to get it as consistent as possible so that you don't take the 29mm, have a huge ghost in the corner, then take the 35mm, and it looks completely different.

In the range of the possible, we try to average. And we do that by looking at pictures. You need experience, because a wide angle lens has a totally different ghosting behavior than a tele lens. And then you have to ask, "Is it good or bad. Could it be better?"

It's funny how we DPs have a vocabulary that's quite different from yours. You were a great translator. I learned that look is to a large degree spherical and chromatic aberration, and flares are not flares, they're ghosts.

This is instructive for both of us. I see why it makes sense for you to differentiate between ghost and flare. For you, a ghost is a reflection within the lens that you can't do anything about. A flare is something that you could try to fix yourself, like flagging the light.

Thanks for an illuminating discussion, Dr. Stray Light.

Thomas Steinich - Optical Design

Thomas Steinich has been an Optical Designer at ZEISS since 2006. He worked on the team doing the Master Anamorphics.

JON FAUER: Tell us about the optical design of the Supreme Primes.

THOMAS STEINICH: It was an interesting and long way to get here. It always starts with the Product Manager coming in and talking about some ideas he has in mind what we should do. What it should look like. What we think the market wants to have.

And what did he say? The market wants Full Frame?

Definitely. The market wants a completely new series of Full Frame lenses for high-end cinema. At the beginning, you start with some rough designs. You start doing some focal lengths and looking into how it could look. Can we reach the goals that we want to have? We have a lot of discussions. It's a process where you start quite rough with very basic designs and you go into more and more and more details. And at the end, you have to put it all together.

Of course, when we do a series of lenses, we want all focal lengths to have similar performance. We have to look in parallel during the design process. That's what we do.

Hypothetically, what happens if the Product Managers asks for a front diameter of 95mm and then you do your calculations and find that's really difficult to do and a 100mm diameter would be much better. Do you go back and forth and discuss?

Yes. We work out the specifications of size, length and weight. Then we have additional discussions. Most of the time, we finally succeed to get to the specs that are requested.

We DPs talk a lot about how to articulate what the look of a lens should be: impressionistic, soft, flary, vintage. How do you optical designers translate those ideas into formulas?

That's the big task for the optical designer. DPs verbalize what the picture should look like. The optical designer must translate those words into math. The calculations need to come to that conclusion. We have a big advantage here in our department because we have a special optical design software that is proprietary to ZEISS. We have special algorithms that are closely related to cinema applications. So it's actually a little bit easier for us to translate these ideas into numbers.

You push a button for the Supreme look?

That would be fun. But, we can simulate a whole picture. And this is something that is really very useful. Because when you have an optical design and you talk to users, it's not such a good idea to talk with lots of diagrams and lots of numbers. You have to show them what the picture looks like.

You actually take real photographs and then you simulate how it's going to look?

I prepare a series of pictures. They show contrast, resolution and other characteristics. And then we compare those real photographs with our computer simulations.

How would you describe the Supreme Prime look to a DP?

The basic concept of the Supreme Prime look is to have the best of everything. Really good contrast and resolution in the plane where you're really in sharp focus. And a very smooth and symmetrical focus fall-off in both near and far directions. When you do a portrait, the Supremes render really sharp pupils but the skin is smooth in front and in back. It's not such a good idea to have the complete image creamy or soft. So this is the basic idea that we try to achieve.

More Relaxed and Forgiving Depth of Field

How do you achieve very smooth skin tones with the Supremes?

We want to avoid different colors of focus, longitudinal color aberration in the back and front focus areas. If we reduce these color aberrations with special materials and lots of design work, we can have the same color over the complete depth of field. This helps to get the same skin tones over a certain range. And this is one big thing that was not easy to achieve over the complete series of lenses. But this was a goal that we had in mind and we achieved it. Another way of putting it is that the depth of field is more relaxed, more forgiving.

How do you deal with flares and reflections in your designs?

We can trace the rays that cause the reflections that you see in the image. We see where they come from. Which surface of the lens. Which angle. We can simulate the coatings on the lenses. We have a really special tool that not only analyze these ghosts, we have also opportunities to control them. For example if we have one narcissism or ghost that is in the middle of the image and I don't want it there, I want it on the edge, I can have our system change radii and put these reflections somewhere else. This is not possible in commercial packages. It is something quite special that is part of our design software.

Explain your design group's philosophy.

The basic idea is to make the best lens we can. A great lens can always look great. If you want aberrations, you always have possibilities of adjusting the image with smoke, special lighting, diffusion, filters or anything else the cinematographer wants to add to the get the desired artistic impression. But if you have a lens that is not sharp, it's never sharp. You can't do anything to improve it. The information is lost. It's not there. So this is not what we want to have. We want to have it sharp where it should be sharp and with nice fall off. And that's the basic idea.

Uwe Weber (above) is Manager of Mechanical Design at ZEISS. Karl-Heinz Rösner (above, next page) is a ZEISS Mechanical Designer. Photographed with 50mm Supreme Prime.

JON FAUER: Which ZEISS lenses did you develop?

KARL-HEINZ RÖSNER: Many. I have been working at ZEISS for 28 years. I designed a lot of lenses for cine as well photo application. I made a lot of lenses for Contax and Hasselblad. The first Cine lens I did was the 10-100 zoom for 16mm.

UWE WEBER: I was the one who turned it into an 11-110 for Super16 by making some internal changes. After that, I worked on many lenses, including the Master Primes. I was honored to receive an Academy Sci-Tech Award in 2012 in Hollywood for that.

Walk us through the Supremes' mechanical design process.

UWE WEBER: We always create a family of lenses and it starts with an idea. We are in touch with the optical designers from the beginning. We work out whether the lenses are able to be built, whether they fit well together as a set of lenses. We try to have the same outer appearance of the lenses, with almost the same length and front diameter, and with lens gear rings at the same position. We start with the mechanical design of the housing, of the mechanics around the focus drives. This has to be started very early, because sometimes it takes a lot of time—sometimes up to two years.

How were you able to make such a small front diameter?

A wide angle lens will have its front element close to the front of the lens. So we need to incorporate a design where the barrel gives the front element some protection from being scratched. Even the 25mm Supreme has a 95mm front diameter. The longer lenses have front elements that a recessed further from the front.

In the very beginning, did somebody say, "We want to have a 95mm front diameter?"

Yes. That was one of the requirements, from the very beginning.

It appears that the focus is not guided by a cam, but it's smoother than most helical focus threads. Can you tell us more?

It's a special, rectangular thread inside. When you remember lenses with helical threads, like the old ZEISS Super Speeds and Standards and even Ultra Prime lenses, we always had the problem that the torque got stiffer at colder temperatures. The threads were tapered on those lenses. We wanted to avoid that. At the same time, we

wanted a large inner volume to get the big optical elements inside.

When you look at a wider focal length, the front elements are big. The rest of the inner lens elements are relatively smaller. And, when you have a big front lens element, you also have a big iris inside of the lens. So, instead of having threads that come to a point, the helical coils of the focus mechanism are rectangular.

It's still a helical focus mechanism?

It's still done on a turning machine, but with special tools. It takes some time to machine them, but we get very good surface qualities and geometry. It's precise down to micron levels. When you compare other designs where curves are inside, you have to mill the curves and the surfaces on the curves are a little bit more rough.

And do you still use grease inside?

Yes, there is grease inside. The question was to find something that works over the whole lifetime of the lens. The surface quality is like a mirror when you have it without grease. You can even have a smooth focus movement without any grease, but we add it because it adds the extra smooth feel that customers want. Because of this combination and the grease we are using, the Supremes work very well at low temperatures.

What is the reason for the non-linear aperture?

It takes up less space inside. We have this in other lens designs—the Master Anamorphics, for example. The most important reason is that it provides much more precision where you need it. Between T1.5 and T4, the throw is much longer than on MP where the scale is linear, and this is exactly where you want it.

Gebhard Müller, Manager of the test lab at ZEISS checking lens performance and contrast with a “black hole” device.

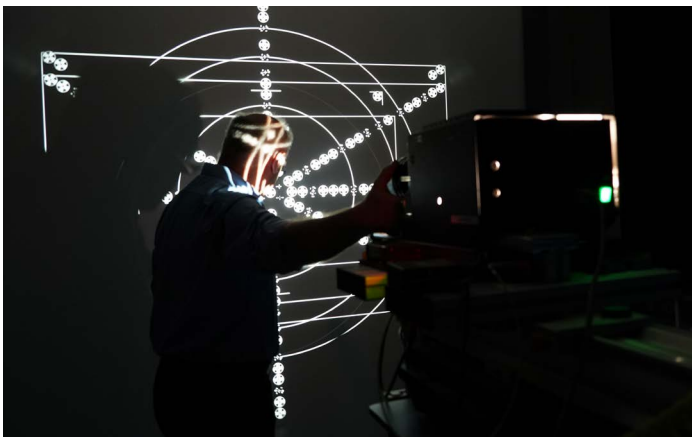
GEBHARD MÜLLER: The lab consists of up to 13 people. One job is to work on the Supreme Prime electronics and develop the firmware for eXtended Data. We also do the prototyping. All prototypes are assembled here in my laboratory.

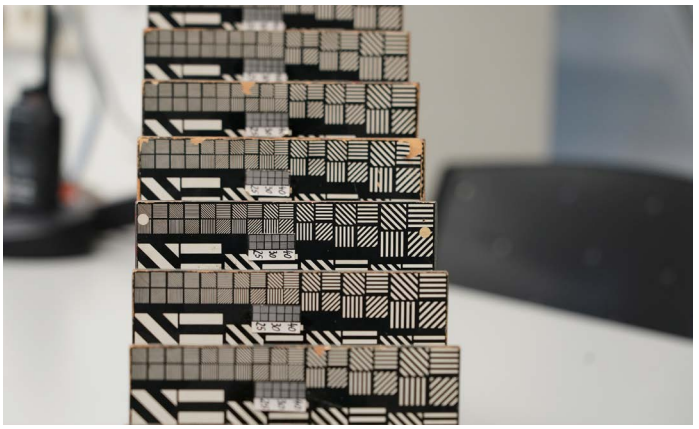
After we built the Supreme Prime prototypes, we began the qualification phase—testing them to be sure they live up to their specifications. The next step is application testing, with the lenses on real cameras, shooting under real and simulated conditions. We want to take them through the entire workflow to see how image quality holds up every step of the way.

Finally, we develop all the test equipment used here and in our service centers. The extended metadata, with information about distortion and shading, along with regular lens data (aperture, focus, etc) are linked together with timecode to be recorded in the camera or externally by companies like Ambient.

Gebhard Müller with Andreas Jung, Developer of electronic hardware and firmware for the Supreme Primes.

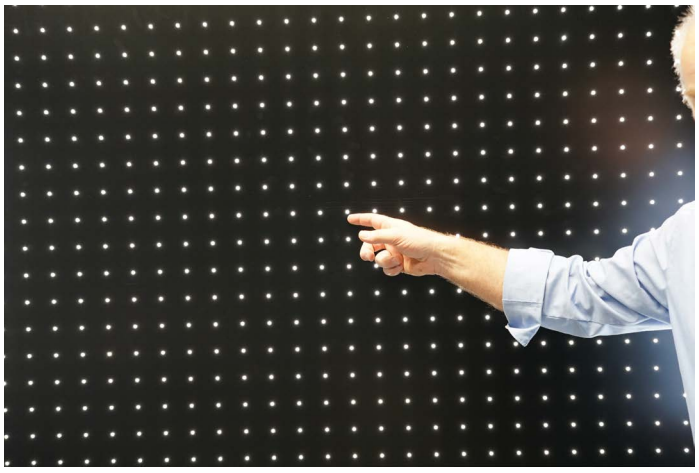
We do a complete qualification of the lenses and to do that, we use a lot of equipment to check each and every parameter that is specified. We project the lenses to test geometry, distortion, resolution, contrast, depth of field. We put them on machines that rotate the focus and iris rings up to 200,000 of turns to ensure that the electronics and mechanics are stable over the whole lifetime of the lens.

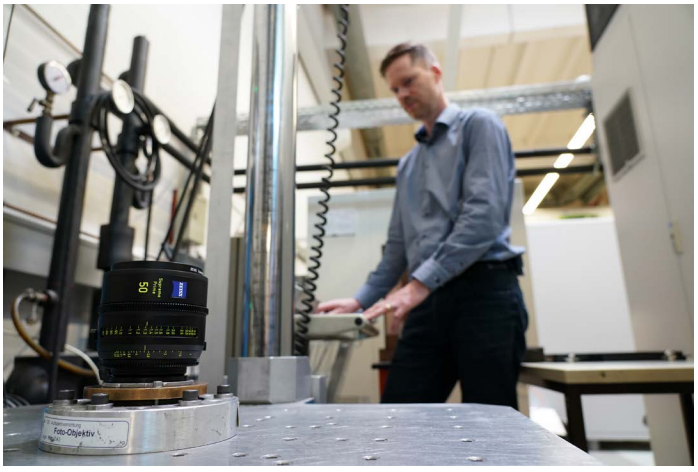




Three-dimensional shadowboxes *(above)* give us a lot more information than ordinary printed lens charts. And they are a lot of fun to put together.

We have developed a lot of specialized devices that allow us to check lens elements inside of the lens holders or to align complete optical systems inside of the barrel. As a result, we have a very controlled way established for assembling the lenses, step by step. After the lens is completed, then a final alignment is done using a K8 machine or a K9 machine or other suitable devices.

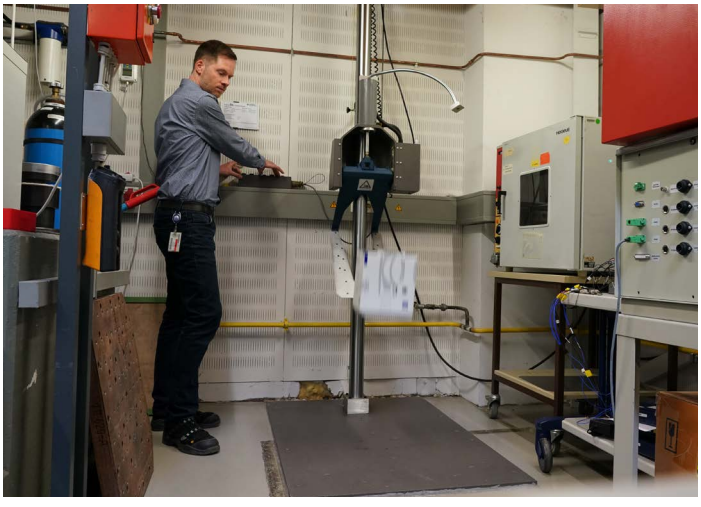




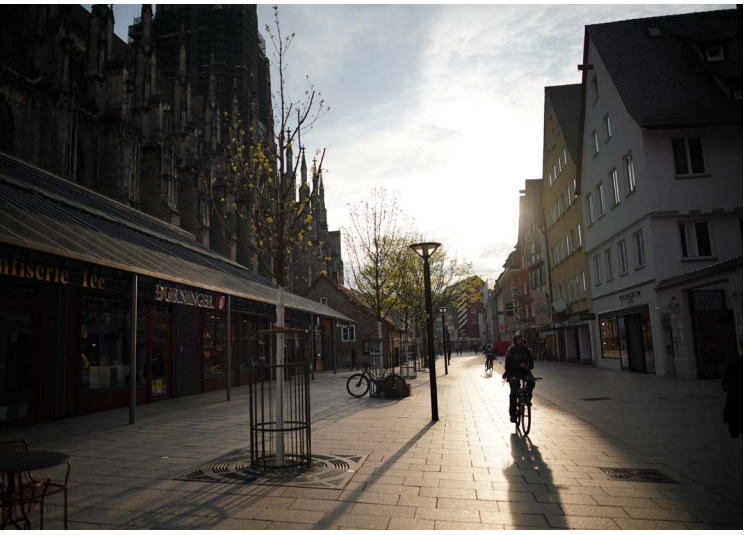
Vibration test, above. Camera truck to pavement lift-gate drop test.

The result is that we have very low variation in performance over the whole series production. This is what we are always aiming for. There is very little difference between the lens design on paper, which is calculated, and the actual performance that we measure in our test labs. This means that no lens leaves the company without meeting our specifications.

Suited up at 40 below zero to test Supremes.



Supreme Field Trip to Ulm



Christophe and Isabel decided it was time to test Supremes on location and we set off to Ulm, 75 km south of Oberkochen.

Albert Einstein was born here. Ulm cathedral has the tallest steeple in the world. A river flows through it—the Danube, on its way 2,700 km to the Black Sea. We tested wide angles (nice geometry), depth of field, architectural photography and food (in-season white asparagus and freshly caught Ulm trout.) All photos on these 2 pages page captured with Supreme Primes.

Supreme Field Trip to Ulm

Testing Supreme Primes wide open at Zur Forelle in Ulm on the Danube. Above, ZEISS Marketing Manager Isabel Winter. Below, Christophe Casenave.

Josef Kohnle, Camera Lens Assembly

Josef Kohnle (above, right) is Senior Director of Operations at ZEISS, managing camera lens assembly.

JON FAUER: You're the busy man in charge of building Supreme Primes?

JOSEF KOHNLE: Yes. I'm responsible for logistics and the supply chain—to get materials here and assemble the lenses. 95 percent of the glass and all the mechanical parts come from ZEISS or from companies nearby in Germany. This gives us a great degree of control over the supply chain. That's how it works with very sophisticated products like the Supremes. If there's a problem, it's easy to drive 30-40 kilometers to meet with the suppliers and talk with them face-to-face about how to improve things.

That seems unique to Germany for suppliers to be so close.

It's an important difference. In the cine industry, volume is relatively small. We do not mass-produce quantities in the thousands, as we do for still photography lenses. We are in the hundreds and have to be very precise. It's an advantage to have sources nearby.

When did you first start working on the Supremes?

We started serial production in November 2017. But planning began about a year ago. The first thing we did was to set up precision mechanical machining for the new focus mechanism. The threads are a new concept. We worked on that for almost a year to get it really precise.

Then we started to plan our workspace and assemble the assembly line. We built a first batch of lenses. We worked together with the R&D and engineering teams discussing how the assembly line could be built to assemble the Supremes precisely and quickly. I think we went through seven or eight different iterations.

After four or five weeks, we had the line running. We use the Japanese Kanban system of lean, just-in time manufacturing. It's like in a supermarket. Our assembly technicians have boxes of parts in front of them at their workstations. When a box of parts is empty, the logistics person takes that empty box down to our supply room to refill it. The other box at the workstation has enough parts until the new box returns. If you go to a supermarket and buy milk, you always want to have fresh milk. If there's no milk, you go to the next supermarket.

That's what we learned from Toyota in Japan. It's called lean logistics.

How long does it take to assemble a Supreme Prime?

At the moment, on average it takes one to two days to build a Supreme Prime. We will add technicians and the time will shorten as we ramp up production.

Take us through the Supreme Prime assembly process.

There are two phases. First, you have a barrel that's mechanical and you put it together piece by piece. Then you fill the barrel up with lens elements. Each element has been blacked (painted black) around the edges with a special formula. We try to produce a "black hole" that minimizes reflections from the inside barrel surface to the edges. The lens is measured on our K8 MTF measurement machine to check diameter, centering and geometry. Each lens is individually adjusted. Each focus scale is individually determined and

identified by letters (AA, BB, CC, etc) and engraved specifically for that lens. The final checks are done on our K9 machine.

How do you adjust the lenses?

With screws from the outside and with shims. Every lens has a little bit of variation. Our goal is precision across the set, for every individual lens. The elements are spherical, aspherical and some are glued together. We have a large R&D department that develops special glues that are optimized for various combinations of glass.

That's another big advantage in what we do compared to mass production. We work on each lens, one at a time.

Are you able to find enough skilled technicians and do you have a training program?

Yes, we have a training program. We are in a rural region, but we attract enough people. ZEISS has a good reputation as a friendly place to work, so that's encouraging. Sometimes we recruit from outside. Every year, I go to the various departments within ZEISS where they have been training apprentices for three years. For example, we have a couple of technicians doing lens assembly who were previously working in our service department.

Does one person assemble the entire lens?

It depends. Our lines are U-shaped. If the technicians need more experience, we start them by doing step one. When they are able to do step one, they go on to step two. And so on. If everybody's qualified, and, for example, we are building 20 Supremes a day, there is a chance that twenty people could each be doing the whole process. Or they could hand the lens off at step three to another colleague.

Do you have meetings where suggestions can be made?

Daily. We meet every morning at 8:15 with the teams from assembly, from the supply chain and from sales. If the sales people tell us we need 40 lenses that day, the supply team will bring us 40 Kanban cards. Each card represents an individual lens and we fill it out with information. For example, a 50mm Supreme Prime might need a focus scale in feet with an LPL mount and another 85mm Supreme Prime requires a metric focus scale and a PL mount. That way, we know the plan for that day. Ideally, by that evening, we have checked off those 40 cards, and 40 completed lenses are ready to go. If there were problems the day before, we discuss them at the morning meeting. Usually, problems can be solved that day.

Are Supreme Prime lenses difficult to build?

They are built in the same large clean room where we assemble Ultra Primes, Master Primes and Master Anamorphics. These are all precise, sophisticated lenses. We have the best qualified people building them. It takes a minimum of six months to a year of training. The technicians cleaning the optical elements have spent up to 18 months for qualification.

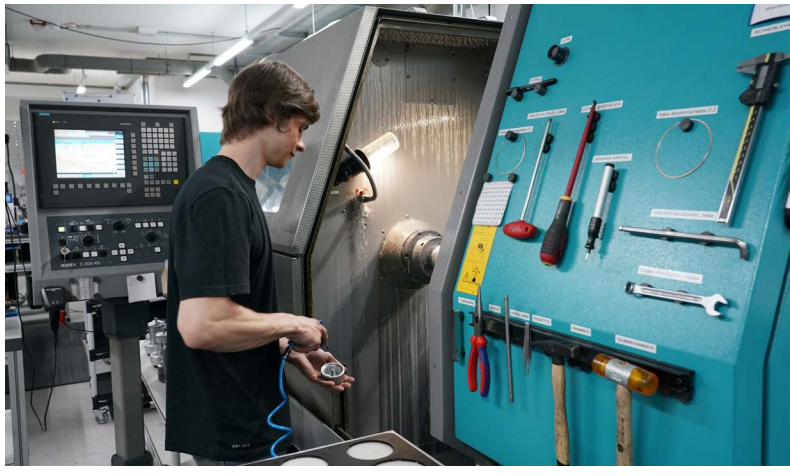
Just for cleaning?

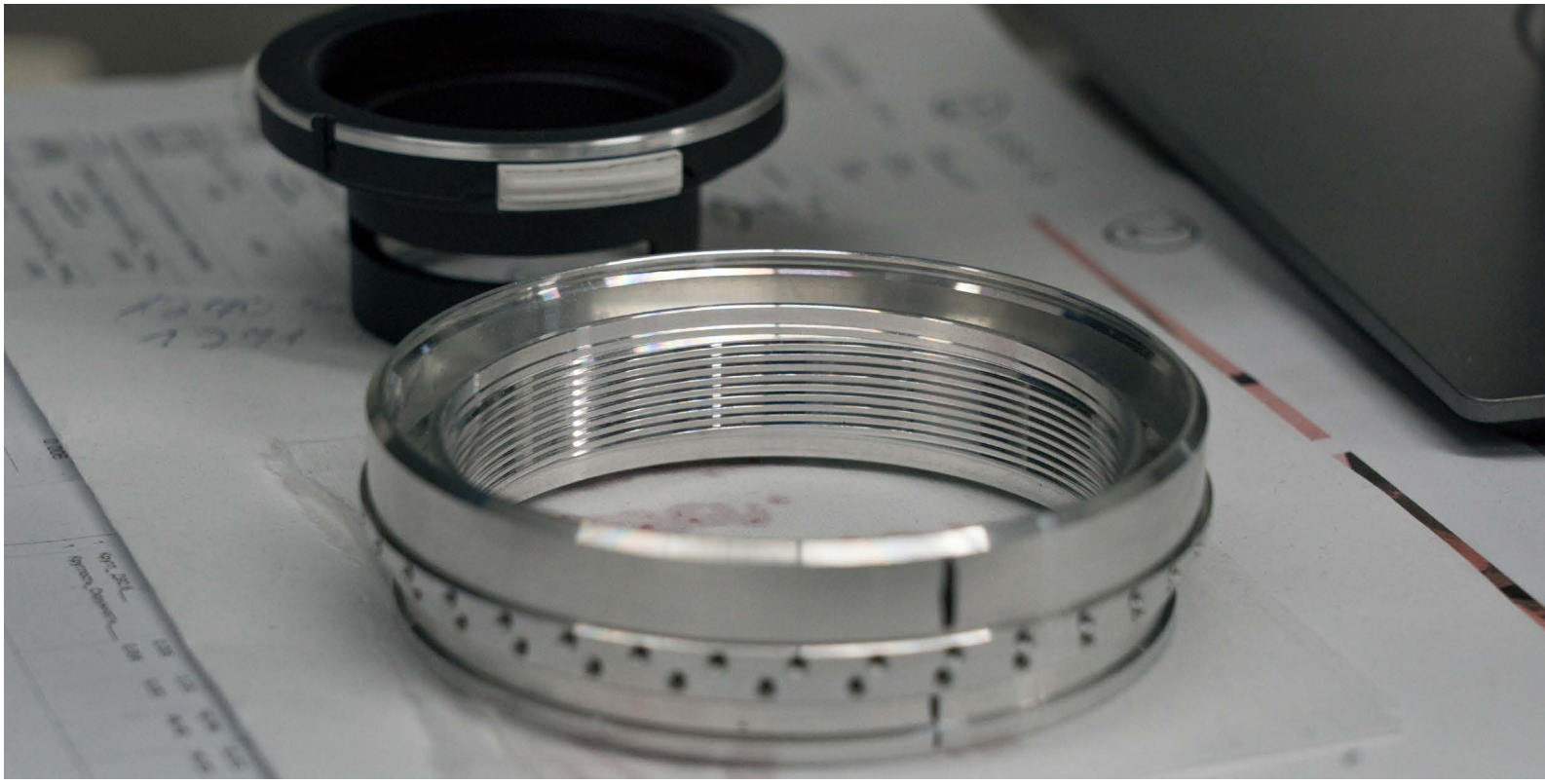
You might think it's an easy job. But to do it well, you have to visualize the complete lens—which consists of a lot of different elements inside. A good technician can look into the completed lens and detect which element a speck of dust or imperfection is on. They can even tell you whether the blemish is on the back side or the front side of an element. A really good technician will even know what kind of material the glass element is, and we have 130 different glass types. For each glass type, there's a different method of cleaning using many different liquids. Some glass types and coatings are very sensitive to various types of fluids.

At this point, to prove the point, Josef led me into the vast clean room where ZEISS Supreme Prime lenses are assembled. He sat me down at a workbench and challenged me to clean a lens element. Despite years of cleaning lenses on location, sometimes responding to the cry that there were more fingerprints on a lens than in the files of the FBI, and having endured a few lens-cleaning Olympics, I am embarrassed to say that I did not pass the ZEISS lens-cleaning qualification test. Josef had proved his point.

On the following pages, join us on a tour and let's see how Supreme Primes are built.

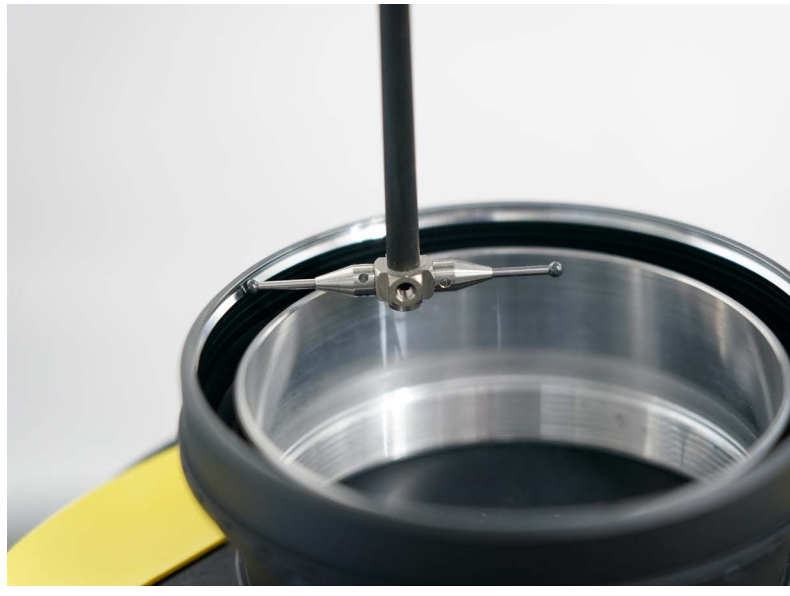
Inside the innovative focus mechanism: rectangular helical threads, precision CNC machining and advanced materials for smooth moves.





Inner and outer rings of focus mechanism.

Measuring to micron tolerances.

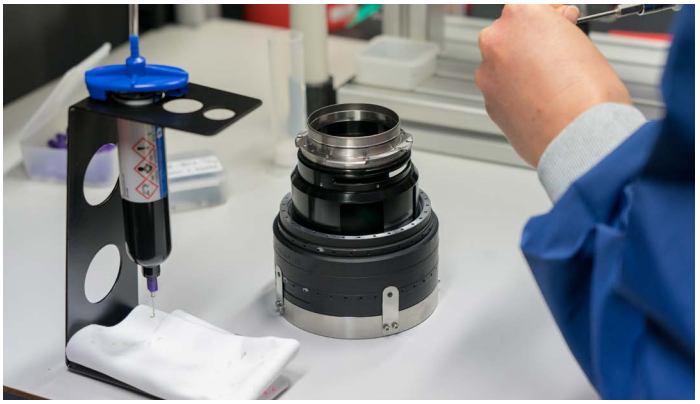


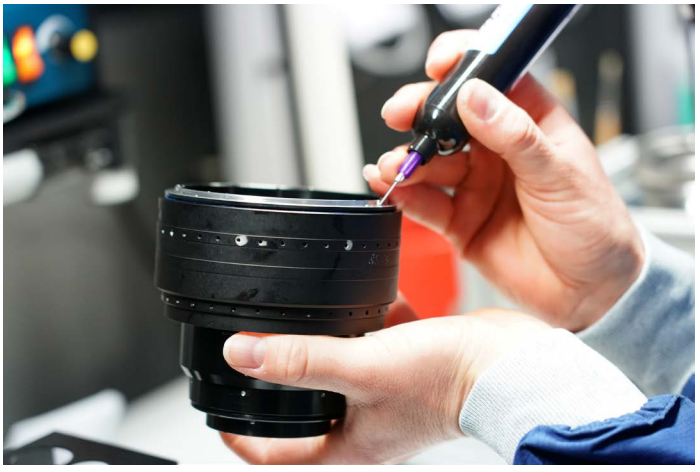
Lens Assembly

Let's build some Supreme Prime lenses. After suiting up, we enter a large clean room—walking past Master Prime, Ultra Prime, CP.3, Cinema Zoom and other lens assembly stations. We arrive at one of the Supreme Prime U-shaped work areas.

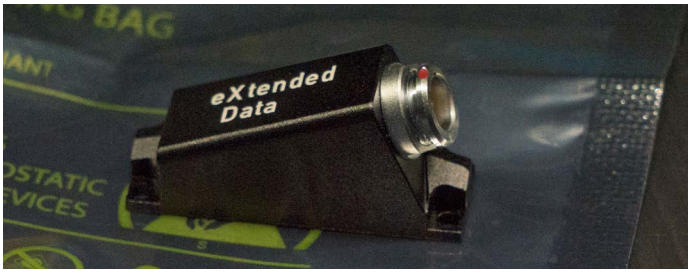
As Josef discussed in his interview, it's a Kanban Supermarket system. The logistics team fills up boxes with parts for each workstation.

Here's a Supreme Prime workstation with the main sub-assemblies.

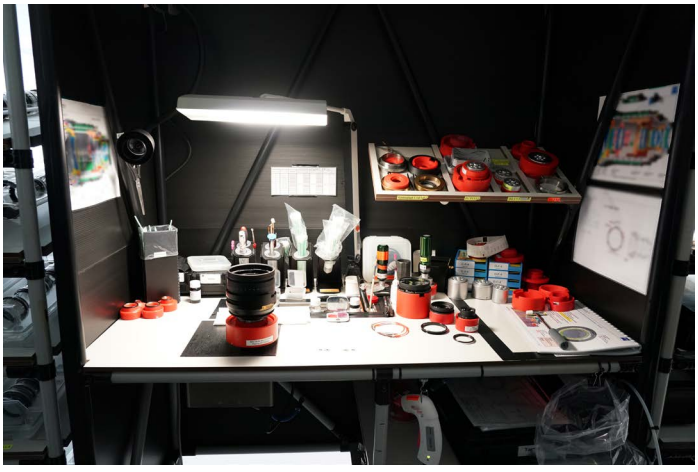


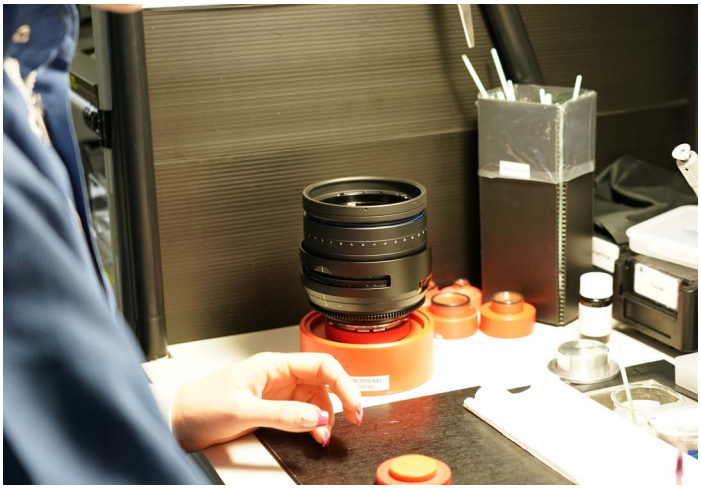


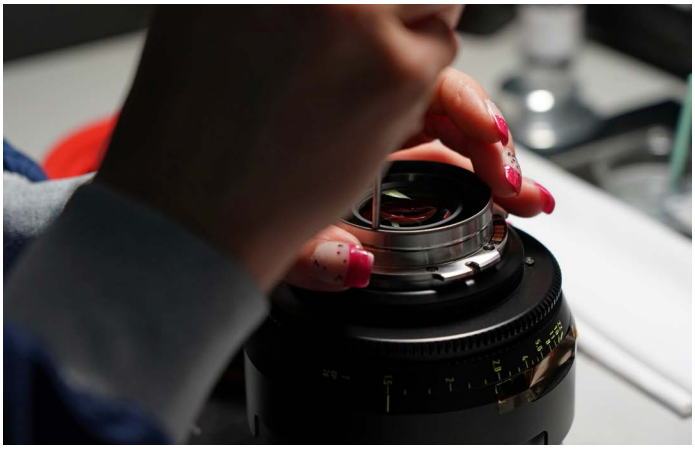
Below: Electronics board for eXtended Data.



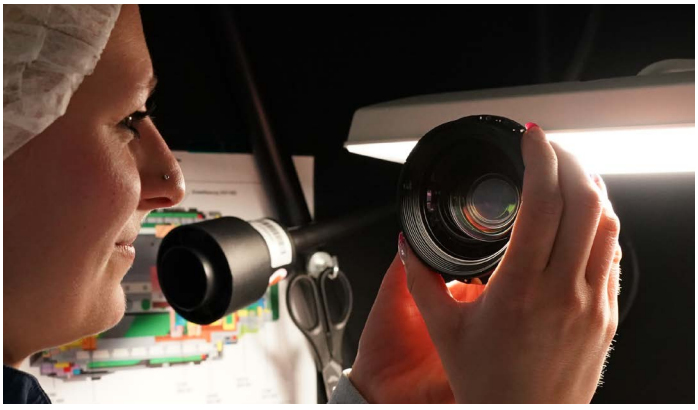
Lens Assembly

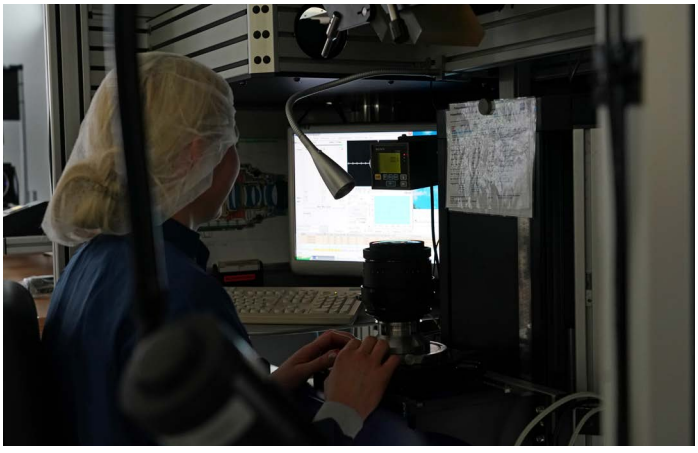


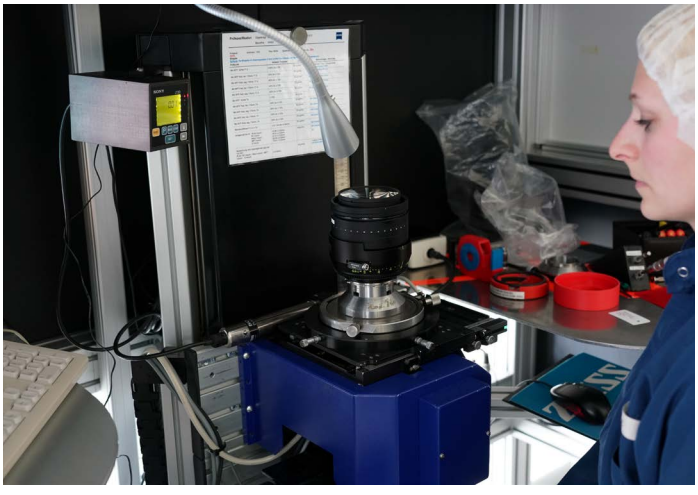




I suspect there is a secret sisterhood of manicures among lens technicians worldwide—in Germany, UK, France, Japan, USA...



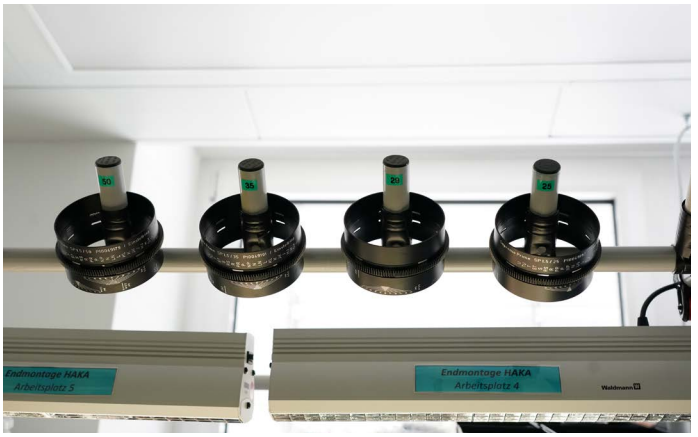




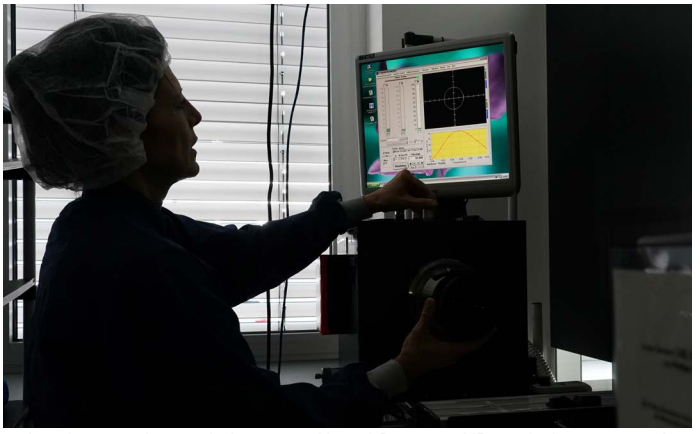
Checking lens on K8, above, and centering, at right.

Supreme Primes - Focus Scales

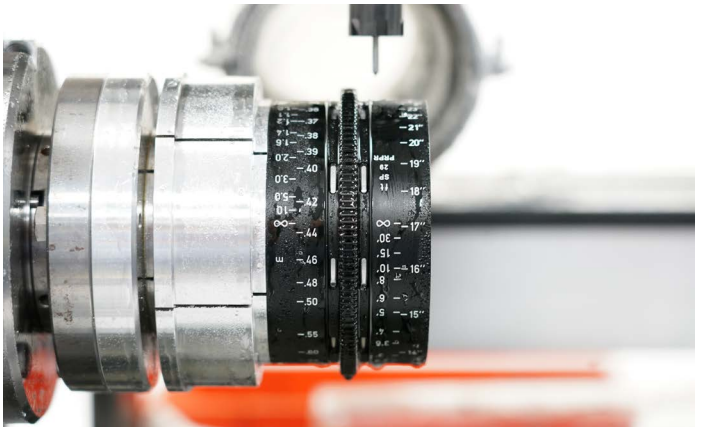
Each lens is checked on a ZEISS K9.



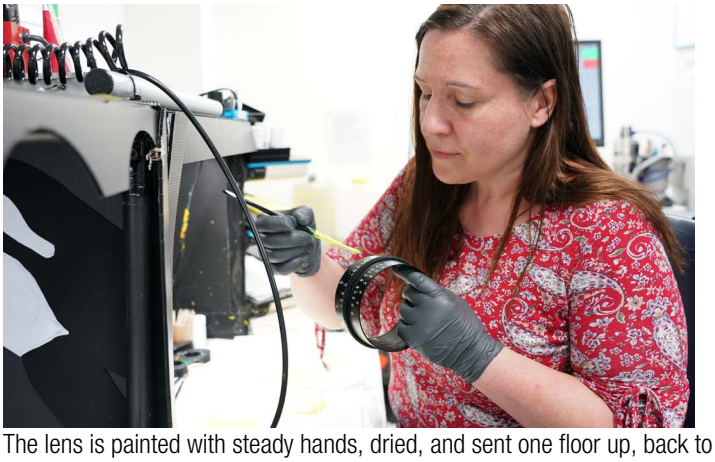
A test focus scale is selected for each focal length.



The lens is focused and the shows which scale is appropriate. In this example, the sharpest image is between N and P, so an NP scale is requested.



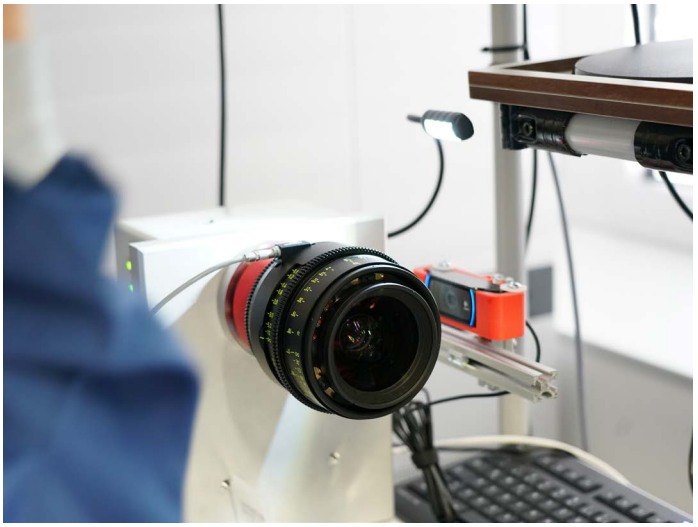
The order goes in to the engraving department, and an NP scale is made immediately. Notice that one focus ring has both feet and meters.



The lens is painted with steady hands, dried, and sent one floor up, back to the assembly department — to be fitted on the lens.

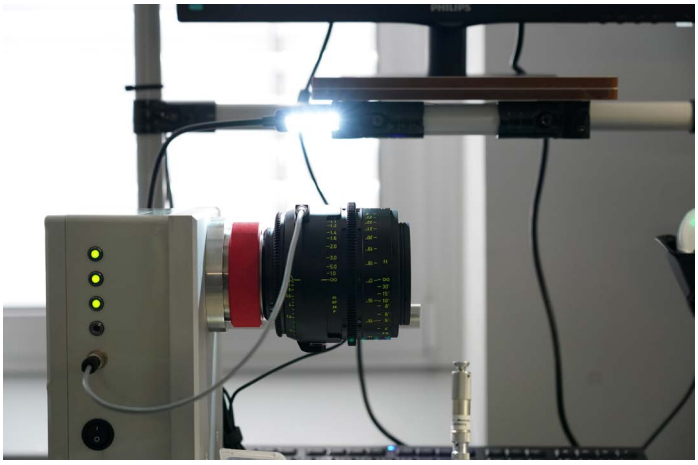
Supreme Primes - Calibrating Scales

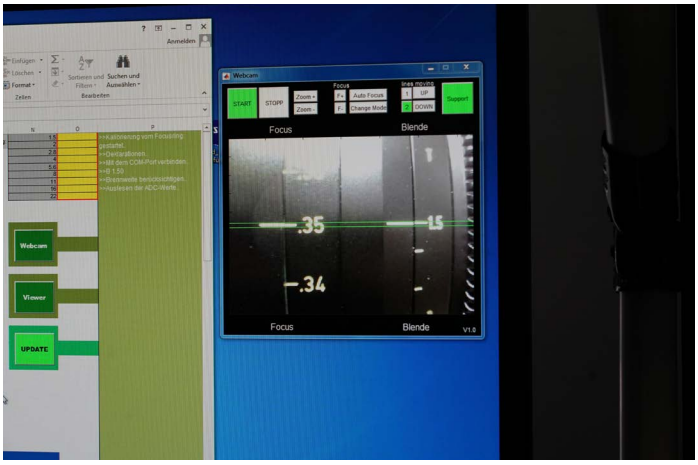
Engraved and painted focus and iris rings, witness marks and lens labeling.



The newly engraved rings are mounted to the lens and checked.

Focus and iris marked are checked against the XD metadata.





Rainer Dolderer (right) is Head of Repair Service at ZEISS. Simon Sommer is the ZEISS Service Trainer.

JON FAUER: Where are the ZEISS service facilities worldwide?

RAINER DOLDERER: We are based at ZEISS headquarters here in Oberkochen, Germany. We service more than 500 lenses a year. Authorized ZEISS service for the U.S. and South America is done by AbelCine, with offices in Burbank and New York. It's NAC in Tokyo and ARRI China in Beijing. We all have K8 and K9 test equipment and the same tools that our assembly teams use.

Do you give feedback to the manufacturing department?

RAINER: During the repair process, if we see patterns of optical or mechanical damage, we will contact our development department with issues that the customer had and suggestions on how to fix them. A lot of things we learn in service are implemented in the next generations of lenses. It's very important to have this information to improve the new lenses.

How does a rental house change a Supreme Prime focus scale from feet to meters? And how do they adjust flange focal depth?

RAINER: You get shim sets and you can adjust the depth the same way as other ZEISS lenses. Changing from feet to meters is easy: each lens has the Imperial and Metric focus scales engraved on the same ring. You simply flip the ring over.

Simon, tell us how you train technicians to repair Supremes.

SIMON SOMMER: We can invite people here to do the training for Supreme Primes or I often travel to rental houses around the world. We also have training sessions with our partners like AbelCine or ARRI.

A class, typically, is about 10 to 15 people. We begin with a selection of lenses on the table. I point out differences between a Supreme and other lenses, and what makes the design special. We discuss image quality and I do a demonstration of lens projection. We go to the K8 machine and measure MTF.

The participants get an understanding of how we do the lens service here at ZEISS, what kind of parts they need and what tools to use. It's very important for them to give customers the service they need very quickly. If somebody has a problem in the field, the lens usually goes back to the rental house. But for further service, the lens goes back to one of the authorized service stations. One of the most important things our classes teach is which technical support the rentals can do by themselves, and when they have to send the lenses back to our service centers.

Do you charge for the training classes? What special procedures and tools do rental houses need to service the Supremes?

SIMON: Yes, people pay for the classes. As for tools, we have a special holding tool to remove the rear group and another for the inner moving group that fits into the thread. Aligning image quality can be done visually on the projector, because you have to move two elements in front for center and field adjustment. Those are the 3 important things that you have to look at to service Supremes.

How often will you have services classes about the Supremes?

SIMON: As often as they like. Probably once a month, either here or at their facilities.

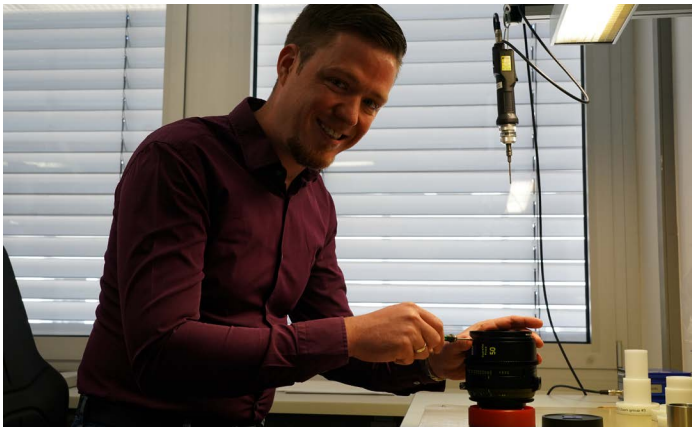
I have a feeling you will be getting many frequent flyer miles in the coming months.

Above: Service Department. Below: Service Office HQ in Oberkochen.

Below: Pictures of Service Department's Greatest "Hits."

Servicing a Supreme

Classroom is set up for service training session.



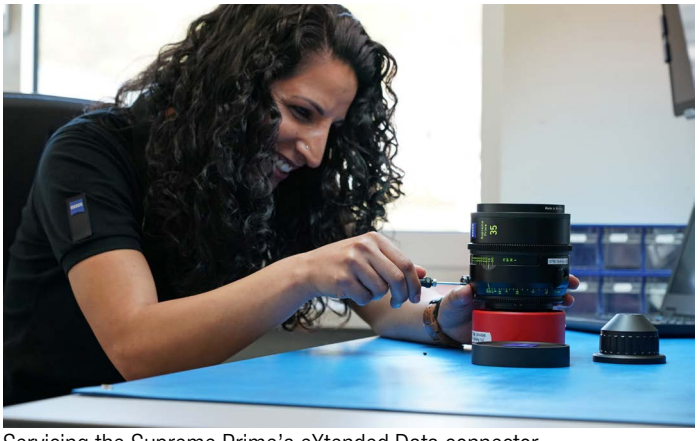
Simon Sommer servicing a Supreme Prime.

Simon removes the front assembly with front element.

Focus mechanism inside lens barrel.

Focus ring removed.

ZEISS K8 workstation in foreground.



Servicing the Supreme Prime's eXtended Data connector.

Connector removed, revealing electronics board beneath.

AJA Video Systems Celebrates 25 Years

Jon Abt, AJA founder and first hardware engineer

John Abt started AJA Video Systems with his wife Darlene in 1993 to develop simple digital parallel to serial and serial to parallel converters. Many of AJA's products at their core continue to bridge connectivity and simplify pro video workflows through video up, down, cross format conversion.

An engineer by trade, company founder John Abt is still very hands-on in product development. Most recently, he designed the two 12G-SDI KUMO routers announced at NAB 2018.

Prior to founding AJA, Abt spent eight years working at Grass Valley Group (GVG) just as the digital revolution in broadcast was taking off. He grew up in Grass Valley and holds BS and MS degrees in Electrical Engineering from California State University Sacramento. Upon graduating from college, he spent eight years working for KXTV, the Sacramento CBS affiliate. He worked in master control and that is where he met his wife Darlene, also a broadcast engineer at KXTV.

One advantage to being in Grass Valley is access to great engineers, thanks to deep historical roots in engineering innovation.

Abt explained, "Not far from AJA's campus, there is a building owned by Litton Engineering that's been there since the 1950s. It was an incubator for many of the technology companies in Grass Valley. That's where AJA was based in the early days. US Robotics invented the first 28K and 56K modems in that building, and there was a company there called Cyan that was a consultant for Atari and built some of the earliest video games. Coincidentally, back in the day, Steve Jobs, who was then with Atari, liaised between them and Cyan. Charlie Litton Sr. was a prominent defense contractor who moved to Grass Valley to start Litton Engineering. He lured Dr. Hare, the founder of Grass Valley Group, to the area and he also worked in the same building. He started the video technology legacy that has come out of this area."

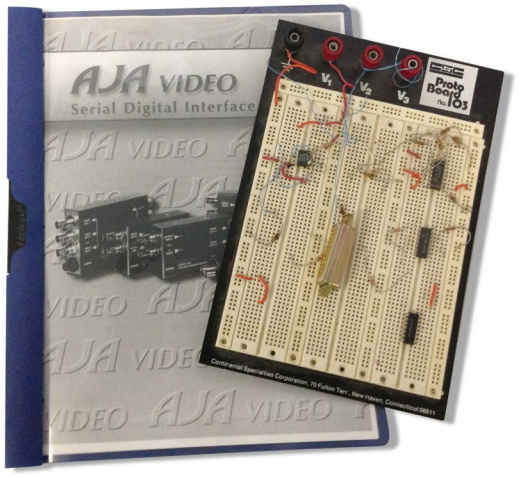
While Mini-Converters have been the bread and butter of AJA's business, there are several long lead products backed by years of development that have also hit big. AJA's first rack frame cards came out in 1997. The first PCI card, a single framestore, was released in 1998. At NAB 2002, the company introduced the first in its line of KONA cards: PCI cards for HD and SD real-time video.

The next turning point for AJA came in 2003 when a collaboration with Apple led to the debut of the Io. AJA developed the hardware and Apple developed the software. Several successful collaborations with Apple followed, including the Io HD which was the first hardware product to natively support ProRes. It offerred desktop power in a mobile video I/O device. The Io XT was AJA's first Thunderbolt device. The Ki Pro was the first affordable HD ProRes digital recorder and player.

The company pioneered the category of portable digital recorders with the release of the first Ki Pro in 2009, ushering in a new era of products that recorded edit-ready files, when the conventional path at the time was to record to tape. The FS family of frame synchronizers, often referred to by customers as the "Swiss Army

AJA Video Systems Celebrates 25 Years

Abe Abt in front of the AJA sign when it was located in the famed Grass Valley Litton Building



Top: Prototype of AJA Video's first Parallel to Serial Converters
Above: First product—C10PS Parallel to Serial Converter

Knives" of their digital workflows, because of their ways to solve any possible video bottleneck, have also been very popular. The latest FS-HDR was the first cost-effective product availble in the market to support live SDR to HDR, HDR to HDR and HDR to SDR conversion.

John Abt said, "You really have to look into the future when you're building a long lead product. Launching a new line can take two to three years of development, and you hope that by the time you hit the market, you've hit the right timing. We know we've hit the right note when we continue building on a family of products, and thankfully we have done that with our Ki Pro, KONA, FS, Io, KUMO, Minis and several other lines. You've got to find the right balance of form factor, functionality, feature support, ease of use, price and performance—and sometimes a bit of luck too. Having many years of experience in the business makes this balance and timing easier to predict, but it's never an exact science."

As AJA grows into new areas, the company continues to deliver pathways for video professionals blazing new workflow trails, from HDR to IP-based standards. Just last year, the company introduced its HDR transforms live converter, the FS-HDR, which provides a fast way to bridge into support for HDR in production, post and delivery.

IP (Internet Protocol) also represents a massive change for professional production and post. AJA believes that at some point IP is the way that everyone in the industry will be working because the technology will enable the most cost efficient production and delivery methods, with built-in embedding, disembedding, routing and metadata support.

The industry is still working through standardization, but AJA remains actively involved with industry standards organizations like AIMS (The Alliance for IP Media Solutions.) AJA recently announced SMPTE ST 2110 support for KONA IP and 10GigE support for 2K/HD video and audio over IP using the Io IP or Avid DNxIP, as well as new IP Mini-Converters for HDMI display at point-of-use.

In addition to its retail products, AJA has a thriving OEM business licensing proprietary technology to many leading third-party equipment developers in professional streaming, video, audio and broadcast. For many years, the company has also developed custom products for the digital cinema industry (DCI), designing and building components for in-theatre projection.

"While it's not something we market in the retail part of our business, our DCI products have pushed us to solve some incredibly complex engineering challenges while adhering to some of the most stringent security certifications in any industry," Abt said. "These development exercises in problem-solving translate to better engineering and new levels of support across all of our retail products as well."

As AJA's customers continue to evolve, the company looks ahead to products that will solve tomorrow's production and post-pro-

Views of AJA campus today

duction processes—while integrating with existing infrastructure. As customers adapt to working within IP structures, and as the demand for professional quality audio and video for online streaming and mobile devices continues to push upstream from the ProAV market, AJA is devising new products to support top quality content regardless of delivery outcome.

Quotes from long-time AJA employees

Bill Bowen, Software Engineer

Bill Bowen was the first software engineer and joined AJA in 1998.

"I had worked together with John at Grass Valley Group, and when I left to do consulting, I rented a desk in AJA's office in the old Litton Building. I knew I wanted to work with AJA, and once they needed software development, I was able to get in on the ground floor.

"Some of the coolest projects I got to be involved with at AJA were helping to define the architecture of our capture cards, being part of the launch of our OEM program and helping to get our DCI business off the ground. Today, I'm working on development of IP and HDR workflow products, and we have a lot of interesting advancement in that arena."

Jason McLachlan, Electronic Engineer in Hardware Design

Started at AJA in 2000

"The company has grown 10x since I first started working at AJA in the year 2000. Finishing my engineering degree at the time, I wore two hats as a combination hardware engineer and IT administrator. We've grown from a small company where everyone did a little bit of everything, to a 200-person company with a lot of very highly specialized engineers on staff.

"Over the years there have been many things I'll never forget. One was seeing our own SDI stream of HD video being interfaced for the first time to a high-resolution LCD display and thinking 'WOW, that looks like a poster!' We were continually challenged to make things happen that were supposed to be impossible, often requiring creativity and ingenuity. Fast forward to today, and we get to combine what we learned earlier with the big, powerful tools and simulators applied to much higher speeds and data rates.

"Grass Valley is a great community. It's been a great place to live and work. The fact that so many of the employees have been here for such a long time is a testament to the fantastic people here at AJA."

Prototypes for early Ki Pro Mini models

Design Model for the original Ki Pro

Kino Flo Plays with Fire

Kino Flo's new TrueMatch Firmware 3.0 introduces eight new lighting effects to their LED fixtures: Candle, Fire, TV, Police, Lightning, Paparazzi, Pulse and Scroll. The free upgrade will be available beginning June 1, 2018.

Each effect is available with the push of a button. Each effect mode comes with a choice of additional types.

Lightning, for example, has "Storm" and "Frankenstein." The Storm effect is modeled on the rate and amplitude of thunderstorm strikes, and Frankenstein displays brighter, more dramatic/cinematic light flashes. There is also rate control, and a cue feature using the power button.

Kino Flo worked long and hard on coding intuitive, hands-on software. It's like having an FX lighting console built into every LED controller. Presets in the **TV** mode setting, for example, are the result of hours measuring light and color variations on TV monitors throughout a programming day. In TV "Sports" setting, the lighting effect is biased toward cooler, deeper saturated blues and greens, and the light variation simulates outdoor sports, such as football or rugby events. The TV mode also comes with "Movie" and "Music Video" pre-programmed lighting scenarios.

All eight of the FX modes have four memory buttons to store custom lighting effects, for a total of 32 FX presets.

"We wanted to take some of the same lighting effects that board operators program remotely for motion picture or television productions and make the effects accessible onboard our Celeb, FreeStyle and Diva-Lite LED products," said Frieder Hocheim, President and founder of Kino Flo Lighting Systems. "We will continue to add features like FX lighting to our LED lighting systems to ensure customer's Kino Flo lighting tools stay sharp."

Settings and tools for the other 6 FX modes:

Candle: Simulates a candle flame. It has "Interior" and "Breeze" settings. Interior is a typical, small candle flicker. Breeze flickers as well, but with larger jumps in brightness.

Fire: mimics an open fire. Pre-programmed under Fire is "Firepit" and "Gas Fireplace".

Police: Simulates police and emergency flashing lights. The five types are, "Blue + Red"; "Red"; "Yellow"; "Blue + White + Red"; and "Blue".

Paparazzi: Simulates random still photo camera flashes. Comes with "Red Carpet" and "Stalker". Red Carpet has very quick, frequent and random flashes. Stalker flashes less frequently, with longer pauses between bursts. You can also use the Power button to cue flash effects.

Pulse: Repeats colors, like a flashing neon sign. There are no pre-programmed types for Pulse. Parameters are set by using the "Hue", "Saturation", "Rate", and "Length" (LEN) controls in the Pulse mode menu.

Scroll: Light changes over a period of time. Like Pulse, there are no preset FX lighting types, but parameters are set using the "Time" and "Saturation" (SAT) controls in the Scroll mode menu.

In addition to the new FX features, Kino Flo's True Match 3.0 firmware comes with other light control enhancements, such as an adjustable Frequency setting, duel Antenna controls for DMX wireless reception, color value sharing, and refined DMX dimming.

The default frequency setting on Kino Flo LED controllers is 30kHz, which generally is flicker-free for most productions shooting on HD or film cameras up to 240 frames per second. However, with the new firmware, the frequency can be dialed up to 300kHz when shooting at higher frame rates and shutter speeds.

For clear, stable DMX wireless reception, Kino Flo LEDs come with two built in antennas. With TrueMatch 3.0, users can manually select the smaller, internal #1 PCB (printed circuit board) antenna, or elect to stay with the #2 EXT (external) antenna, the more powerful of the two antennas.

New mode features within the General Menu allow users to translate RGB values to Hue & Saturation values, and to make other settings changes that take effect only after exiting the General Menu.

Dimming & Color Consistency

Kino Flo has refined further its LED dimming and color controls. The new firmware profile ensures color compatibility from fixture to fixture even when light levels vary widely.

The industry has been asking for LED fixtures with a consistent, controlled dimming curve that doesn't affect the color saturation when moving between 100% and 1% light output. The latest firmware update to the Kino Flo line of fixtures ensures a superb levels of consistency.

Pierre Angénieux ExcelLens Tribute at Cannes

Photos by Pauline Maillet

71st Festival de Cannes, May 18. Ed Lachman, ASC received this year's Pierre Angénieux ExcelLens Lifetime Achievement Tribute for Cinematographer at Cannes.

The evening unfolded promptly at 6pm on the red carpet, where security was tight, sunglasses were banned, and even selfies of the ritual stair climbing exercise were strictly discouraged this year. Celebrants progressed to the rooftop aerie of the Mouton Cadet terrace overlooking Cannes Yacht Harbor for a magic hour of cocktails and conversation.

The 6th edition of the Angénieux ExcelLens presentation was held in the Salle Bunuel theater of the festival hall. Cannes Director Thierry Frémaux reminisced how he had first met Ed at Telluride and was a terrified passenger as Ed took him for a spin at high speed on a mountain road.

Raphaël Keller, Director of Innovation, Video and Technical industries at the CNC (Centre National du Cinéma et de l'Image Animée) and Severine Serrano, Managing Director of Angénieux International Sales & Marketing took the stage.

Suzel Pietri, Director of Orbis-Media, described the origins of the Angénieux Tribute. She was flying home to France from a Singapore film festival. Her seat was defective. A gallant gentleman offered to swap seats with her. It was Dominique Rouchon, Deputy Managing Director of Angénieux International Sales & Communications. They talked about film for the next 14 hours. The ExcelLens Tribute was hatched on that flight.

Todd Haynes spoke eloquently about Ed. They had worked together on *Far from Heaven, I'm Not There, Carol* and *Wonderstruck*.

Emmanuel Sprauel, President of the Angénieux brand, gave a moving speech. He began, "Dear Ed and Cecile, dear Todd, dear Thierry Frémaux, dear partners and friends, dear all...

"It is, of course, a great pleasure to be here with you and to share with my words and your eyes this moment to honor your passion and the way you crafted images to present and share stories with the public.

"When I was a child, my father showed me his 8mm camera. It was a Beaulieu with, guess what, an Angénieux Zoom.

"Of course I understood what a camera was designed to do: make films. At that time, when digital did not even exist, it needed a certain level of technical knowledge. But I was unaware of what was the real purpose of my father's camera and what emotions this camera would make me feel.

"I realized, as soon as I began to use it, the incredible joy to touch it, to capture images and moving scenes, and later on to share my frame of mind. It was a way to share my vision, with my eyes behind a camer,a with the people I loved. It was a way to capture, in a unique and personal way, a piece of the present, always running as a flow. It was a way to be able to transport, from he present to future times, the pleasure of this instant. It was a way to prepare and to become prepared, to remember this instant, to remember what we have now.

Pierre Angénieux ExcelLens Tribute at Cannes

"As a consequence, it was a way to learn and become conscious of what we will not have any more, vanishing as soon as it has happened, unless we did succeed in capturing it, or a part of it, or the sense of it, with the eyes and the frame of the camera.

"A journey through time.

"As many of us, I have been truly moved by the vision of these home-made films with family and friends. It was my first taste of cinema, a real life experience with authentic image characteristics, that has become recently attractive again as 'vintage look.' I am sure the attraction for 'vintage' comes not only from the image characteristics but also from a collective memory of the flavor of past times. It is the kind of emotion that happened again when I viewed recently *Carol* and its very special colors.

"Then comes art and photography, and it is when my story is ending that yours, Ed, is beginning, when the technique becomes of some importance to support your intentions, to translate your esthetic vision on things and people, and to express your views and emotions in front of the reality of life. I am pretty sure that your inner passion has a true link with mine and to all those who experienced such emotions in their lives.

"What a challenge to expose and to share your personal vision of life with the public. What a challenge to create the atmosphere that will give the public the sense of the situation and envelop them with it. In each moment of the film, your creativity and our products are absolutely complementary to have it happen. Of course, it does not emerge out of the blue, but rather, it comes from maturity and careful settings. As in the film *Carol,* when you painted the relationship between Carol Aird and Therese Belivet, you chose the colors and the esthetics and the 16mm format.

"In any case, as the President of the Angénieux brand, be sure all the people in Angénieux share the passion to help you bring your vision to life. We all are truly dedicated to make the best products for your eyes and hands so that you could simply forget them, because they simply suit you the best. Angénieux is a star brand in the cinema industry in the world, and we all are very proud, here in the most famous cinema Festival in the world, to dedicate the 2018 Pierre Angénieux ExcelLens in Cinematography Tribute to you. Thank You."

Todd Haynes and Ed Lachman

Pierre Angénieux ExcelLens Tribute at Cannes

Ed Lachman and Emmanuel Sprauel

Xu Zheng, Cecile Zhang, Severine Serrano

Emmanuel then presented the 2018 Pierre Angénieux ExcelLens in Cinematography: an Optimo 28-76 zoom lens.

Ed Lachman was deeply moved. He replied, "For me the challenge of cinematography is revealing, or trying to evoke, the poetic or psychological authenticity of the image in the story you are telling. Images aren't only around pleasant pictorial aesthetics but also can be the projection of the emotions for the characters in the story. Images are about experiencing something with your camera, it is the immediacy of that experience inside yourself that you are able to translate, and you can share in a documentary or narrative form."

Angénieux also honored a rising star young cinematographer this year for the first time. Chinese cinematographer Cecile Zhang graduated with a BA degree with honors from the Beijing Film Academy, and is currently completing her Masters Degree there. Her impressive show reel was screened.

Severine Serrano, Managing Director of Angénieux International Sales & Marketing, walked to the podium on stage and said, "It is a great pleasure for me to be here with the best professionals in the cinema. We will see clips of your films, watch "the making of" behind the scenes and hear tributes to your work tonight.

"Whether for a feature film, a television series, commercial, documentary or a video clip, the image is at the service of the director and the narrative idea. In this creative process, cinematographers are an essential link. For decades, the aesthetics and technological requirements of cinematographers have helped build the success of Angénieux optics. I would like to thank the partnership between the Cannes Festival and Angénieux to pay tribute to these professionals of the image without whom the cinema would not exist.

"For more than 80 years, Angénieux has been transmitting its passion, its excellence and its love of beautiful images with one principle only: technology serving the creation of art.

"The important cultural practice of the young generation is the image of the cinema. What better thing is there than to put the generations together? And that is why this year, for the first time, Angénieux wishes also to highlight the work of a young talented cinematographer from the international film community.

"The Chinese cinema surprises us, it radiates more and more, and a true diversity of contemporary production exists. Angénieux has been supporting this development for many years.

"Coming from China, received with great honors at the Beijing Film Academy, with a strong experience with a various feature films, video clips and commercials. Cecile Zhang explores with dynamism new territories of creativity, and every time carries with it all the energy of a new generation of cinematographers. She is a member of the group of women filmmakers of the ICFC (International Collective of Female Cinematographers.

"And so, Angénieux has chosen Cecile Zhang—to promote her work and to gives her the opportunity to use, on one of her next productions, an Angénieux zoom lens In honoring your work, Miss Cecile Zhang, your young talented career, and Mr. Ed Lachman, your recognized career in the industry, Angénieux wishes to congratulate you on the occasion of this ceremony, the Pierre Angénieux ExcelLens in Cinematography Tribute, which recognizes both of you as great professional and honors your and attachment to the values of passing on knowledge. From the creation of images to the thought of the visual narrative in the continuity of your work, we honor you, Ed and Cecile.

"Congratulations, Ed. *Gōng xi nǐ*, Cecile. Thank you. *Xiè xie*."

The high point of the evening for many was a wonderful, moving, often funny series of videos about working with Ed: from directors, actresses, actors, artists and a photographer dangling outside Ed's window in New York, and Christopher Doyle, Julianne Moore, Mark Wiener, John Malkovich, Volker Schlondorff, Peter Sellars, Ulrich Seidl, Michelle Williams, Werner Herzog, Willem Dafoe, Sofia Coppola, Greta Gerwig, Steven Soderbergh, Meryl Streep and Wim Wenders.

Chris Doyle, HKSC, winner of the 2017 ExcelLens Tribute, mused in his video what was under Ed's hat.

Werner Herzog (Pelicula o Muerte, Film or Death) talked about the time they were filming *La Soufrière* on Guadeloupe and Ed asked what would happen if the volcano erupted. Herzog gleefully remembers telling Ed that they would all be airborne.

The finale was Daft Punk's Thomas Bangalter writing an homage to Ed on a glass screen: "Dear Ed, With a camera you make music for the eyes. Thank you for sharing with us your vision and the unique light in your smiling eyes. Bravo for tonight and congratulations. Love Thomas / Daft Punk."

Pierre Angénieux ExcelLens Tribute at Cannes

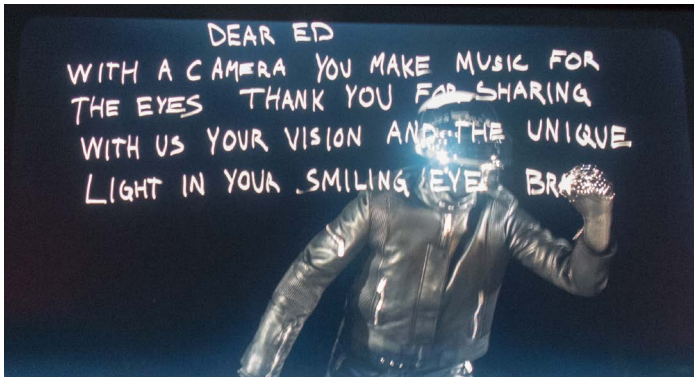
Cecile Zhang, winner of Young Cinematographer Tribute

Ed Lachman, ASC, winner of the 2018 Pierre Angénieux Tribute

Franz Kraus, Emmanuel Sprauel, Dominique Rouchon

Thierry Frémaux, Director of the Cannes Film Festival

Raphaël Keller, Director of Innovation at the CNC



Dear Ed, Love Thomas / Daft Punk

RED Simplified: MONSTRO, HELIUM, GEMINI

The phone connection was crackling in Cannes. Jarred Land and Brent Carter were on the line. "Uh-oh," I thought. "What camera name had I managed to mangle this time?" I was eternally on red alert for messing up the names of RED cameras and sensors in these FDTimes reports.

But honestly, how could any mere mortal remember that a RED W8K VV MOSNTRO really should be called a RED Digital Cinema Weapon 8K VV Camera with MONSTRO Sensor, not to be confused with a RED 8K VV Epic Camera with DRAGON sensor or a RED Weapon 8K Helium? And what about carbon fiber, aluminum, medical white or Xenomorphs? (WEAPON and EPIC are bodies, MONSTRO, DRAGON and HELIUM are sensors. Fincher gets Xenomorph bodies and brain surgeons get the white ones, along with a few lucky DPs.)

My head was spinning and it wasn't just from jetlag, back-to-back screenings while wearing a too-tight tuxedo, hearing Élodie Bouchez discuss improvisational acting on "Guy," or bottomless glasses of Rosé at Optimo and Summilook soirées.

And then, as any good French neo new-wave existential screenplay would have it, a cool, calm wind blew across the Croisette and this agony of mind, this creeping pain that gnawed and fumbled and caressed and never hurt quite enough—this moment to jump across the precipice, to exist—suddenly there was meaning.

Meaning—it was the voice of Jarred in the earbuds, "We are simplifying to avoid confusion. We are going to unify all models with the popular DSMC2 body, the same WEAPON brain—the powerful circuits inside, but we're going to get rid of the body name. We'll name the camera by the sensor, sort of like what you and many others have been calling them all along. They will all have the camera brains of the WEAPON, and the different models will be determined by the sensor. The sensor will be like the film stock.

"This a great way for anybody to get into the system. The cost of the brain goes down, and they can upgrade the sensor."

Whew. So here's the way it will work, and the result is a line of cameras that's easier to distinguish at basically more affordable costs. Essentially, there will be 3 models of REDs to remember:

DSMC2 MONSTRO has the same specs as the WEAPON MONSTRO 8K VV camera. The body is available in aluminum alloy and, on request, in Carbon Fiber.

DSMC2 HELIUM has the same specs as the WEAPON HELIUM 8K S35 camera. The body is made of aluminum alloy. On special order, this camera is also available with a HELIUM 8K S35 Monochrome sensor.

DSMC2 GEMINI has better data rates and REDCODE settings than the EPIC-W 5K S35 GEMINI camera. Otherwise, the rest of the features are the same. It's available in aluminum alloy.

Here are more details. The prices are as if you were walking into a RED store and buying a camera from scratch. We'll get to upgrades in a moment:

DSMC2 MONSTRO: $54,500

This is the top of the line 8K VV (Full Format) camera with MONSTRO sensor: 35.4 Megapixels, 40.96 x 21.60mm (46.31 mm Ø), 60 fps at 8K Full Format (8192 × 4320), 75 fps at 8K 2.4:1 (8192 × 3456), etc. By the way, the MSRP of this camera was previously $79,500. So it's now much more affordable to jump into Full Format at a very competitive price.

DSMC2 HELIUM: $24,500

This is the 8K Super35 camera with a Helium sensor: 35.4 Megapixels, 29.90 x 15.77mm (33.80mm Ø), 60 fps at 8K Full Format (8192 × 4320), 75 fps at 8K 2.4:1 (8192 × 3456), etc.

DSMC2 GEMINI: $19,500

Formerly known as GEMINI 5K S35, it has RED's highest-sensitivity sensor and captures very low light scenes with little noise and superb shadow detail. The 15.4 Megapixel Dual Sensitivity, full-height, 18mm high Sensor is 30.72 x 18 mm (35.61mm Ø), 75 fps at 5K Full Height 1.7:1 (5120 × 3000), 96 fps at 5K Full Format (5120 × 2700), 120 fps at 5K 2.4:1 (5120 × 2160), etc. If you're shooting S35 anamorphic, the 18mm vertical, full-height image area will not introduce a crop factor.

Meanwhile, back in Cannes, I ducked into a quiet alcove on the Gray D'Albion's rooftop, where the signal strength was sufficient to start up a quick Q&A with Jarred and Brent.

RED Simplified: MONSTRO, HELIUM, GEMINI

JON FAUER: This really simplifies things, doesn't it?

JARRED LAND: By going to just a single brain called "DSMC2" and then referencing the sensor, it just simplifies the lineup and makes it so much more intuitive. You have the brain, now pick what sensor you want in it. Since people have been calling their camera by the sensor name for years anyway - a "DRAGON", a "HELIUM", and so on, it just made sense to simplify our lineup that had gotten complicated over the years."

Was this unified Brain idea on your brain for some time?

JARRED: "You and I have talked the last year or two about my goal to eventually get to a single unified brain with sensors becoming the only variable, and today we have finally have achieved that goal.

How does that affect manufacturing?

BRENT CARTER: By committing to a single brain, we get to the quantities that allow us to work with new manufacturing and supply chain partners. And those economies of scale get us to the point where we can really affect the total cost of a brain.

How were you able to get the prices at these reasonable rates?

JARRED: We had to take a step back and look at how we started. It was with a RED ONE at $17,500 that changed the industry. We needed to get back to where people could get our top-of-the-line camera specs for under $20K. That required a lot of tough choices and a re-thinking of our business, but it is right to do this for our customers. I don't know if this pricing is short-term or long-term, but we will do our best to keep costs down so we can keep it here as long as possible.

What about upgrades from existing cameras?

After releasing the GEMINI sensors, we have gotten a ton of emails from customers who had yet to get into the DSMC2 line. They wanted to know how they could finally make the jump to DSMC2. So, we are also opening up some more upgrade paths because I really want everyone to have a proper chance to get into our current line.

Upgrades to Gemini?

$12,500 for an upgrade from Scarlet-W to DSMC2 Gemini.

$14,500 upgrade from DSMC1 Dragon to DSMC2 Gemini.

$4,950 to upgrade Epic-W internals to the new unified DSMC2 (Weapon class) brain.

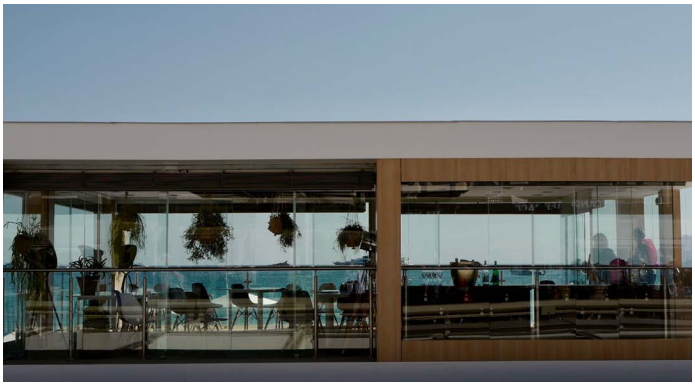
And what about upgrades to DSMC2 MONSTRO 8K VV?

BRENT: It was $29,500 if you had a WEAPON. But, now the price is $39,500 to move into MONSTRO from most other cameras (HELIUM 8K S35, WEAPON 6K DRAGON, DSMC2 HELIUM or GEMINI 5K S35.)

See chart online: tiny.cc/upgrade-to-DSMC2

Summilooks à Cannes

The darkness and rain that hung heavy over the beaches of the Croisette lifted. And the festival organizers at Cannes said, "Let there be light." And there was light. And the light was good. And the intrepid CW Sonderoptic-Leica team could not separate the light from the darkness as they presented their lenses to cinematographers and attended day and night screenings of films created with their Summilux-C and Summicron-C and Thalia and M 0.8 lenses. The screenwriters called the light "DAY" and the darkness "NIGHT," and the cinematographers clamored for lenses that offered unique looks and were always beautiful. And on the sixth day, there were award presentations. And the Leica team saw what the filmmakers had made, and it was all very good. But they did not rest.



Top and above: Nespresso Plage.
Below: Winner of La Semaine de la Critique Leica Award for best short film, Jaqueline Lentzou for *Hector Malot: The Last Day of the Year*

Above: DPs trying out Leica and CW Sonderoptic lenses.
Below: At La Semaine de la Critique, l-r: Laura Kaufmann, Emmanuel Froideval, Gerhard Baier, Ariane Damain Vergallo, Tommaso Vergallo.

Summilooks à Cannes

The Cannes Film Festival has a category called *Un Certain Regard.* It literally means "A Certain Look." Now, isn't that appropriate. It looks like a lot of DPs liked Leica looks, and so did the juries.

Four of the films awarded top honors at Cannes this year were shot with Summilux-C, Summicron-C, Summilux-R, Summicron-R and Summicron-M lenses.

PALME D'OR

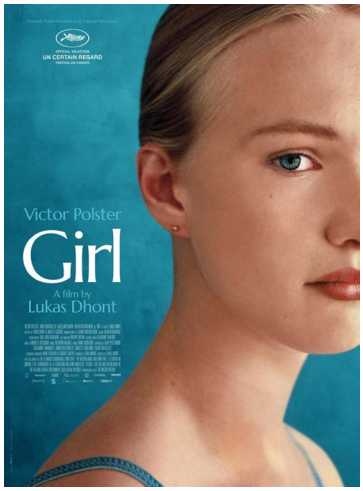
The Palme D'Or is the top prize at Cannes. It was award by Jury President Cate Blanchett.

Manbiki Kazoku (Shoplifters, Une Affaire de Famille)

Director: Kore-Eda Hirokazu,
Cinematographer: Ryuto Kondo

Camera and Lens Equipment supplied by Sanwa Cine Equipment
1 Arricam ST 3-Perf Camera
1 set of Leica Summicron-C primes: 18, 21, 29, 40, 75, 135mm T2.0
1 Angénieux Optimo 24-290mm
1 set of Tiffen Antique Pearlescent filters

Storyline: "Osamu and his son come across a little girl in the freezing cold. At first reluctant to shelter the girl, Osamu's wife agrees to take care of her after learning of the hardships she faces. Although the family is poor, barely making enough money to survive through petty crime and shoplifting , they seem to live happily until an unforeseen incident reveals hidden secrets."



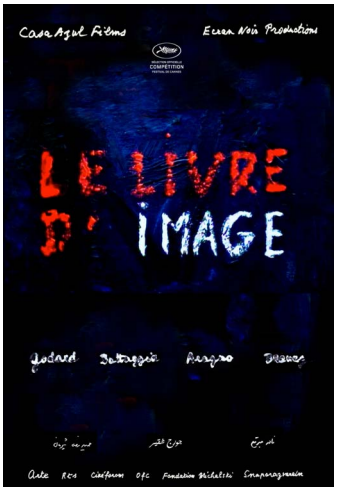
LA CAMÉRA D'OR
Awarded by Ursula Meier, President of the Caméra d'Or Jury.

Girl

Director: Lukas Dhont

Cinematographer: Frank van Eeden

ARRI Alexa Mini
Leica Summilux-C lenses



SPECIAL PALME D'OR
awarded by Cate Blanchett

Le Livre D'image (Image Book)

Director: Jean-Luc Godard

Cinematographer: Fabrice Aragno

Sony α7 II camera
Leica Summilux-R, Summicron-R, Summicron-M lenses

LA QUINZAINE DES RÉALISATEURS (DIRECTORS' FORTNIGHT) SACD Prize

En Liberté (The Trouble with You)

Director: Pierre Salvadori
Cinematographer: Julien Poupard, AFC (at left, photo by Ariane Damain Vergallo)
ARRI Alexa Mini camera
Leica Summilux-C lenses.

Julien Poupard, AFC attended la Fémis film school in Paris. After graduation, he interned at several equipment rental companies and then as a Camera Assistant.

In 2013, Poupard shot Claire Burger's *Party Girl.* It won a Caméra D'Or at Cannes. In 2016, he shot Houda Benyamina's *Divines* which also won a Caméra D'Or and then three Césars.

En Liberté takes place on the French Riviera. Yvonne is a detective and young widow of the former police chief. But she learns that her husband was not exactly a model of virtue.

Julien Poupard talked about the virtues of Summilux-C lenses. "I liked them a lot....their T1.4 aperture for night shooting practically without any additional lights, resulting in an interesting silkiness and a feeling of both sharpness and softness. We used the Alexa Mini and composed in Super 35 spherical widescreen (2.39:1). It was a simple configuration, which I like. Keeps it all human."

Logan Schneider on ARRI Alexa LF and Signature Primes

Cinematographer Logan Schneider talks about "Papa," shot with Alexa LF and Signature Primes. It's online (arri.com/largeformat)

I don't think of the Alexa LF camera as being sharper, rather it has increased clarity. The unique depth of field and visual compression were welcome additions to my tool box. Because I know this sensor so well already, I was able to immediately drop into the creative process rather than fussing with the camera.

The Signature Prime lenses are a leap forward. The look and feel are completely new, consisting of a pleasing contrast level combined with a radical clarity. I'm not sure how they pulled this off, but they were wonderful to work with."

Clarity

I don't think of this camera as being sharper, rather it has increased clarity. The tendency of high resolution cameras and modern lenses has been to appear overly sharpened or "snappy". Focus is razor-sharp, can be quite harsh and at times distracting. I believe that when we lost the 15 micron thickness of film emulsion, we lost the focus roll-off that was one of the elements that helped images feel natural and immersive. Since then, we've been going down the rabbit hole of vintage glass and de-tuned lenses. Yes, there are unique aspects to these lenses such as flares, but much of the time these lenses are chosen primarily to take the "edge" off of the modern sensors.

What I found unique about the combination of the LF and Signature Primes was that I was seeing all of the information associated with 4K+ resolution, but the focus roll-off and contrast of the in and out of focus areas were much calmer. Focus didn't snap in. It rolled in. Basically, it felt like looking through a window. I couldn't feel the plane of focus and I couldn't feel the texture of the lens. It felt wonderfully natural and clean. I'm still trying to figure it out. This is my take on the glass component of the equation.

To me, the Signature Primes represent a serious progression equivalent to the creation of Master Primes after the Ultra Primes. It's a new thing.

They feel lower contrast, but can handle an extreme contrast range. While testing before the shoot, I opened the door from the dark test space out to the burning Burbank sun, perhaps a 10 stop difference. The edge of the doorway was a clean, straight line, even wide open. The lower contrast helps mellow out the high resolution sensor. Also, the Signature Primes feel consistent throughout the whole iris range. This is a first in my experience, and proved very useful when dealing with the challenges of the Depth of Field. Many lenses, even modern lenses, shift character and contrast as you change the T-stop, especially wide open. The glass performance of the Signatures, combined with the large number of curved iris blades, allowed our close-ups, shot around a T4, to cut seamlessly without altering the character of the lens. Focus was subtle. It did not snap in, and was often hard to judge critically, as it would at times only present itself when something went out of focus. The scenes felt present and real, as I mentioned earlier, like looking through a window.

Because of these qualities, I hesitate to call the Signature Prime lenses sharp. I started to refer to the character of these lenses in combination with the LF as having a clarity to them. They lack the harshness of most modern glass. Clarity describes the clean feel and lack of distraction in the focus plane.

Depth of Field

The depth of field and visual compression were welcome additions. Large Format/ Full Frame combined with a T1.8 aperture provided a unique look. I shot almost all of the wide shots at a T1.8 to accentuate the isolation in the frame, stopping down to a T4 or T4/5.6 for close-ups and inserts. I was fortunate to have the wonderful Valentine Marvel pulling focus, which was a crucial thing.

Technical Details

We shot the Alexa LF at 4.5K, 2:35:1 spherical aspect ratio, ARRIRAW, rating the camera at 800 ISO. I viewed regular Arri Rec 709, because I know it well and I didn't want to introduce another variable to the very busy shoot days. One of the nice things about using the camera was that our DIT, Pat Paolo, didn't have to change

anything on his system other than to order faster drives. All the other components fit right into his normal SXT Codex workflow. The short was graded at Neon Diesel Finishing by Aaron Peak, who did a great job of keeping things dark and natural.

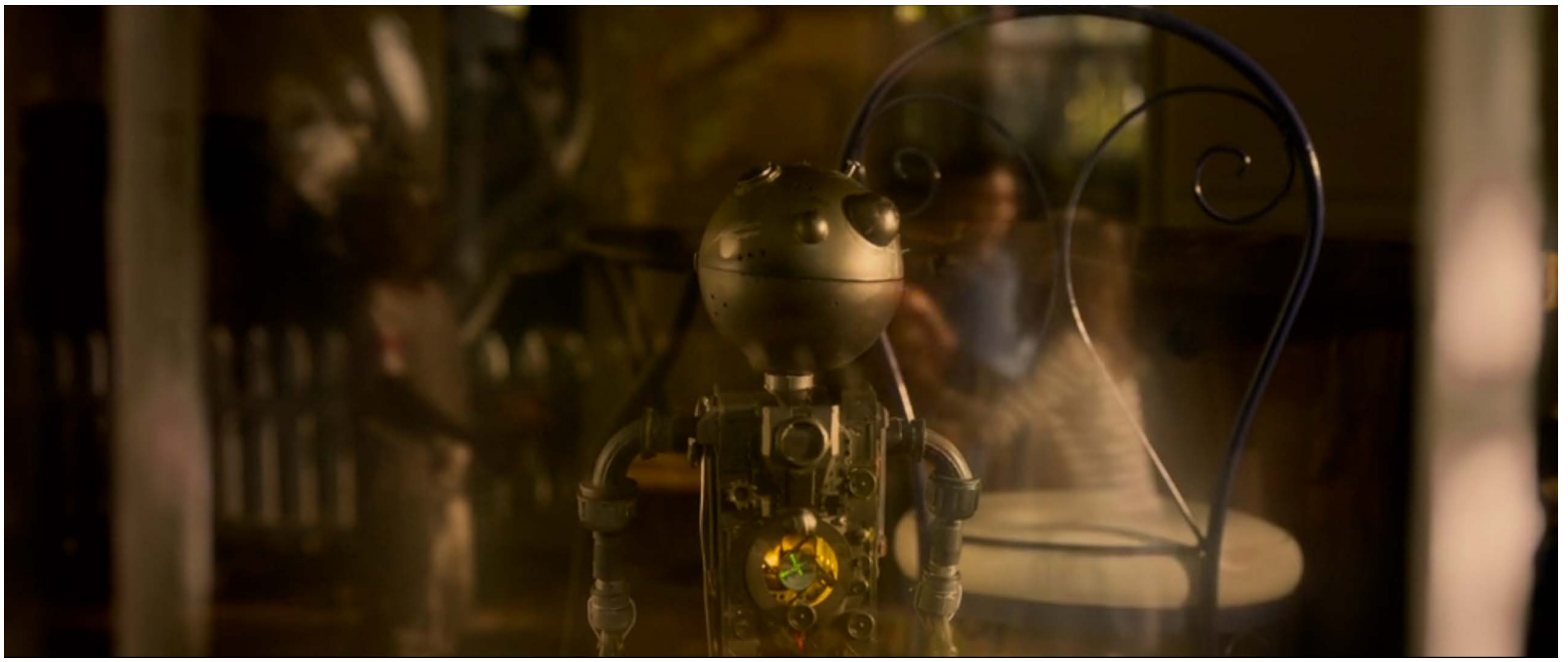
Full Format

I think that everyone will be experimenting with full frame in the coming months and years, and it will eventually find its place parallel to Super35 and Anamorphic. I think that the bigger the exhibition format, the more significant the impact, and that will be a factor. I'm very glad that the LF will allow cinematographers to have ARRI as an option for 4K-mandated projects, which are becoming more and more common, even outside of Netflix.

About "Papa"

This shoot was not designed as a test. I met the director, Doug Petrie, through Janina Gavankar, an old friend who was serving as producer. Doug has a long history as a writer and showrunner and had written this script to promote himself as a director. We got along well and were already in preproduction when I called a friend at ARRI about something else and he asked me what I was shooting in January. I mentioned that I was shooting this short film and he asked if I would like to try something new. Of course!

We shot 30 scenes in two days, all of which had unique lighting setups. In that time we did not wait for the camera at all or have to baby it as a prototype. We lit the same way as we would have regardless of the format and we framed the same as well. The only functional adjustments was stopping down for close-up work, which was never a problem with an ND in the mattebox. In my opinion, the best way to learn about a camera is to put it in a real world scenario and that's exactly what happened on this project.



Kieran Fowler NZCS ACS on Alexa LF and Signature Primes

Kieran Fowler said, "I was impressed by the quality of the lenses and how light they were. I enjoyed the way they reacted with the direct street lights, the extreme shallow focus along with the occasional 'red orb' flares. They look beautiful on faces with a nice amount of sharpness and a beautiful focus fall-off.

"Now that the Alexa LF captures true 4K, I think it will be good on Netflix and other shows that require true 4K acquisition. I think the image quality of the larger format lets you work with the creative choices of shallow focus and how that could tie in with story and narrative, and is good on larger screens."

ARRI cforce mini RF lens motors

The ARRI cforce mini RF is an intelligent lens motor with an integrated radio module that eliminates the need for an additional camera-mounted receiver unit.

The cforce mini RF is based on the ever-popular cforce mini motor. It includes the latest iteration of ARRI's white-code radio module with improved interference resistance, and six additional radio channels compatible with the Wireless Control Unit WCU-4 SUP 3.1. It comes with the high-quality outdoor antenna already used on the UMC-4 motor controller.

The ARRI cforce mini RF can pair with up to three hand units for split focus, iris and zoom operation. For example, the Focus Puller can have one WCU-4 for focus. The Second AC might have the second WCU-4 for a delicate and slow push in on the actress's profound and dramatic moment. And the DP can have the third hand unit to ride the iris.

The cforce mini RF motors provide full lens data for focus mapping and lens data display with the WCU-4 hand unit.

The cforce mini RF motor system uses an LBUS interface. You can use one, two or three cforce motors daisy-chained together. The new CAM connector provides a versatile interface for power supply and run/stop control with ARRI and other cameras (e.g. RED, Sony, Canon and Blackmagic).

- Integrated white-coded radio module eliminates the need for an additional receiver box
- 14 radio channels
- Lens data support for focus mapping and lens data display on WCU-4 hand unit
- Daisy-chainable with additional classic cforce motors and LBUS devices
- Interface for run/stop control with ARRI and other cameras

WCU-4

ARRI Certified Pre-Owned Cameras

Just as BMW and Mercedes do with fine used cars, ARRI has established a Certified Pre-Owned Program.

Christian Richter, Manager of ARRI's Certified Pre-Owned Camera Systems, explained the program when I visited Munich. "Now customers can buy cameras at very affordable prices and be confident in the knowledge that these cameras and all components, including the sensor, are checked with the same equipment we use in manufacturing new cameras. Any parts that require replacement are exchanged.

"The program will give more filmmakers the assurance that they are not sacrificing performance for price because the selected ALEXA cameras come directly from the manufacturer and are backed by ARRI's warranty."

Stephan Schenk, Managing Director of ARRI Cine Technik and General Manager of Camera Systems Business Unit added, "It's a global initiative that adds a new tier to our products, allowing more filmmakers access to our technology. It also gives educational institutions a cost-effective way of providing high-quality equipment for their students."

Under the ARRI Approved Certified Pre-Owned Program selected ALEXA Plus and ALEXA Classic EVs undergo thorough assessments, are given thorough overhauls, and are recalibrated.

Before the ARRI Certificate of Approval is issued, the equipment goes through the same final function test as new cameras, ensuring it meets the high standards expected of it. The ARRI approved and certified cameras are also covered by a one-year warranty.

Example of a Recent Sale

Alexa Plus 4:3 sold for 13,900 €
Operating Hours: 979 SUP: 11.1:31779

Accessories: ALEXA Electronic Viewfinder EVF-1, Center Camera Handle (CCH-1), Viewfinder Cable Short (0.35m/1.2ft), Viewfinder Mounting Bracket VMB-3, Wedge Adapter (WA-1), Battery Adapter Back for V-lock (BAB-V), 2x Sony SxS 64 GB cards, Quick Release Baseplate, Bridge Plate Sled, Support Rod Holder, Baseplate, Case, BP-12 Bridge Plate, Anamorphic Desqueeze License Key, ProRes Codec Option, QuickTime File Format Option, High Speed License Key, DNxHD License Key.

Close Focus Thalia Large Format Lenses

Close-Focus Large Format 24mm, 55mm, 120mm Thalias

Three new close-focus Thalia lenses from Leica sister company CW Sonderoptic are coming this summer. (See updated table on the next page. Close-focus Thalias are highlighted in red.)

Thalias are lenses with character. They offer luminously beautiful skin tones, sharp eyelashes and a natural, smooth tone.

Thalias cover large format cameras: Sony VENICE Full Frame 36x24mm, RED and Panavision DXL2, ARRI Alexa LF and ARRI Alexa 65. The image diagonal is 60mm.

Thalias come with user-swappable PL or LPL mounts, as well as XPL mounts for Alexa 65 cameras at ARRI Rental.

PL Mount

XPL Mount

Thalia Lenses

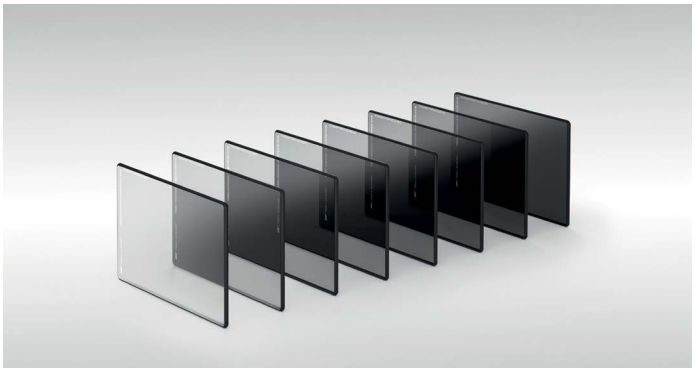
Circular irises, beautiful bokeh

Thalia Specifications - Updated

Focal Length (mm)	**24**	**30**	**35**	**45**	**55**	**70**	**100**	**120**	**180**
Aperture	3.6	2.9	2.6	2.9	2.8	2.6	2.2	2.6	3.6
Length (in)	4.9”	5.2”	5.2”	5.2”	6.1”	4.9”	4.9”	6.9”	6.1”
Length (mm)	124.5	131.5	131.5	131.5	154.5	124.5	124.5	175	154.5
Front Diameter (mm)	95	95	95	95	95	95	95	95	95
Close Focus (ft)	7.8”	1’8”	1’10”	2’	11.7”	1’8”	2’4”	22.5”	5’
Close Focus (m)	0.4	0.5	0.55	0.6	0.7	0.5	0.7	0.57	1.5
Weight (lb)	3lb 2oz	3lb 4.6oz	3lb 1.6oz	3lb 3.6oz	3lb 9.8oz	2lb 5.2oz	2lb 8.8oz	2lb 10oz	3lb 9.2oz
Weight (kg)	1.42	1.50	1.40	1.46	1.64	1.06	1.16	1.66	1.62

Image Circle: 60 mm diagonal (covers ARRI ALEXA 65, RED and DXL 8K VV, VistaVision, Full Frame, Super35)
Matched Barrels: Focus and Iris Ring locations in same position for all focal lengths. 0.8M Lens Gears.
Front Diameter: 95 mm on all lenses in set (same as Summilux-C and Summicron-C)
Lens Mount: PL, LPL and XPL (XPL for ARRI Rental) - Stainless Steel, user-swappable
Front Filter: 92 mm screw-in (same as Summilux-C)
Rear Net Holder: Same as on Summilux-C
Metadata: /i Technology lens data contacts
Focus Rotation: 270°
Iris Blades: 15
Iris Shape: Circular at all apertures
Close Focus focal lengths highlighted in red

The Technology of ARRI FSND Filters



by J. Kaster, ARRI Optical R&D Department

This article is edited from a full-length ARRI white paper. Any errors may be attributed to Jon Fauer's jetlag.

The technology in ARRI's new FSND Neutral Density filters involves absorptive anti-reflective optical thin-film coatings. These coated filters provide cinematographers with state-of-the-art color neutrality and optical precision.

Absorptive anti-reflective, multilayer, thin-film filters were introduced in 2013 for Alexa cameras. The FSND filter was inserted into an Internal Filter Module (IFM) within the mount. FSND filters were subsequently fitted into the internal motorized ND filter assembly of Amira and Alexa Mini cameras.

ARRI FSND mattebox filters in 6.6"x6.6" and 4"x 5.65" sizes were introduced in September 2017.

A brief history of ND Filters

Once upon a time, neutral density filters were made from dyed glass or dyed polymer/adhesive films between two glass sheets. Those technologies found broad acceptance for a long time. With the digital age came the necessity for IRND dye-based neutral density filters. They had increased attenuation around 800nm. The reason is that most digital image sensors are quite sensitive to near-infrared light and this can render the image with strange colors—for example, certain black fabrics can appear reddish.
(By the way, this was not unique to digital. With film, the dreaded 3 am call from the lab sometimes warned of weird magenta-looking colors where things should have been black. This was especially vexing with high-number NDs. We just didn't know why. -JF)

Above: ARRI FSND1.2. Below, Dye-Based ND1.2

It took decades to overcome the limitations inherent in ND dye absorber filters and to become ready for cinematography. Before the mid-1950s, thin-film coated ND filters were highly reflective, partially metallic "mirrors." An improvement in the 1950s was made by shading the metallic reflector with an appropriate material and they were nicknamed "dark mirrors". The coatings consist of silicon monoxide layers and an aluminium film overcoated with a germanium film. The germanium's absorbance masked the reflective aluminium film in the visible spectral range. The key optical design feature was to lessen the coupling between spectral transmittance and reflectance to enable low reflecting, absorbing thin film coatings.

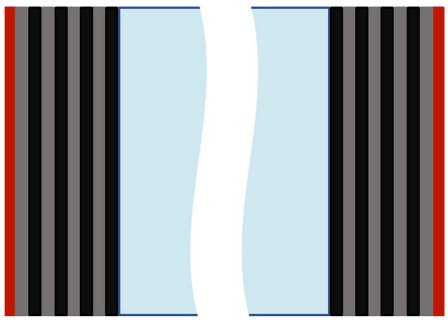
In the early 1970s, a metallic neutral density filter with further-reduced spectral reflectance was patented, but the coating's reflectance was still dependent on its facing forward (toward the scene). Research continued during through the 1990s and progress was made in the understanding of combining color-neutral absorbing ultrathin metal films (<10nm thickness) with impedance-matching dielectric multilayer coatings. The researchers' results are a central contribution to the foundation of today's optical thin-film neutral density filters.

Similar results were patented shortly after in Japan with a focus on the photography industry. Many patents were granted, mainly in Japan, some in the US and even fewer in Europe. Optical thin film coatings implementing ultrathin metal films are also common in modern architectural (windows), automotive and aerospace applications, as well as in the semiconductor industry.

How Thin are Thin Film Coatings?

Only a few optics manufacturers have mastered the ultrathin metal film coating process to deliver high quality and highly consistent filters. The optical coating design itself is a challenge. The complete multilayer thin-film coating thickness on one clear glass substrate side is roughly 1/10,000th of the filter's thickness, comprising several layers or complex mixtures of dielectrics, semiconductors and metals.

The absorbing layers embedded inside the coating have a thickness of only a few nanometers. That is approximately 10 atomic layers. Thickness must be controlled with a precision in the range of 0.3nm (0.0000000003 meters). As a comparison: common grass grows about 20 to 40 nanometers per second in the summer months.



The Technology of ARRI FSND Filters

Stray Light

Some mattebox filters in front of a lens can introduce flares such as ghost reflections. The severity of visibility is proportional to the spectral radiance of stray light, which usually increases with focal length. But it also depends on the specific optical design of the lens and the associated stray light paths.

It's up to the cinematographer whether this stray light is regarded as problematic or artistically valuable. To offer a non-ghosting choice for the cinematographer, ARRI FSND filters are equipped with low reflective coatings on the smooth optical surfaces and blackening of the edge surfaces. With increasingly sensitive imaging macro contrast (HDR), micro contrast (4K/8K) and color gamut (Rec 2020), the flare of ARRI FSND filters is designed to be minimal.

Another topic related to flare relates to surface defects like scratches, particulate contamination of the surfaces, roughness, inclusions and bubbles on the surfaces, and striae inside the glass substrates. Those defects usually become visible inside homogeneously bright bokeh areas—out-of-focus highlights. This is addressed by strict tolerancing of the glass quality, the surfaces, manufacturing processes and dedicated quality control. So, a special protective coating, a dedicated multilayer thin-film design and material selection enable easy cleaning and improve scratch resistance.

Mattebox filters are used in harsh environments and need to fulfil the camera crew's expectations on handling, durablility, reliability and optical performance. The filters need to withstand hostile environments, rain, salt, beaches, heat, cold, UV radiation and chemical substances like lens cleaners, hand creme, suntan lotion and sweat.

To improve mechanical shock resistance and handling comfort, ARRI FSND filters have rounded, C-shaped edges. These curved edges reduce the chance of chipping the glass and make the filters easier to handle. ARRI's FSND filter edges have also been colored black to prevent the scattering of light.

When clean out-of-focus highlights are desired in high dynamic range scenes, efforts to maintain high surface cleanliness becomes increasingly important—for example, when lighting with candles or dark interiors with bright windows. Clean optical surface become more important because highlights tend to smear if the filter is dirty. *(Craft-service encrusted filters may be regarded as problematic or artistically valuable. Your mileage, job security or invitations to Cannes Film Festivals may vary. -JF)*

ARRI FSND filters have water- and oil-repellent surfaces that make cleaning easy. Non-volatile residuals from unfavorable cleaning agents *(household window cleaners and sketchy lens solvents)* may still deteriorate the optical performance and care should be taken to avoid those. ARRI provides cleaning notes with FSND filters. For further reading on the subject, we recommend R. Schalck, "The Proper Care of Optics: Cleaning, Handling, Storage, and Shipping," SPIE Press Book PM233, 2013. (ISBN: 9780819494573.)

Imaging Performance

Highest imaging performance enables many creative options. It simplifies shooting for CGI compositing. When less crisp, softer pictures are preferred, it is always possible to intentionally deteriorate the image by creative means.

Therefore, ARRI FSND filters are designed for maximum imaging performance. To limit asymmetric distortion, especially critical when using tele lenses, the optical surfaces should be parallel over the filter's entire area. Slight spherical bending may not a big issue. But, irregular surfaces or glass thickness deviations can decrease imaging resolution. To avoid aberrations by such irregularities, the average tolerance of one ARRI FSND filter can be compared as follows—If the elevation profile between New York City and Los Angeles would be similarly flat, the average height deviation would have to be just 0.75 meters (about 2 feet). In actuality, the real elevation profile between New York City and Los Angeles is approximately 1,142 meters.

Admittedly, plane parallel glass surfaces in front of, or behind, a lens will unavoidably introduce intrinsic aberrations, even if the filter substrate would be without any irregularities. As a function of lens parameters (for instance, a decreasing T-stop and an increasing angular field of view), as well as filter parameters (for example, substrate thickness and dispersion of the materials), lateral and longitudinal chromatic, spherical, coma, astigmatism/field curvature and distortion can occur. In many cases, those intrinsic aberrations do not become noticeable and are negligible compared with the objective lens' aberrations. If they do become apparent, which is possible with an ultra-wide-angle lens at moderately closed aperture, there are several options:

- Minimize the number of filters in the mattebox. A total of three filters is recommended. By the way, three filters without antireflective coatings already add additional light loss of approximately -0.4 stops.
- In camera-internal filters might be used instead. At the filter position between lens and sensor, the intrinsic aberrations usually will be lower (smaller angular field and thinner filters). ARRI Signature Prime lenses even account for the intrinsic aberrations caused by camera-internal filters in ARRI cameras. With a filter positioned between the lens and sensor, there is also the benefit that no focusing of veiling glare or flare appears for first order scatter from the filter when using entocentric or telecentric lenses. This is the case for most motion picture or photographic lenses.

Summary

Multiple layers of ND coating, anti-reflective (AR) coating, hydrophobic coating, oleophobic coating, as well as a final "hard" coating have been applied to both sides of the ARRI FSND filter. A normal filter has a 4% - 6% reflectivity rating at each air-glass surface, but ARRI has been able to achieve 0.2% reflectivity. Since crews often stack filters together and reflectivity is cumulative, reducing this down by a factor of 20 is helpful. Reducing reflectivity maximizes contrast. The hydrophobic and oleophobic layers keep water and grease from adhering to the surface of the glass, cutting down on cleaning time. The hard coating prevents scratches on the filter and is extremely resistant to wear and tear. Rental houses and owners should enjoy a long filter life and return on investment.

The pouches provided with each ARRI Filter are made of water-resistant Cordura. The lining is made of a microfiber material called Microdear. It is not only anti-static, but also cleans the surface of the filter every time it's taken out of the pouch or put back in. *Self-cleaning filter pouches—perhaps the nicest touch of all.*

Sigma 70mm F2.8 DG MACRO Art

Sigma's new 70mm f/2.8 DG Macro Art lens will be available in Canon EF, Sigma and Sony E-mount for $569.00. It is the first Macro Lens in the Sigma's Global Vision Art Line, designated with an "A" on the barrel. What is art? "Designed with a focus on sophisticated optical performance and abundant expressive power," says Sigma.

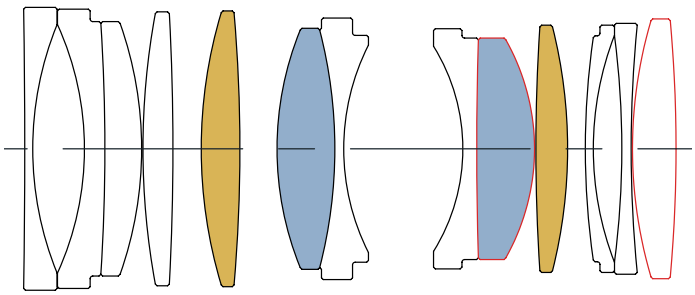
(Sigma's 105mm f/2.8, 150mm f/2.8 and 180mm f/2.8 APO Macro EX DG OS HSM lenses are earlier designs.)

The new Full Frame Sigma 70mm f/2.8 DG MACRO Art focuses to 1:1 magnification. Optical performance is superb. Autofocus is very smooth.

The new 70mm Macro lens has an extending, floating, two-group focus mechanism that minimizes optical aberrations at all focus distances and apertures.

A new coreless DC motor drives the focus groups.

As we are fond of asking, wouldn't it be nice to see a cine version of this beautiful Macro? Until then, the new 70mm Macro Art lens will work closely on a Sony VENICE with E-mount.



Sigma 70mm f/2.8 DG Macro Art Lens Specifications

(DG = Full Frame)

Lens Construction:	13 elements in 10 groups
Number of Iris Blades:	9 (Rounded)
Minimum Aperture	f/22
MOD:	25.8cm / 10.2in
Filter Size (mm)	49mm Ø
Maximum Magnification	1:1
(Diameter x Length)	70.8mm Ø x 105.8mm / 2.8in. x 4.2in.
Weight	515g / 18.2oz.
Lens Mounts	Sigma, Canon EF, Sony E-mount

(Sony E-mount model is developed, manufactured and sold based on the specifications of the E-mount as disclosed by Sony Corporation under a license agreement with Sony Corporation.)

Airstar

Cinestar

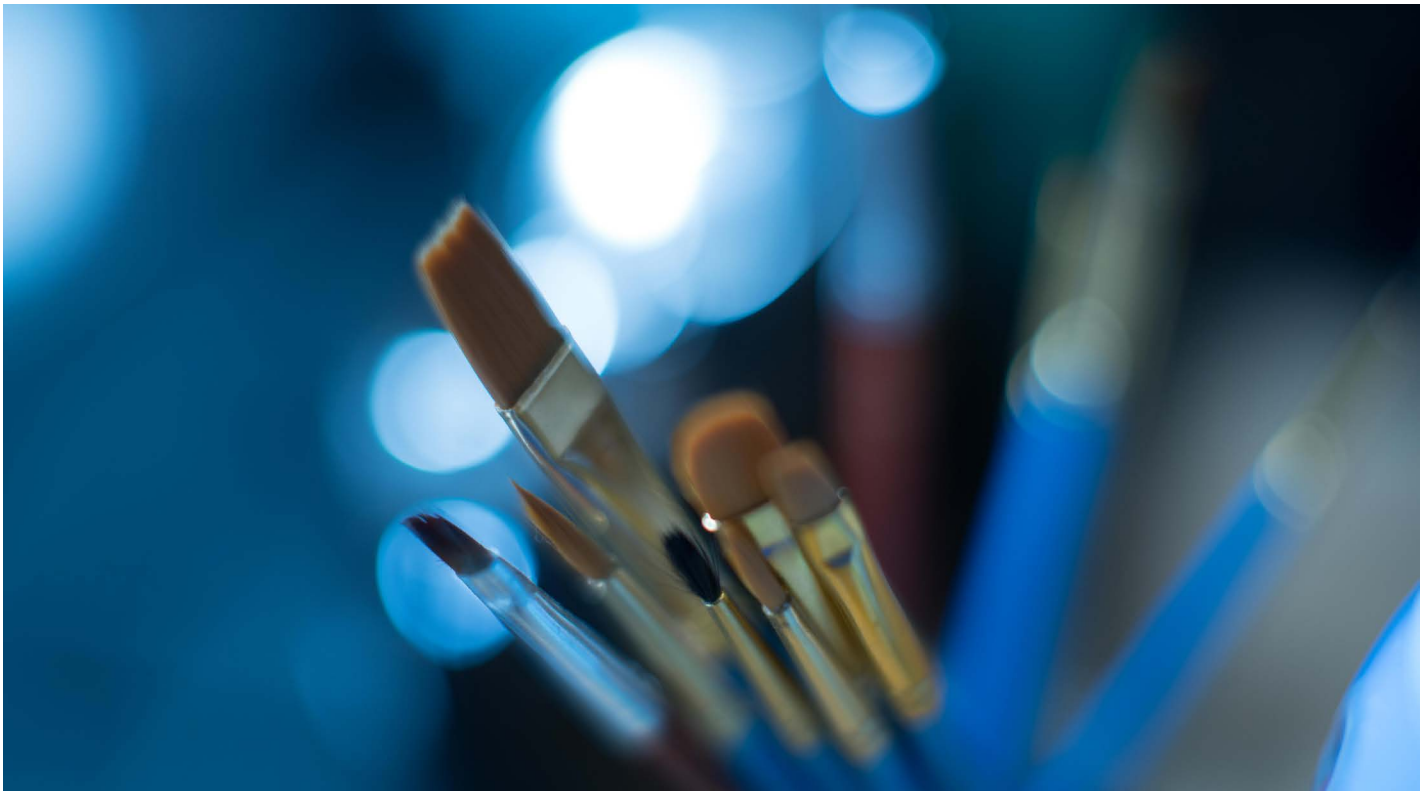
Cinestar is Airstar's latest LED lighting balloon. It provides wide angle coverage, soft diffusion, full color temperature control (2700-6500K), a high CRI rating and produces 850 watts of flicker-free light. Cinestar draws 1000 W / 10 A. It's portable, with versatile mounting options and a low-profile body that make it perfect for indoor and outdoor use.

LED Light Pad

Airstar is also debuting a brand new product at Cine Gear Expo this year, the LED Light Pad. Building upon their innovative helium balloon technology, they've developed a strong new LED lighting product that promises reduced power consumption and easy-to-zero rigging.

It produces 900 - 1,800W of High CRI (95+) light and features full bi-color temperature control, dimmable intensity control and flicker-free soft diffusion with an output of 60,000 - 120,000 lumens. LED Light Pad draws 1800 W / 20 A.

RAW Camera Company - Vancouver



RAW Camera is a camera rental, lens service and post-production company in Vancouver, Canada. RAW's founders are experienced filmmakers: Paul Engstrom as a DIT and post production specialist and Pieter Stathis as a cinematographer. RAW supplies commercial, television and feature film productions. They have an impressive inventory of modern, vintage, custom and uncommon lenses.

RAW is a prominent DIT service provider for many DPs from around the world. RAW also assists productions with dailies, archiving and grading for theatrical delivery and streaming 4K/HDR.

One of the industry's top lens technicians, Victor Muniak, is the head of Optical Engineering and oversees RAW's servicing of lenses. Along with innovative lens designer Alex Nelson, RAW's founders Paul Engstrom and Pieter Stathis also own Zero Optik, an LA-based design and engineering firm that specializes in modifying and customizing lenses for cinematography.
rawcamera.com

Above: Paul Engstrom. Below: NOCT before anodizing.

DP Pieter Stathis on location. Below: Optical Engineer Victor Muniak

Kramer Morgenthau ASC on *Fahrenheit 451*

Books begin to burn at 451 degrees Fahrenheit. *Fahrenheit 451* was François Truffaut's first color film, released in 1966, shot by Nicolas Roeg, BSC, starring Oskar Werner, Julie Christie, and Cyril Cusack. The story, by Ray Bradbury, is about a future of oppressive government, TV screens that occupy entire walls, blatantly fake news and firemen who burn books.

52 years later, Kramer Morgenthau, ASC was cinematographer on HBO Film's *Fahrenheit 451,* directed by Ramin Bahrani, starring Michael B. Jordan, Michael Shannon and Sofia Boutella.

Fahrenheit 451 opened at Cannes. The audience was treated to a dazzling display of available-night cinematography, often illuminated with practical lights punctuated by the glow of orange flames—captured by Kramer Morgenthau's fine work and the impressive low-light capabilities of Panasonic's Varicam 35. Far from the critical crowd in Cannes, Kramer called from Philadelphia to discuss *Fahrenheit 451.* He said this about that:

"Based on the scouting and seeing what the director wanted to do at night—being free to move quickly in any direction and the fact that this movie takes place almost entirely at night—I had heard about the low-light capability of the Panasonic VariCam 35. I had time to shoot tests, and I was pretty blown away with the Panasonic at night with very fast lenses. I could almost shoot with no light.

"We worked with a Panavised (PV mount) Panasonic VariCam 35. Panasonic's VariCam 35 has a 4K, Super35mm sensor, and its 800 and 5,000 dual native ISO is well known for the ability to work in low light, at night, with very little noise. Once you're into the high ISO space, every practical becomes a source. I mostly dialed the ISO down to 3200 for the night scenes with a little less noise.

"This camera sees way beyond what the human eye does. I like to shoot wide open, to give the backgrounds a softer feel with the shallow depth of field. At 3200 ISO with the lens at T1.4, it was an entirely different universe. Every light you see, or don't see, becomes a bright source. They pop in a kind of surreal way, which worked for the story. I found myself constantly turning lights off. We shot with 2 cameras and had a 3rd body as backup. We recorded 4K UHD, AVC-Intra4K444 to the camera's internal P2 card.

"Fire is a huge part of this movie. I was dancing a fine line between picking up enough light at night and also holding detail in the fire. I constantly was riding the iris to balance holding details of the flames and on the actors' faces, especially whenever we used flamethrowers, and we used a lot of them in the final scene. Our "A" camera operator Mike Heathcoat was great in shooting long, continuous takes.

"I mostly shot between T1.4 and T2. We used Panavision Super Speeds. Panavision lists them as Legacy Primes. They are older glass from the mid 1970s-80s that I like to use, which takes some of the hardness off the digital aesthetic. I usually like to shoot anamorphic with Panavision C Series, and this glass felt like the closest I could get to that but in a spherical lens. I could shoot them wide open at T1.4. I also had a 50mm Ultra Speed that would open up to a T1.0. We mostly worked with the 20, 24, 29 and 40 mm lenses.

"The lenses had unique characteristics and aberrations—an imperfect image, in a good way. Wide open, the bokeh were beautiful and the imperfect coatings made interesting, strange rainbow flares. We were able to shoot at pretty shallow stops for a very interesting look. The combination of the old lenses and the digital camera was pleasing to the eye and handled the flames nicely.

"For night exteriors, gaffer Michael L. Hall had soft boxes on Condor cranes with SkyPanels for a soft, ambient overhead lighting. Wireless control let us dial in any color, and we used a lot of intense colors. I also had Sourcemaker 8'x8' blankets. Sometimes I would have an Obie for close-ups on the actors.

Light source: one match

"I shot in 16:9, which was the delivery format. HBO projects aren't shot in a widescreen 2.39:1 aspect ratio—they don't flex on that. Because it was a Panasonic VariCam 35, it was 4K/UHD acquisition. That wasn't the reason I used the camera, but it was a nice perk. I wanted to do something different, to take a risk and push the limits, and that camera seemed to be an interesting way to go.

"We shot in and around Toronto and worked out of Panavision. Russell Bowie, my focus puller in Toronto, was really instrumental in helping me get everything at the last minute over a July holiday/Canada Day weekend. In Los Angeles at Panavision Woodland Hills, my rep David Dodson helped me on his end to get the cameras to Toronto on such short notice for our 40-day shoot. We shot a lot in remote locations and in Hamilton, 45 minutes away.

"Tim Stipan graded *Fahrenheit 451* at Company 3 in New York using Blackmagic Design's DaVinci Resolve."

Additional text courtesy of Panavision. Photos: HBO Films

Transvideo StarliteHD-e Focus Puller Monitor

If you're a Focus Puller, this monitor is for you.

The Transvideo StarliteHD-e displays Cooke /i and ZEISS XD lens data on screen. You do not have to calibrate lens motors. It's plug and play.

In the photo above, the information on screen shows that we're shooting with a 135mm lens at T22 and our focus is set at 1.60 meters (5'3").

Depth of Field is automatically calculated on screen. It shows we're sharp from a near focus (NF) of 1.5m to a far focus (FF) of 1.6m.

The Transvideo StarliteHD-e monitor-recorder will be at Cine Gear. It plugs directly into ZEISS eXtended technology lenses—the new Supreme Primes and CP.3 lenses, as well as all Cooke/i lenses. ZEISS eXtended Data provides information about lens distortion and shading in real time.

In addition to the helpful on-screen heads-up display of focus and iris (and zoom), StarliteHD-e can record static and dynamic lens metadata from the lens and camera. The StarliteHD-e has a convenient SD card slot, so the lens metadata information is captured and stored onto the SD card along with frame-accurate timecode.

This is a huge advance in how metadata can be used. Up to now, it was up to the camera manufacturers to provide, or not provide, metadata recording. And each approach was different. The Transvideo StarliteHD-e Focus Puller monitor changes all that.

See it at the Transvideo / AatonTransvideo Cine Gear Booth 60c.

aatontransvideo.com

Aaton Digital

Aaton Digital introduces full integration of the Wisycom and Lectrosonics wireless receivers in their CantarX3 and Cantar-Mini recorders. This provides direct access to the UI of the receivers from the Cantar and allows set-up of options or channel frequencies as well the use of a spectrum analyzer.

Note the wireless receiver tray in the photo above.

The final version of the Cantaress advanced mixing surface companion of the CantarX3 will be demonstrated at the Cine Gear booth.

And, Aaton-Digital will present the dual integration of Sennheiser Ambeo immersive VR sound technology in the CantarX3 and CantarMini.

aatontransvideo.com

Koerner Camera Pacific Northwest Lens Summit

Koerner Camera, Portland

Michael Koerner, center

by Adam Wilt

Koerner Camera Systems in Portland, Oregon hosted more than 250 attendees at the 2nd annual Pacific Northwest Lens Summit on the first Saturday in May to enjoy many technological treats:

Whitepoint Optics Finnish lenses re-built from Hasselblad elements, and capable of covering an 82mm image circle. ARRI Signature Prime large-format lenses and an Alexa LF to put them on. Schneider filters including the Rainbow Streak, anamorphic-style flare inducer. Lindsey Optics filters and macro lenses. Gecko-Cam Genesis G35 Full Frame cine lenses from Munich.

Hot Rod Cameras reworked an Angénieux DP-series zoom: front element recoated with a design to cause colored flare. Angénieux has a similar version without the recoating: plenty of flare, no added color. Tokina Vista large-format T1.5 lenses. HandeVision IBERIT and IBELUX lenses from Kipon. A Fujinon 75-400mm cine zoom with a behind-the-lens filter holder, and a set of diffusion and streak filters ready to install. Leica M0.8 cine lenses: classic M-mount lenses with focus and iris gears. Positive-locking M-mount fronts for Sony VENICE, ARRI Alexa Mini and RED DSMC cameras (the latter two with custom OLPF frame cut away for the lens's rear element) let large cameras use these compact lenses.

Rehoused classic B&L Baltars and Nikon stills lenses from Zero Optik, along with a 35mm pinhole lens. Motorized Precision's MIA camera robot. MIA can fly a 10 kg / 22-pound camera around the room at up the three meters per second, with full FIZ (focus/iris/zoom) control and precise repeatability, all while running off single-phase wall power.

Preston's Light Ranger 2 focus assist system, a 1st AC's best friend. Light Ranger 2 graphically illustrates focus distances and depth of field onscreen, vastly reducing a focus-puller's uncertainty. It can even be used for no-excuses autofocus.

More tools too numerous to describe in detail: FIZ hand units and lens motors from ARRI, Preston, and cmotion. Lenses and adapters from Zeiss, Cooke, Canon, Leica, LOMO, Duclos, Fujinon, Angénieux, P+S Technik, NiSi, Sigma, and Schneider. Sony VENICE cameras, RED MONSTROs, Panasonic VariCams, and Canon C700 FFs. I'm sure I've missed some things, at that.

If I had to pick themes or trends for the Lens Summit, I'd pick these: the move to large formats, the ongoing interest in anamorphics, and the desire for "character." "Character" might explain the number of new lenses available with uncoated front elements, the quest for the roundest iris and the best bokeh, and the number of rehoused vintage lenses and new designs using classic formulas.

Koerner also staged a day-long training session with Duclos and Fujinon on the Friday before the Summit. The invitation-only training drew lens techs from rental houses across the country to witness the complete teardown and re-assembly of a ZEISS Super Speed in the morning and a Fujinon Cabrio in the afternoon.

Michael Koerner, Owner of Koerner Camera and organizer of the event said, "Most people said they got more info out of this show than NAB, guests as well as exhibitors." He added that the lens techs want more training sessions next year, "which is something we'll have to expand on. I am thinking two days of classes, two classes each day."

Technovision Classic 1.5x Anamorphic Full Frame Lenses by P+S Technik

	40mm Prime	50mm Prime	75mm Prime	100mm Prime	135mm Prime	35-70mm Zoom	70-200mm Zoom
T-Stop	T2.2	T2.2	T2.5	T3.0	T3.0	T3.2	T3.0
Anamorphic Squeeze	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x	1.5x
Image Circle	LF	LF	LF	LF	LF	40-70mm: 43.5mm Ø	FF
Angular Rotation Iris	90°	90°	90°	90°	90°	70°	90°
Min. Marked Object Distance	1m/3'3"	1m/3'3"	1m/3'3"	1m/3'3"	1.4m/4'7"	1.5m/4'11"	2m/6'6"
Close Focus from Lens Front	0.9m/3'	0.9m/3'	0.9m/3'	0.9m/3'	1.4m/4'7"	1.17m/3'10"	2m/6'6"
Angular Rotation ∞ to MOD	250°	250°	250°	250°	250°	250°	250°
Mount	PL	PL	PL	PL	PL	PL	PL
Other IMS lens mount options	LPL	LPL	LPL	LPL	LPL	LPL	LPL
	EF	EF	EF	EF	EF	EF	EF
	E	E	E	E	E	E	E
	-	-	-	-	-	MFT	MFT
Front Diameter	114mm	114mm	114mm	114mm	114mm	114mm	114mm
Length from Front to Mount	110mm	110mm	152mm	220mm	270mm	210mm	300mm
Weight	2100 g	2100 g	2500 g	2700 g	2900 g	2950 g	3500 g
Focus Drive Gear. mod 0.8	50mm from PL-Mount	50mm from PL-Mount	90mm from PL-Mount	90mm from PL-Mount	90mm from PL-Mount	140mm from PL-Mount	243mm from PL-Mount
Iris Drive Gear. mod. 0.8	23mm from PL-Mount	23mm from PL-Mount	63mm from PL-Mount	63mm from PL-Mount	63mm from PL-Mount	24mm from PL-Mount	24mm from PL-Mount
Zoom Drive Gear. mod 0.8	-					62mm from PL-Mount	129mm from PL-Mount
Focus Scales	metric or imperial scales - two opposing focus scales with hard stops						
Markings	approx. 20-25 in m/ft						
Zoom Scales	two opposing scales with hard stops						
Iris Scales	two opposing scales with hard stops				*Specs may change without notice*		

Technovision Classic FF 1.5x Anamorphics by P+S Technik

"Technovision Anamorphic lenses reborn" is the description from P+S Technik at Cine Gear 2018 about their Technovision Classic 1.5x Full Frame anamorphic lens series.

And the news comes just in time. No sooner have the latest generation of Full Format cameras arrived than cinematographers began to clamor for anamorphic lenses to fill the larger Full Format/VistaVisionish frame.

P+S Technik launches a modern, full frame version of the famous Technovision anamorphic lenses. The new Technovision Classic anamorphics are designed to cover larger camera sensors such as Sony Venice, RED Monstro, ARRI Alexa LF, Panavision DXL2 and Canon C700 FF.

The Technovision Classic Series includes 2 zoom lenses (35-70, 70-200) and 5 primes (40, 50, 75, 100 and 135 mm). They cover Full Format with a 1.5x anamorphic squeeze. Alfred Piffl (company founder and product manager) and Anna Piffl (Managing Director and head of sales & marketing) talked about the new Technovision Classic Series.

How did this cooperation with Technovision come about?

Alfred: Harald Buggenig, Owner of Technovision Rome, asked us if we would like to build a new series Technovision optics. It was an honor. And this is just the beginning.

Why did you call this lens series "Classic"?

Alfred: The term "classic" refers to the classic anamorphic design principle of a having a front anamorphic cylindrical element—which we use on the Technovision Classic series.

You've been working on anamorphic lenses for some time.

Anna: Back in 2015, we wanted to offer a series for anamorphic production on Super35 cameras. We introduced the Evolution 2x Anamorphic lenses (matching Kowa) for S35 in 2017. Now the 1.5x series is an investment for today and the future, for Full Frame, S35, 16:9, 1.5:1, 2:1 and 4:3 sensor cameras.

Alfred: In early 2015, the topic of anamorphic lenses became relevant at P+S Technik. At NAB 2016, a first product, the 35-70 anamorphic zoom, was introduced. P+S Technik had rehoused several hundred vintage lenses since 2012, and with that experience, it was possible to create a genuine anamorphic look for the zoom.

We used the abbreviation "CS" which referred to "CinemaScope," the classic wide screen anamorphic format. We used our "CS" to describe a wide screen anamorphic lens which includes all the classic properties associated with front anamorphics such as unique bokeh, nicely formed flares, pincushion distortion, shallower depth of field and a wide angle of view.

Why did you choose a squeeze factor of 1.5x?

Alfred: The 1.5x squeeze factor is an excellent match for the large variety of sensor aspect ratios on new cameras today and especially for Full Format 36x24mm (3:2) and Large Format. *(Quick math: 1.5:1 sensor x 1.5 anamorphic = 2.25:1 aspect ratio. Crop top and bottom slightly for 2.39:1.)*

The 1.5x anamorphic lenses are great for 16:9 image sensor capture (as on Canon C700 FF) by making use of the whole sensor. This benefits the filmmaker in capturing the best possible digital negative with the least necessary cropping, if any, in post-production. In other words, you get an anamorphic image into a 16:9 frame with all the inherent benefits of the anamorphic look. *(Math: 1.78:1 x 1.5 anamorphic = 2.67:1 aspect ratio. Crop the edges for 2.39:1)*

Why not 1.3x or 2x squeeze ratios we are familiar with?

We feel that 1.3x anamorphic lenses produce a look not dissimilar to spherical lenses. The stronger the compression factor, the more pronounced are the characteristics. But a 2x squeeze anamorphic lens for Full Frame would be much bigger and heavier. (*Also the math involves more cropping and unused area: 1.5:1 x 2 = 3.0:1 aspect ratio.*)

What cameras desqueeze 1.5x in the viewfinder?

Alfred: We have been talking to camera manufacturers about this. ARRI announced a 1.5x desqueeze in the viewfinder of their new Alexa LF camera. I expect the others will integrate this as well. Some external viewfinder monitors and recorders offer 1.5x de-squeeze.

Are the Technovision Classics so-called vintage lenses?

Alfred: The Technovision Classic lenses are newly-made, based on our own optical design.

What can you tell us about their look and character?

Anna: The lenses offer a truly cinematic look and beautifully organic bokehs. They have the large-screen feeling of CinemaScope.

Alfred: Vintage looks with character that shape the image are becoming more and more popular. The large image circle means they will cover the most common image sensors today with no vignetting and this helps to make them future-proof investment.

What do you mean by future-proof?

Alfred: All the Technovision Classic series of 1.5x anamorphic zooms and primes are ready for both Super35mm and for the latest large format sensors. They have outstanding optical performance and durable mechanical engineering, along with a large image circle.

How much will they cost and where can they be ordered?

Anna: The zoom lenses start at 2,000€. The primes start at 19,000€.

What mounts will be available?

Anna: The Technovision Classics are shipping with a standard PL mount. But we have already planned LPL mounts and they can be ordered with the lenses. We also offer IMS interchangeable lens mounts for Canon EF and Sony E-mount.

When will the Technovision Classic lenses be available?

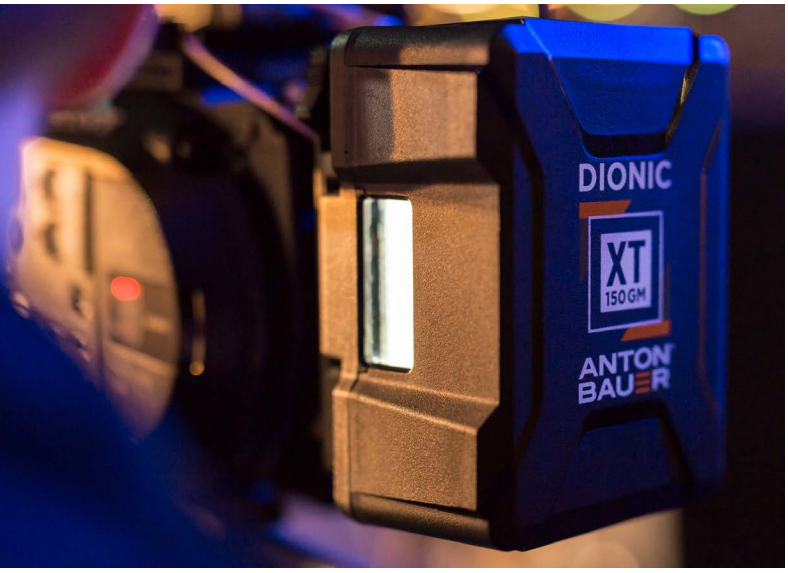
Anna: The 35-70mm has been shipping since 2016 and will be integrated in the Technovision Classic series. We are working towards shipping the longer zoom lens in Autumn.

We are aiming to deliver the first tele lenses before the end of this year. The shorter primes are scheduled to follow in Spring 2019.

Are they available for lens tests?

Anna: The 35-70 zoom is available at several rental houses in the US, New Zealand, France, Germany, Austria. You can also contact us directly or through a local reseller. Vimeo test footage: *vimeo.com/album/3570677*

New Anton/Bauer Dionic XT Batteries



Anton/Bauer Dionic XT series are Li-ion cine-style batteries that fit nicely on ARRI Alexa Mini, RED DSMC2, Sony VENICE, Blackmagic URSA Mini and other similar-size cameras.

Dionic XT batteries come in V-Mount and Gold Mount and are also compatible with many brands of chargers. The batteries feature an intelligent internal system that facilitates managing your fleet of batteries efficiently. In addition to cameras, the Dionic XT batteries can power portable LED lights (e.g Litepanels Gemini.)

There are 4 models that have just launched.

	Dionic XT90G	Dionic XT90V	Dionic XT150G	Dionic XT150V
Capacity	99Wh Nominal	99 Wh Nominal	156 Wh Nominal	156 Wh Nominal
Height	5.1 inches (13 cm)	5.1 inches (13 cm)	5.1 inches (13 cm)	5.1 inches (13 cm)
Depth	2.1 inches (5.5 cm)	2 inches (5.1 cm)	2.7 inches (7 cm)	2.6 inches (6.6 cm)
Width	3.8 inches (9.7 cm)	3.8 inches (9.7 cm)	3.8 inches (9.7 cm)	3.8 inches (9.7 cm)
Weight	1.76 lbs (0.8 kg)	1.76 lbs (0.8 kg)	2.4 lbs (1.1 kg)	2.4 lbs (1.1 kg)

Charge 0°C to +45°C (-32°F to +113°F)
Discharge -20°C to +60°C (-4°F to 140°F)

Maximum Discharge Rate 173W or 12A
Output Voltage Nominal 14.4V Operating 10.0~16.8V

Lietpanels 2x1 Firmware Update

Litepanels Gemini 2'x1' LED soft panel fixtures get a new firmware update.

Gemini fixtures have RGB+WW (Red, Green Blue, White, White) LEDs. WW offers daylight and tungsten. RGB LEDs let you dial in almost any conceivable color, adjust from familiar Daylight to Tungsten, including Plus and Minus Green, or choose a familiar gel color.

There are 3 color modes. CCT (Correlated Color Temperature) is the familiar Bi-Color (Daylight to Tungsten) setting with the addition of Plus and Minus Green correction.

HSI mode is for full control of Hue, Saturation and Intensity from the 360° color wheel.

Gel mode is like having a electronic swatch book inside the fixture's control panel.

In Effects mode, Gemini fixtures can be fully customized with 11 lighting effects.

In the fire mode, for example, you can have candle or bonfire — and vary the rate, depth, intensity, hue and saturation.

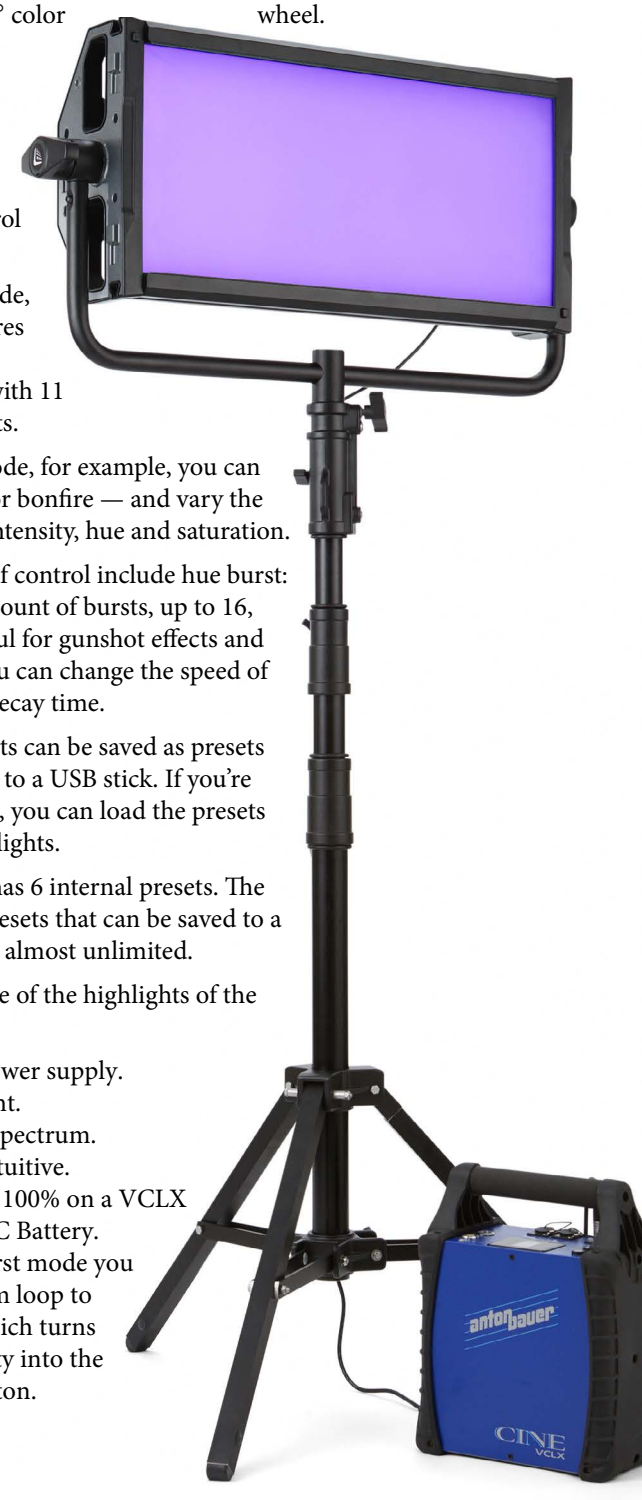
Other areas of control include hue burst: adjust the amount of bursts, up to 16, which is useful for gunshot effects and fireworks. You can change the speed of fire and the decay time.

All your effects can be saved as presets and recorded to a USB stick. If you're renting lights, you can load the presets into the new lights.

Gemini 2x1 has 6 internal presets. The number of presets that can be saved to a USB stick are almost unlimited.

Here are some of the highlights of the Gemini 2x1:

- Internal power supply.
- Light weight.
- Full color spectrum.
- Menu is intuitive.
- Can run at 100% on a VCLX 28-30 V DC Battery.
- In Hue Burst mode you can go from loop to manual which turns the intensity into the trigger button.



ADULT PI (V.O.)
One day Mamaji said to my father that of all the pools in the world, the most beautiful was a public pool in Paris. That the water there was so clear you could make your morning coffee with it, that a single swim there changed his life.

Mamaji dives into the crystal clear water - and we follow,taking in the divine miracle of his underwater journey across the pool.

ADULT PI (V.O.)
Before I was born, he said to my father, "If you want your son to have a clean soul, you must take him one day to swim in the Piscine Molitor." I never understood why my father took this so much to heart...but he did, and I was named "Piscine Molitor Patel."

That is the introduction to the story in the *Life of Pi*.

This is a story of the cinematographer who shot that movie, which won him an Academy Award in 2013 for Best Achievement in Cinematography. Like *Pi*, it's about resourcefulness and a curious mind. And there's a lesson: If you're a DP, learn DaVinci Resolve.

Claudio Miranda, ASC routinely works with DaVinci Resolve Studio and the DaVinci Resolve Mini Panel for grading (and editing) as part of his work as a cinematographer. His credits include *Tomorrowland, Oblivion, The Curious Case of Benjamin Button, Life of Pi*, and many shorts, commercials and music videos.

Claudio said that it's important for him as a cinematographer to understand color grading and editing. "I like to test cameras. For me it is more intimate to deal with the footage by myself. To look at over and under exposure, highlight detail, color in highlights and shadows; I really get to know the capabilities of the camera and the capabilities in DI. Over the years, I've spent a lot of time next to colorists and learned a lot from them. I am always asking questions, and I find DaVinci Resolve Studio very intuitive."

Claudio talked about a recent commercial for Infinity where he used DaVinci Resolve Studio and the DaVinci Resolve Mini Panel on set. "We used a rear projection screen for the background of the interior shots and some tight exterior shots of the car, using DaVinci Resolve Studio, I was adding blur, vertical blur, multiple Power Windows, checking lighting and sending cues to the dimmer board operator, positioning, and correcting perspective.

"Each of the car windows had a slightly different tint, so I created a Power Window for each of them, correcting the differences in color and luminance. Just out of the camera frame, I would add a Power Window or two that would add more lighting to the interior of the vehicle. All this had to be done while shooting. The only time I had to cache was when we were using more than one type of blur, and overall, the whole system was super fast. The client and director were impressed by DaVinci Resolve Studio's flexibility and how flawlessly it worked."

Claudio's equipment package includes the DaVinci Resolve Mini Panel, UltraStudio Express and UltraStudio 4K Extreme 3 capture and playback devices. "With the DaVinci Resolve Mini Panel, I am able to work much faster and can fine-tune much better with the physical wheels. I also really like how I can bounce from editing to color grading quickly," he added.

In addition having DaVinci Resolve on set, Claudio also has a home system that he uses for testing, pre-production and color references for larger projects, as well as his own personal projects, which are edited and graded in DaVinci Resolve Studio. "Initially, I was using another program to edit then bringing it into DaVinci Resolve Studio, but why the extra step? Just stay in the one program," he explained. "Also, as a cinematographer I cannot stand looking at footage that is not color corrected, so working in one program that I can bounce back and forth between editing and color grading is a great workflow for me.

"I like to work in RAW in order to see the full capabilities of the camera, and I can even edit in RAW with DaVinci Resolve Studio. I find it so fast that I really do not need to render proxies. I especially like the stabilization tools. If I need to zoom into a shot, it's nice to deal with the original files to see where the zoom starts to break."

Top, left: Claudio Miranda working with DaVinci Resolve. Top right: DaVinci Resolve Mini Panel. Above: on location on *Tomorrowland.*

Fujinon Full Frame Zooms

Toshihisa Iida, General Manager of Fujifilm Optical Device and Electronic Imaging Products Division

Project FFF

This sounds like the introduction to a Ninja movie:

INT. SECRET LOCATION – DAY

In an undisclosed location at NAB, attended by unidentified executives from an unnamed company, Film and Digital Times learned of new Full Frame zoom lenses being planned. This brief report has been authorized and vetted by the company, as are all reports in the Swiss-neutral, NDA-abiding pages of FDT.

The company is Fujifilm. It seems that they are studying the possibility of Full Frame zoom lenses. Much of the disclosure at the meeting was left to the imagination—so let me imagine what the lenses might be.

We know they will be Fujinon Full Frame zooms. Hmm…good name: FFF.

They will be lightweight, compact, high-end and comparable in optical quality to the Fujinon Premier Series. The maximum aperture will be T2.X, where X is still being worked out. I would guess T2.9. We conjured up a code name: "Ninja."

Fujifilm's current line of successful compact Cabrio zooms for Super35 consists of these Cabrio zoom lenses:

14-35 T2.9
19-90 T2.9
20-120 T3.5
85-300 T2.9-4.0

For Fujinon Full Frame zooms, I would vote for equivalent coverage. To keep the size and weight down, reduce the individual focal length range.

So, maybe 28-80 and 70-200 — and hopefully a wide 14-30.

Fujinon also makes the Cabrio 85-300 T2.9 and the following Premier HK zooms:

14.5-45 T2
18-85 T2
24-180 T2.6
75-400 T2.8-3.8

…so, I would assume there could be additional Full Frame studio zoom equivalents in Fujinon's future. But to feed the Full Frame frenzy, I would guess that we'll see a lightweight, handheld, rig, gimbal, drone friendly FFF 28-80 mm T2.9 FF zoom first.

Fujifilm Instax Square SQ6

Who needs the new, analog, instant-print Fujifilm Instax Square camera? Only the director, DP, AC, AD, location scout, casting director, script supervisor, makeup and hair artists, wardrobe stylist and pretty much everyone else on set who wants instant, analog, printed, in-the-hand photos.

The SQ6 is Fujifilm's first Square format analog Instax camera. The square format film, 1:1 aspect ratio, allows for more image area than earlier models.

The SQ6 offers three additional modes. The double exposure mode is capable of superimposing two images onto a single film when the shutter button is pressed twice. The macro mode gets close-up images as close as 30cm. The landscape mode is helpful for scenics and wide vistas of locations.

INSTAX SQUARE SQ6 Specs

- Comes in 3 colors, Pearl White, Blush Gold and Graphite Gray.
- Uses FUJIFILM INSTAX SQUARE film (purchased separately).
- Picture size: 62mm x 62mm / 2.4in. x 2.4in. (Medium Format)
- Retractable lens: f = 65.75 mm, 1:12.6.
- Inverted Galilean finder, 0.4 x, with target spot.
- 3 motor driven focus modes: Macro Mode (0.3m - 0.5m/1 ft -1.6 ft), Normal Mode (0.5m - 2m/1.6 ft - 6.6 ft), Landscape Mode (2m/6.6 ft to infinity).
- Programmed electronic shutter release: 1.6 sec - 1/400 sec.
- ISO 800. Exposure compensation: ± 2/3 EV.
- LED display with Shooting mode (auto, selfie, macro, landscape, double exposure), brightness adjustment, flash suppressing and self-timer mode.
- Two CR2/DL CR2 lithium batteries.
- Capacity: Approximately 30 INSTAX SQUARE 10-pack film packs with new CR2/DL CR2 lithium batteries.

Keslow opens in Salt Lake City and New Orleans

Keslow Camera recently opened new offices in Salt Lake City, Utah and New Orleans, Louisiana.

The new offices reflect rapid growth and the industry's geographical migrations. Keslow Camera already supported a number of productions over the years in Utah, such as HBO's "Mosaic," Disney's "Andi Mack" and now Paramount Network's upcoming series "Yellowstone."

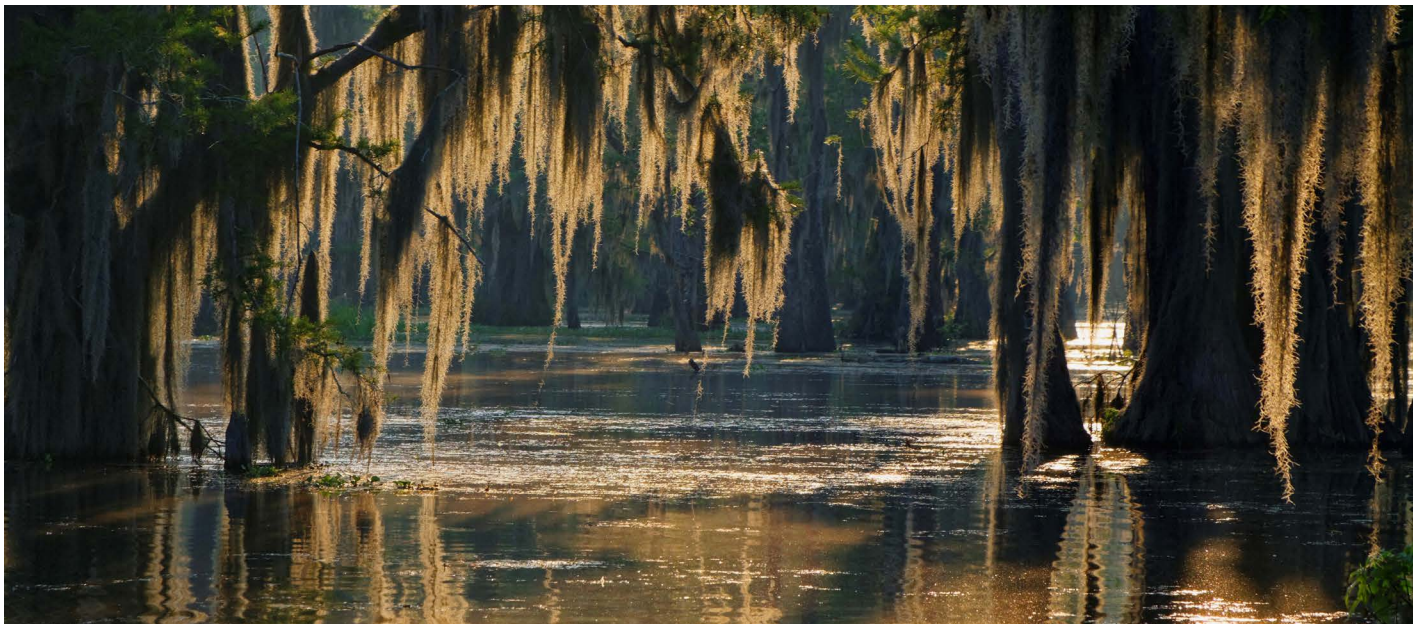
The recent growth in Utah is significant. In 2017, the state issued 602 film permits, up from 356 in 2016. Filmmakers continue to return to Utah for their professional crews and jaw-dropping scenery. Utah offers beautiful locations with craggy deserts to the south, green mountains to the north, some of the world's best powder skiing, and urban locations as well.

Louisiana was recently called "Hollywood South." Following a plunge in film production in recent years, the industry is experiencing a rebound. Unique neighborhoods and architectural beauty make Louisiana an excellent base for production, including the projects that Keslow Camera supports, such as SyFy & USA Network's forthcoming series "The Purge."

"With the vast amount of content being produced throughout North America, the decision to expand to Salt Lake City and New Orleans, in an effort to better support our filmmakers, made perfect sense. We strive to have a presence in the locations our customers are shooting in, wherever possible," said Dennis McDonald, Keslow Camera's Chief Operating Officer.

Keslow Camera is respected for high standards and meticulously maintained equipment. In addition to corporate headquarters in Culver City, the two new offices support the company's overall growth strategy. Keslow Camera's recent acquisition of Clairmont Camera in 2017 accelerated the company's growth and diversified its equipment inventory.

With offices in Los Angeles, Atlanta, Vancouver, Santa Fe, Chicago and Toronto, the new offices in Louisiana and Utah will mark number seven and eight for Keslow Camera.



ProRes RAW

Panasonic EVA1 with the new EVA2.0 update records ProRes RAW to Atomos Shogun Inferno.

ProRes RAW is one of the most important technical advances this year. It democratizes the digital negative.

I expect every major cine camera will soon have ProRes RAW inside. Atomos worked with Apple on the development, and their Shogun Inferno is an excellent way to jump in.

ProRes RAW is a new format from Apple that gives us digital negatives with ease, speed and economy. It addresses the current gallimaufry of RAW formats and customized, proprietary post processes. ProRes RAW workflow is consistent, repeatable and efficient.

What can you record today in ProRes RAW? The Panasonic EVA1 can output 10-bit Log-encoded RAW data in 5.7K up to 30 fps, 4K up to 60 fps, and 2K up to 240 fps; and the VariCam LT can output RAW in 4K up to 60 fps and 2K up to 240 fps.

The Atomos Shogun Inferno and Sumo 19 can record all of these formats in either ProRes RAW HQ or ProRes RAW. This efficiency allows RAW data to be stored in similar memory space as common video files.

With Final Cut Pro X, you can can edit and grade natively in RAW on a MacBook Pro. ProRes RAW files will also output from Final Cut Pro X to video finishing formats faster than other RAW formats. And Final Cut Pro X now includes increased color correction controls plus support for 3D-LUTs such as Panasonic's V-Log-to-709 image transform, included in the program.

Final Cut Pro X got ProRes RAW in the 10.4.1 update from Apple on April 9. It combines the flexibility and advantages of RAW with the performance (data rates, speed, ease) of ProRes. Within Final Cut Pro X, files remain in RAW during editing, color grading, and effects work, all the way through to the final output render.

By posting in the native ProRes RAW, Apple combines significantly lower data rates with the performance of ProRes. You will be able to play full-quality 4K ProRes RAW files on MacBook Pro and iMac systems in real time without rendering. You can even edit multiple streams in full quality without delays or skipped frames.

There are two types of ProRes RAW files: ProRes RAW HQ (higher data rate) and ProRes RAW. ProRes RAW HQ files are smaller than ProRes 4444 video files and ProRes RAW files are smaller than ProRes 422HQ files. This efficiency allows RAW data to be stored in similar memory space as common video files. For further details, read the Apple ProRes RAW White Paper April 2018.

Other camera companies are weighing in: Canon C300 series, Sony FS7 series, DJI (Inspire 2 drone and Zenmuse X7 Super 35mm), etc.

IB/E Optics

IB/E Optics is welcoming the new LPL mount with 3 new products.

LPLx2 VV Optical Extender

IB/E Optics' LPLx2 VV Optical Extender doubles the focal length of Large Format and VistaVisionish (ca. 46.3 mm ∅) LPL mount lenses. High-index, low-dispersion glass ensures high resolution and contrast with minimal optical degradation. As is typical of a 2x extender, there's a light loss of approximately 2 T-stops. Recommended maximum aperture setting on the lens being used is T1.9. The LPLx2 VV attaches to the rear of an LPL mount lens, and then goes directly into the LPL mount of an Alexa LF or any other LPL mount camera. So, for example, if you attached the IB/E Optics LPLx2 VV to a Signature Prime 125mm, opened to T2.0, you would have the equivalent of a 250 mm at T4.0.

PL-LPL Mechanical Adapter

IB/E Optics' PL-LPL Mechanical Adapter lets you attach almost any PL mount lens onto an LPL mount camera (e.g. Alexa LF). If you are shooting a film with a combination of LPL and PL lenses, attaching a PL-LPL Adapter to each PL lens will save lots of time.

LPL - UMS Mount Adapter

The LPL-UMS Mount Adapter is the newest addition to the UMS Mount System used on many IB/E Optics products, including the Large Format Raptor Macro lenses, the Fujinon Zoom Conversion Kit, and the Canon Zoom Conversion Kit. The system makes it easy to quickly wap between PL, EF, E, F, FZ and MFT mounts in the field without re-shimming or adjusting back focus.

Blackmagic Design Pocket Cinema Camera 4K

Someone said, "The best camera is the one you always have with you." The new Blackmagic Pocket Cinema Camera 4K is just that kind of camera. It is rugged, compact, lightweight and highly unobtrusive.

This compact camera will wind up on independent films and documentaries, fashion shows, travel blogs, web videos, weddings, corporate video, sports and more.

The rugged body of the Blackmagic Pocket Cinema Camera 4K consists of a high strength polymer polycarbonate that's reinforced with carbon fibers. This gives it strength and rigidity to help protect against accidental knocks and drops. The handheld design features a multi function grip which has logically placed buttons and dials that allow super fast access to essential shooting functions such as recording start/stop, still photos, ISO, shutter, aperture, white balance, power, etc.

Images can be recorded onto standard SD cards, faster UHS-II cards or CFast 2.0 cards in either ProRes or RAW formats. You can record directly onto the same external USB-C media drives used for editing and color correction. That means you can turn projects around much more quickly because you don't have to transfer files. Just unplug the USB-C drive and then connect it to the computer to start editing.

The Blackmagic Pocket Cinema Camera 4K uses the same MFT (Micro Four Thirds) lens mount as the original Pocket Cinema Camera. The MFT mount is versatile and allows for different lens adaptersto be able to use PL, LPL, PV, M, F, C, EF and other types of lenses from manufacturers such as Canon, Nikon, Pentax, Leica and Panavision.

Blackmagic Pocket Cinema Camera 4K Specs

- Full size 4/3 sized sensor with native 4096 x 2160 resolution.
- Compatible with Micro Four Thirds lenses
- Many MFT lens mount adapters available for most lenses.
- 13 stops of dynamic range
- Maximum ISO of 25,600
- Carbon fiber polycarbonate composite body: light weight.
- Multi function grip for quick access to recording start/stop, still photos, ISO, shutter, aperture, white balance, power.
- Built-in SD, UHS-II and CFast card recorders.
- USB-C expansion for recording to external SSD or flash disk.
- 10-bit ProRes and 12 bit RAW.
- Full size HDMI output for monitoring with camera status graphic overlay.
- Mini XLR input with 48 V phantom power
- 3.5mm audio jack, headphone jack, and locking DC 12 volt power connection.
- Built in 5" LCD touchscreen allows focus.
- LCD supports on-screen overlays, including status, histogram, focus peaking, and transport controls.
- Records 4K up to 60 frames per second and windowed HD at up to 120 frames per second.
- 3D LUTs can be applied for both monitoring and recording.
- Blackmagic OS as used in URSA Mini and URSA Broadcast cameras.
- Remote camera control via Bluetooth.
- Includes full license for DaVinci Resolve Studio.

Availability and Price: Blackmagic Pocket Cinema Camera 4K will be available later this year for US$1,295 from Blackmagic Design resellers worldwide.

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