

A Quarterly Magazine

Anuj Dhawan

Chirantan Das

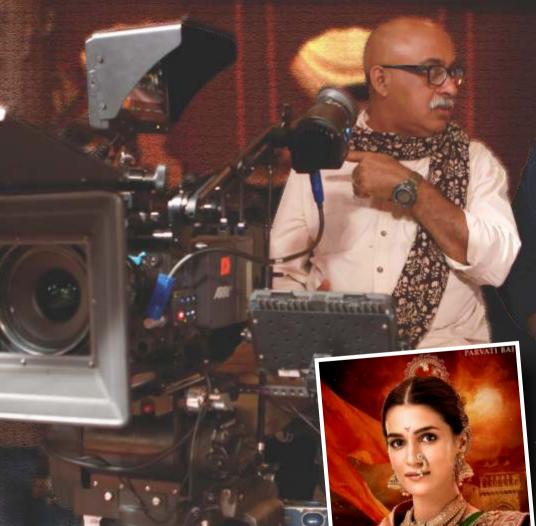
Siddharth Diwan

Jishnu Bhattacharjee

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Rupesh Kumar Supratim Bhol

Pooja Gupte



Muraleedharan CK
On Shooting Panipat



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Issue: 27 January - March 2020

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Edited, Published & Printed by Naresh Sharma Registered Address, Sangam Appt., F.NO-214, Pocket-24, Sector - 24, Rohini, New Delhi-11008S. Printed at: Roller Act Press Services, C-163, Ground Floor, Phase - I, Naraina Industrial Area. New Delhi-28

R.N.I. No.: DELENG/2013/52718





Dear Friends,

It is January 2020, and you are reading the 27th issue of 'Cinematography Art' magazine. This journey of the last six and half years was rewarding as we have not only increased our subscribers base but now the advertisers are approaching us for their brand presence as well. With every issue, we present views of Cinematographers, which provides our readers with their mindset, and the challenges they faced while filming.

In this issue, we have CK Muraleedharan talking to us about 'Panipat', a film that the audience was waiting to watch for the last 2 years. The scale on which this film was made has never been witnessed by the Indian cinema. The issue also features discussions by Anuj Rakesh Dhawan on his process of visualization in 'Bala', Chirantan Das in 'Pati Patni Aur Woh', and Jishnu Bhattacharjee in'Mardaani2'.

We not only present big blockbusters, but also the work of cinematographers who have done equally brilliant work on –'Art House Low Budget Cinema'.In the current issue, you will read about Siddharth Diwan's meticulous cinematography in 'Chintu ka B'day', Joy Supratim's Bengali film 'The Unsaid', and Rupesh Kumar's children's film 'Jhalki'. Technology is evolving and helping the community of cinematographers a lot. While in our last issue we listed almost all major companies who had introduced large format lenses.

In this issue we Focus on Whitepoint Optics Neo Super Baltar series is the first one by the company made from modern glass. While the lenses are brand new, the recipe by Bausch & Lomb is originally from the same era as Ts & Hs70 series. Super Baltars were used in many iconic Hollywood classics such as Martin Scorceses' Godfathers, Alfred Hitchcocks' The Birds and Ron Howards' Rush more recently.

Evaluating the resolving power of a lens is one of the most important things. We give you views of Stéphane Paillard on how can we find resolution of a lens.

Encouraging women cinematographers is also our mandate. Pooja Gupte, talks about her visit to Stuttgart Film Festival to participate in the 'Cinematographers Meet' held in May 2019.

Happy Reading!

Waresh Sharmy

Cheers!! Naresh Sharma

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Interview with DOP

Interview with DOP



Muraleedharan CK

on Shooting Panipat



Jishnu Bhattacharjee

on Shooting "Mardaani 2"

Interview with DOP Interview with DOP



Chirantan Das On Shooting "Pati Patni Aur Woh"

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Anuj Dhawan's on shooting "Bala"

Interview with DOP



Supratim Bhol On Shooting "Abyokto"

Interview with DOP

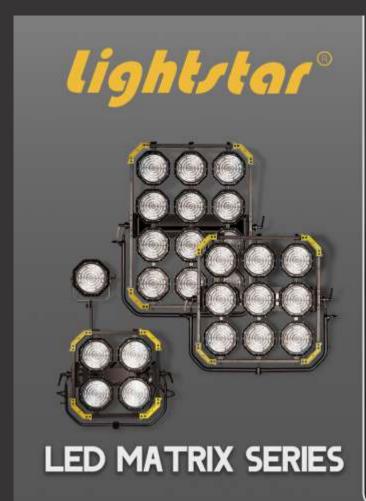


Rupesh Kumar On Shooting "Jhalki"

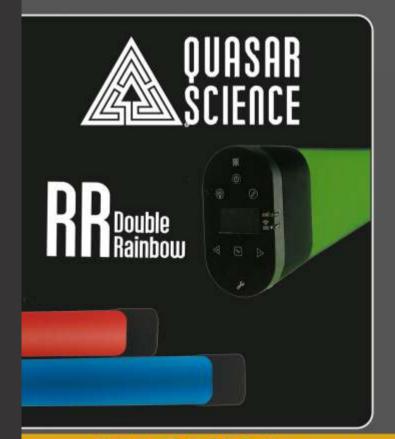
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Interview with DOP

Interview with



Siddharth Diwan
On Shooting "Chintu Ka Birthday"



Stéphane Paillard

DOP Pooja Gupte



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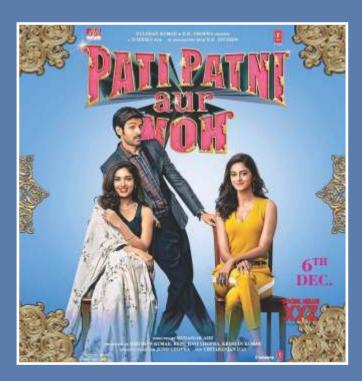
KNOWLEDGE SERIES PART - XI



JSSHARMA







When did you hear the script of 'Pati Patni Aur Woh'? So, how did you choose the interesting locations for the film?

When I read the script, I realised it demands a realistic look. I think comedy works best when it is put in real locations, rather than on sets. So, location was really important. So we decided to shoot the whole thing on real locations. We did the recce and kept looking for the house for Vedika and Chintu, which was the main house. We were looking for a modern house which is more upmarket than their parents' houses, which should not be a big apartment, as it is not Delhi or Bombay and should look like Kanpur. The only problem was that it was a small location of a real house, which made it not so 'shooting friendly'. The look of the location was perfect, both inside and outside. We decided to shoot sequences in one go rather than separate. So, we







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would start from the outside to inside and then come out again in the same scene, sometimes in the same shot.

How did you manage to find other houses in the film, like Vedika's and Chintu's parents' houses?

They were not that difficult to find, actually. We found it in Malya bad, which is a town just outside of Lucknow. It was really nice and we found it suitable for our film. So, it was actually pretty easy to find good locations.

From the art director's perspective, how did you go about deciding to prop up certain areas. Were there already decor in terms of props etc. or you dressed it up?

No, most things were actually a challenge. Tariq Khan did a very good job in art direction. He has given the proper feel to the locations , from property to colour scheme, everything was nicely done. We did everything in the way we wanted, including dressing up of both the houses.

You chose many outdoor locations for your film. What were the challenges you faced in shooting at such locations?

I think, the biggest challenge is to manage the crowd. It is a difficult job because there are so many people. So, we had police force and bouncers to help. Even shooting one scene outdoors was a pretty tedious job.

Besides managing the crowd, did you face any obstacles with lighting during the day and night sequences?

Yes. It is completely different problem. We were shooting in Lucknow in July and August. The weather was unpredictable and kept changing. Sometimes it was cloudy, sunny or it would rain. So, there were all kinds of problems.

Tell us about how you managed the lighting in night sequences. Particularly, when two friends meet at a point near the highway.

Yes, I love that location. It was right next to the Ganga river. There was this flyover at the backdrop and huge garden with big umbrellas where they will sit. It was dark so we decided to put lights in



all those umbrellas. I wanted it to look as natural as possible. That was the idea behind putting lights in them.

In terms of location lighting, did you encounter any restrictions?

Usually, I try to be as minimal as I can be. There is always a struggle with using less lights. I always strive to shoot with minimum lights or no lights at all. That is my whole idea. So, in many sequences we have not used a lot of lights. Here, because of the small spaces, I couldn't put up many lights, so used the Minimalistic Scheme of Lighting.

In situations when the sun is really bright, do you use HMI, Fillers or things like that to shoot?

In a situation like that, I normally

choose an angle where the top light slightly becomes back light. I use big skimmers instead of lights. Maybe 2 or 3 of them so that i could bounce the light to fill their faces. I like this kind of look better than using lights.

In sequences which were shot inside the mall, what kind of lighting did you prefer? Did you use extra lights for ambience lights to boost up some areas?

90% of the malls were all ambience lights. Only in close-up sequences of actors or whenever they are close to the camera, we used lights on their faces trying to simulate the ambience light level. Otherwise for wide shots, we have used ambience lights.



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In a particular sequence, the camera revolves around the actor for about 2 minutes. How did you come up with the idea of shooting it in such a manner?

Initially, when we decided on the location and the manner of shooting, we were going to use the round trolley. When we actually started shooting, we realised that the trolley won't work. It would not be able to move 360 degrees.

So, we scrapped that idea and went forward with the steady cam. It was a good option and worked perfectly.

To make sure all the characters stay in frame, did you use any kind of fixing







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mechanism like rods?

No, we didn't have to use anything like that. We just gave them a mark. Since it was a small space, there was not much scope to move around. The steadycam operator managed pretty well actually, without any reference or anything.

There are certain sequences that were shot through the glass of the car. We are unable to see any reflection of a person or the camera. How did you manage those rigging shots?

Most of these was shot with a polarizer filter, so that I capture the clouds, sky, trees passing by, electric poles and everything. I like that look a lot. There were some sequences where it was completely overcast. So, even the polarizer didn't work. I had to entirely cut down the sky with black cloth.

Did you use any artificial lights to boost up the level, because outdoor inside the car and outdoor, there is difference in exposure.

These sequences that I'm talking

about were shot on a low loader . The camera on car was on a low loader with HMI lights. Otherwise, when I use polarizer filters, the cars are normal riding. I used just a small light inside the car to fill up the faces.

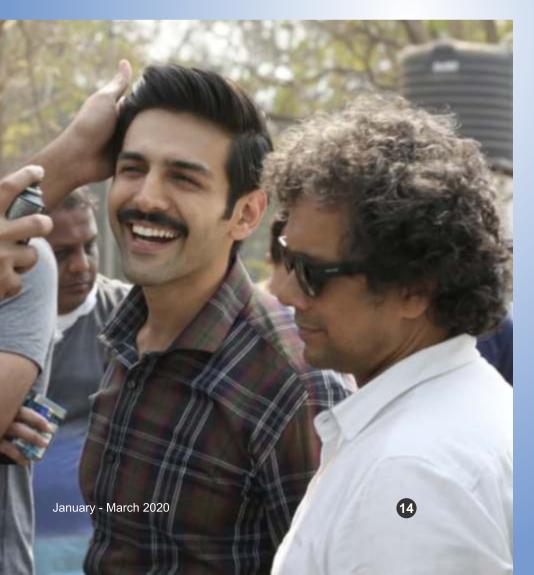
Have you used any computer graphics in the film which the audience may not be able to figure out?

There is very little VFX in the film. In one of the sequences, the actor comes out of the window and stands on the edge. It was not safe at all, so we attached a thick rope around his waist for support. That's the only VFX we had.

You use a drone to shoot the opening shot of the film. How did you design that ?

The idea was in the script of the film. It was the Director's vision to film the whole Lucknow city and slowly proceed to the court and the police. We were able to implement his vision accurately.

Which particular camera and lens did you use for this film?





I used Alexa XST and Master prime lens.

Once the film was shot, what was the process of colour correction after it?

The colour correction was done by Tushar Yadav from Red Chillies. I have a good rapport with him, and he understands exactly what I am looking for. He has worked before with me in 'Bard of Blood' for Netflix.

He actually understands my vision for sequences. So, I just required a little time on this, but the whole thing was done by him.

Feedback:

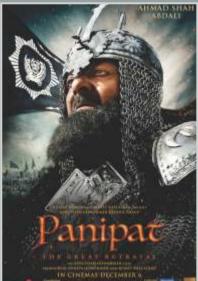
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Interview with Cinematographer

Muraleedharan CK on Shooting Panipat

The main aspects of the film 'Panipat' are the sets and the locations. While shooting on the sets is under control, shooting on locations always has several issues. How did you manage to tackle this problem?

The sets were a major component in our film. We had big sets of palaces, like Ahmed Sha Abdali's palace in Afghanistan and the Shaniwar Wada. In Nitin Desai's Studio (Panvel), we had a variety of sets lined up before we began the process of shooting. In the same studio, Ashutosh Gowariker shot Jodha Akbar. Some sets from that film, like the Red Fort, were still there. So, we collectively decided to reuse them after renovating them.

We built the entire Shaniwar wada as a real structure having concrete pillars and walls. It was an outdoor set. This was challenging and took three months to build. Around 70% of the shooting was done in the ND studio. The sequences we shot outside were primarily the war and travel ones. We had put up large tents near the lake in Film City. That way, I could get some inside-outside view of people coming into the tent and also of people's shadows through the fabric when they were moving outside. The sunlight filtering through the tent fabric helped me to get a special colour tone to the scenes shot inside .I wanted to use these elements.

How did you shoot the night sequences of the tent?

We shot them at night as it was easier to do so. We also had to cover the tent with skimmers sometimes. Like, when we were shooting a rainy-day scene, we needed some cloudy lighting feel inside. So, we put up big skimmer outside to cover the tent. Sometimes a punched an 18K from a crane through the fabric. I even made sun patches like this in scenes like when they were doing namaz etc.

Can you elaborate the colour scheme used in the film?

I had mainly three colour schemes in the film. The first one was the saffron theme with the Marath as which is predominant in the beginning when the song is taking place. It is very colorful in Shaniwar Wada with lots of lights & lamps.

For Ahmad Shah Abdali, a blue-cyan colour scheme was used from the beginning. I wanted to use the same colours in the Afghani palaces, so I experimented a lotto get that stained

glass feel inside the set. Therefore, I used mirrors which were mounted high above the catwalk, with coloured gels and punched light from far away into the mirrors. The light reflected from these mirrors looked like they were coming from stain glass windows above. Later, in post the VFX team replaced the catwalk with roof structure and windows.

The third scheme, red and black was more of a thematic scheme rather than a colour-oriented one which I used in the war. This scheme revolved around the idea of rage and anger. For this, I used colours which signified those emotions. This was happening in the war field with one lakh people and thousands of animals like horses and elephants. Dust and blood were constant elements that helped to give that brown earthy feel. So did the canon firing which hit the mud while a lot of people running around. We wanted blood but not in the gory sense. It was more of a kind of feel which you cannot see.

My colourist and I came up with the red and black colour scheme. So, we

removed colour from the blue sky completely. We made it white and more brownish with dust seen around. The sun which was shining through the dust clouds was hazy. Red was accentuated here and there with a little brownish feel to signify bloodshed and battle.

The uniformity of dust in long shots is unattainable. Did you work on it post-production?

Many a time, we could not use so much of actual dust while shooting as it is problematic for the actors and animals. Hence, we asked the VFX department to create the dust effect in post-production. Also, I worked with the black density while grading to get the dusty feel in the frame.

There is a day and night sequence when Sadashiv Rao Bhau returns to the court of Nana Saheb after his victory. What was the lighting process in both scenes?

There were two different lighting schemes I used. Sadashiv Rao Bhau and





his army come back in the day and celebrate their victory with a song. I got a temporary cover on the set to block sunlight. I needed this because I was using lots of diyas on the set as that could be the natural light source in a

space like that at that time. There was no catwalk on that set, but Nitin Desai gave me a grid structure on top where I could fix lights.

Despite it being shot in daylight, I used a lot of divas too. I realized that the beauty of that period will not be recreated using artificial lighting. We could have used mashals instead of diyas, but the issue with mashal is that they have violent undertones which was disrupting the environment. Diyas created a soft, gentle mood and were appropriate for that particular scene. Since the court would function in the daytime, I imagined slanting windows which would be giving filtered sunlight in the central courtyard. So the scene was lit with partial sunlight and partial warm light with divas.

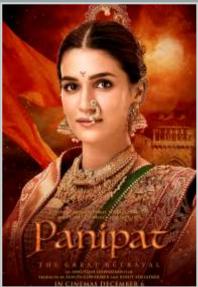
We also designed artificial diyas. We had a lot of cables through the pillars and had those diyas on the pillars. When the construction was going on, my assistants supervised the wiring and they were finally connected via the Electric Dimmer board. We used around 50-60 kinds of different flickering patterns through DMX board to create

an uneven flickering feel on the set. Only areas near the lens were real lamps. Even the Ganesha was lit with diyas. So, we had daylight simulation via HMI lights in the central hall and the rest of the pillars and walls with the diya kind of feel. Since there were 300 dancers in that space, I had to light them properly.

As for the night scenes in the court, we had discussions on how the court must have functioned post sundown in those days. This led us to believe that the servants would bring down the chandeliers at night to replace the candles. But, if the court was held at night, then lanterns would be there too. So, in the scene where they discuss who should fight Abdali, you see the actors standing in partial light, and servants and others standing here and there in darkness. I had a pool of lamps around to light the actors' faces.

In the introductory scene of Ahmad Shah Abdali, there was a streak of blue light appearing from above and a fire source in front of him. How did you come up with this idea to emphasize his actions?





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I explained earlier how I lit the palace. The element of fire came in because of two reasons. It's snowing outside the palace. So it must be very cold. They must be using fire to keep the temperature bearable. As a light source also, they must be using fire. Here I decided to use big fire sources instead of diyas. The presence of fire element helped me to create the ambience of ambiguity and fear. This also helped me to accentuate the gold of the throne. I used lot of small lights rigged on DMX to create the effect of fire in this scene.

In the sequence of Parvati Bai entering the armory to show her support for Sadashiv Rao Bhau, there is a strong light falling on the statue. It was the only source of light. How did you choose this particular part?

We made a set with two doors and no windows. Since it is an armory in the palace, it has to be safe and secluded. Most of the structures in those eras are designed in such way that there would be enough natural light filtering in. I wanted some contrast in the scene, which is why I didn't want to use mashals or diyas. I thought it would be appealing if there was natural light coming from some window on top. So, I put a shaft from where the light would come in, which then brightens the room.

I used a mirror and an 18k HMI light. It was placed at a height outside the set, so I had to cover the top with black clothes and use the height to my advantage. I made two platforms---one

for the light and one for the mirror. The reflected light worked as a sun beam coming from a window. It looks as if there is only one light shaft coming down and everything else is lit by its bounce.

What was the reason behind using warm yellow hues when Sadashiv Rao Bhau goes to pursue King Soorajmal in Rajasthan?

One reason for this was that I had to get as much variation as possible within the scheme. He is visiting various palaces. Shuja-ud-Daula's palace was done on the terrace, and his palace interior was done with everything white. Originally, for Soorajmal, what I had in mind was an excessive wood kind of palace .Nitin Desai came up with the idea of replacing wood with yellow stone. That's how yellow tints emerged. The architecture of this palace also gave me a different feel.

Shuja-ud-Daula's palace interior we used white fabric with embroidery work on it, white curtains on the windows, and white mattresses with white pillows on the floor.

When Parvati Bai attempts to wear the crown, and is stopped by Sadashiv Rao Bhau, you have used red hues. Please comment on that.

This was in the Aina Mahal after they conquered the Red Fort. It was pitch black and the room was filled with mirrors. When Parvati Bai walks in with the red lantern, due to all the mirrors, the Aina Mahal lights up in the same

colour. We used lots of 100-watt bulbs and some of them were covered with red gelatin. I stringed six to seven of them in a row on a wooden rod and hung them behind the pillar so they were hidden. I had different clusters of such bulbs hanging and they were connected to different 'electrical dimmers. My lighting team operated these dimmers on different cues to create the moving light feel. The effect created by the swaying bulbs was phenomenal in that particular sequence.

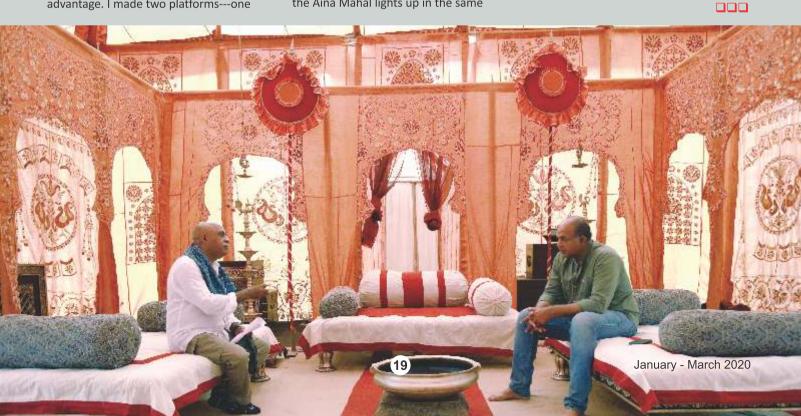
You have used the Large Format, which is newly Introduced format? Which camera and lens you used and was the reason to do so.

This is a story which required a big canvas. Large sets, lots of people and events like a war with lots of movements. So I wanted to use the biggest canvas available. During my tests, I found the Arri Alexa LF as the best one to use for this film. Signature prime lenses worked very well as a combination with LF. When I was watching the rushes later I felt like I shot it on film.

I had an excellent team of following people working with me. Baikunta Raut – 1st Ac, Vijay-2nd Ac, Satish Reddy and Nawraj Thappa on focus, Laxman from Light&Light as Gaffer, Vishnu as Grip and Ramani Ranjan Das on second unit.

Feedback:

Muraleedharan ck <ckmurali.dop@gmail.com>





Pooja Gupte is a cinematographer based in Mumbai. She has studied cinematography from Satyajit Ray Film and Television Institute, Kolkata India. Pooja was selected as an Indian cinematographer in Berlinale Talent Campus 2012, Germany. She was also invited to present her work in Stuttgart, Germany as part of series Making of Indian Cinema at Stuttgart-Indian Film Festival 2019. Her first feature film as DOP "Crossing Bridges" won National (President's) award in 2014 and is now streaming on amazon prime. Post that she has shot multiple award-winning features and short films. Some of her prominent works have been Rukh produced by Drishyam films streaming on Netflix, Brij Mohan Amar Rahe a Netflix original produced by Yoodlee Films. Pooja won best cinematography award at AIFF 2018' For Rukh. She has recently shot a 5 episodic web-series called "Cheesecake" produced by TVF

and streaming on MX Player. Pooja has just finished shooting a feature film called Panchank produced by Madhuri Dixit Production RnM. In this Interview She talks about Her participation as guest invitee on "Visual Landscape of Indian Cinematography" Stuttgart Indian Film Festival

I was fortunate to attend a very warm film festival in Stuttgart, The Stuttgart Indian Film Festival Germany. Since last year the festival started a very exciting series "Making of Indian Cinema" .This series initiated a conversation on different departments and aspects of Film-Making engaging the audience in depth about the process. The Festival Director Oliver Mahn and Program Director Elisa Kromeier invited three Directors of Photography from India. I was one of them. It was a pleasant surprise as they invited me through IWCC (Indian Women

Cinematographers' Collective) website and just a year earlier two of my films Rukh directed by Atanu Mukherjee and River Song directed by Sange Dorjee Thongdok were a part of the festival.

I presented some of my work and shared experiences in front of a huge audience, film-lovers and students of Ludwigsburg Film School (Filmakademie Baden-Württemberg) at Metropol Cinema. I shared the stage with three other DOPs Paramvir Singh, Shanti Bhushan and Conrad Lobst. It was amazing discussing the nitty-gritties of Cinematography like, why we choose a certain color pallet or style of shot taking and lighting. How the approach and process changes with the different directors and different stories. We also discussed the other important things that help the cinematographer define lookof the film like Make-up, Production Design and Costume design. We spoke



about the Indo-German collaborations' and and the history of collaboration from the time of Devika Rani and Himanshu Rai. The session was very interestingly moderated by Konstanze Welz and organized by Maurice Gleinich and Anna Vollmer. We also visited the Ludwigsburg Filmakademie Baden-Württembergwhich is one of the finest film schools in the world.

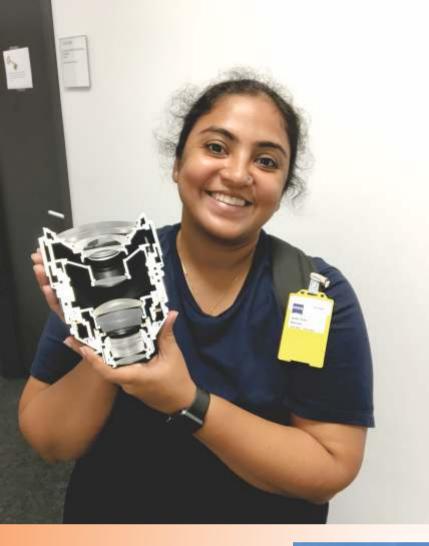
After my heartwarming stay in Stuttgart I travelled to a small town called Oberkochan. Oberkochan has a population of approx. eight thousand people and more than ten thousand people travel to the town to work in the very famous Carl Zeiss Factory. As I entered the huge premises I realized that in the many departments that there

are, one building belonged to cinema lenses department. It was incredible to know that all Zeiss lenses across the world and the oncel have shot the mostwith come from this one building. Some of my favourite Zeiss lenses are MK Series super speeds, Ultra Primes and Master-Primes. I actually got to see how the lenses are manually assembled right from Compact primes to the latest Supreme Primes. The whole building is made dust free zone so no dust enters the workshop. There are so many minute details and mechanism in assemblingthese lenses and I actually got to hold a half of Master-Prime lens. I also got to test the first prototype of 150mm Supreme Prime. I also saw the lenses being calibrated, tested and repaired. I must add most the assembly

and repair is done by women.

I also visited the Zeiss Museum. Last year marked the 50th year of moon landing and I got to see the lens that captured the moon landing, the Carl Zeiss Planar 50mm f/0.7 is one of the fastest lenses in the history of photography. Stanley Kubrick used this lens to shoot in candle light for the film Barry Lyndon.

I spent almost five hours in the Zeiss workshop and finished walking the whole town in thirty minutes.Peter Dorai— Zeiss India and Christophe Casenave- Zeiss Germany were very kind to invite me and this was undoubtedly the most fascinating experience of my life.



base plates, grading dailies at there facility and accessing it online to jot down few. Its amazing to been able to visit ARRI Munich and Berlin. Hans Salzinger and his colleagues made my trip to ARRI most memorable.

My next stop was Gecko-Cam owned Heinz Ratzinger. The workshop of Gecko-Cam is in the suburb of Munich at Putzbrunn. Gecko-Cam does not only makemost efficient lens testing projectors but they have a series of their own lenses called Genesis. Very interesting in terms of organic flaring in frame. They also rehouse the old lenses like MK Series lenses and give Vintage feel to the ultra primes, Master primes by changing the coating and rehousing the lenses. I also saw a Full-Fox Dynamic Full Frame Focus which one can attach to the C-Motion and track focus on the subject with a screen showing the frame. This was a new concept and facility I visited, one which I had not planned and became one of my most learning experiences.

In this trip to Germany, I was like a child in Candy Store totally in awe of all the wonderful places I stopped-over. During this period, I was also Hosting the IWCC Instagram account iwccollective which has the photos of the things I have mentioned. Cinematography is about learning more experimenting more and that's what this trip did!

Feedback:

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My next stop was Munich, famous for none other than ARRI for any cinematographer. I started my day early after all I was visiting 100 years of history and I always wanted to visit ARRI from my film school days. The day first started with the demo of prototype of Alexa Mini LF and Signature Prime Lenses. I visited the camera assembly station and also saw how they test each parameter, like dynamic range of sensor with image analysis before the camera goes out. When we speak about ARRI the first thing that comes to our mind is cameras and then lights but I also learned that ARRI has a huge postproduction set-up, the VFX department, Sound Mixing Department, Grading studios and ARRI academy. Some of these facilities are not just in Munich but also in Berlin which I also got the opportunity to visit later in my trip. I also met the colorist Steffen Paul who graded Dark, Netflix original a web-series and discussed the HDR Color Grading. There are so many different technologies and accessories by ARRI for cinematographers' comfort, like compact

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Bala is based in Kanpur. It is an old city. It is not very glossy and doesn't have a modern structure. In order to achieve the rough look of a small town, which particular camera model and lens did you use?

I think, for me, shooting in Kanpur and the whole visual design of Bala was not technical at all.

It is not about the kind of camera or lens we choose, but more about the kind of colour we use, and also the kind of lensing we want to shoot the characters with.

We shot Bala using a Red Camera paired with Master Anamorphic lenses. I have been a fan of Red for quite some time now. Yes, Red gives a different image than Alexa but the question is what kind of image can connect more to the narrative you're about to shoot. We wanted to show the painful summer like that of North India which you will not find in Mumbai. We wanted to implement the small nuances in Amar's script. We wanted to get the whole thing in imagery as well as the bad heat and summer. Since Alexa gives a little

smoother image, I felt that we might not get that feeling from it. Alexa has better latitude and can hold the highlights quite well while Red has lesser dynamic range which gives a little burnt out feel that I wanted for the film. This is the reason I went for Red.

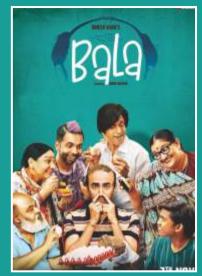
From this burnt out, I noticed that there was a strong out-of-focus source of light or a patch of light in the background, particularly an artificial light. Was it designed to give the burnt out feel in the night sequence?

Yes. When we were grading it, we made the highlights punchier to give a little more rigidness of the place. It can be seen even in the house---the way the sun comes in---because the whole house was a set. We looked for many locations. Finally, we realised that there are so many characters and so much drama in Bala's house that we decided to make it a set and shoot.

Talking about the sets, there was a veranda in the house which had a lot of light streaming in. Was that part of a set or a location?

No, it was a set. It was built inside

"



"

the studio. Our production designer, Mayur Sharma, made a great set. I had to figure out the replication of daylight ambience and beams of sun coming in as this was my first time in a big set





where we had to create the natural source of sunlight.

You mentioned that the central courtyard was also a set. How did you decide whether the light coming in from the top should be a hard light or a soft light?

Everything was designed according to the time of the day. We designed a sun path on top of the house. We discussed where the temple should be placed according to Vaastu, and where the bathroom should be. We made the whole house accordingly. So, in the first

sequence, we see his house when he's having breakfast, and the moment he leaves, a patch of sunlight is seen streaming from the left of the scene hitting the green where his brother is practicing cricket. So, we shifted the sun path according to the time of the day. It was not like we should use top light or something else. We just tried to maintain the sun path from evening to morning. In the morning, sunlight comes here, and in the evening, the sunlight comes there. That's how we stuck to the plan.

Bala's friend's barber shop had blinking LED bulbs and greenish tube light. Did you research on it or did you want it like that?

We recce and decided that in a couple of childhood scenes, we needed a warmer tone, and when they grow up there was to be a cooler tone. So, when we were dealing with a situation---social tempering---we decided to shoot with tube light. Even the gel in the cinema light makes the scene cooler, and looks like tube light, but it is LED. If we look at the character, he always has coloured hair as he wants to be at the top.

Bhumi has been given a darkish complexion as per her character. What were your instructions to the makeup artist and were there any touch-ups in the post?

Since we were shooting in 48°C to 49°C, touch-ups on Bhumi's face were only required when her makeup was patchy. We didn't have the time to test on Bhumi and see how she looked and how the makeup was reacting to the warm and cool lights. She was also working on other projects. So, we made a standard makeup set meaning this is the amount of makeup that should be on her every time there is a scene.



Did Bala also have touch-ups in the post to help make his wig appear like natural hair?

We had a special prosthetics team. The "Makeup Plan Company" was asked to make it flat and not in contrast, because it is difficult to monitor or fix the area on the head. So, every frame of those scenes has gone under VFX. And, we made sure it looked as authentic as possible.

There is a particular sequence where they are shooting a TikTok video which has a frosted image on both sides. Was it done in post or during the shoot?

The frosted look was done in post, but the blurs which were out of focus were done while shooting for the 9:16 aspect ratio.

There was a sequence where Bhumi and Seema Bhargava are sitting on the rooftop. They are talking about the need of a man at night. Why did you choose a reddish kind of light for Seema's face and not the moonlight?

It was not red, but a sodium-vapour source. It was more golden, which might have shifted in projection. We used the real sodium vapour to simulate the feel, rather than using the cinematic lights.

There is a sequence right after fixing Bala's engagement where the car is bumpy but the camera is fixed. How did you manage to get that effect?



The production designer made artificial speed breakers for this sequence. This was Aman's idea. The camera was fixed firmly to the car, and the frame was rigged pretty heavily too. So, it looked as though only the characters were moving. Otherwise, it would have become too jarring to register.

Is there anything specific you would like to tell about the challenges you might have faced during the shoot in terms of camera movement or lighting?

The first time we shot, we realised there was chroma in every sequence. And, we tend to see how bad it usually

goes. That was one challenge. We wanted it to look like a real location. We used chroma slightly. All the sequences on the terrace and his window were green screen, because we had to shoot between Kanpur and Mumbai. We had to match the set. Shooting at 47°C to 48°C was a bit hard. So was simulating lights from different places, and matching them between Kanpur and Lucknow. But working with Ayushmann and everybody else was a treat.

Feedback:

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After joining the crew as the DP, what was your first step in preparation of Mardaani 2?

I was really excited when I was narrated the plot of Mardaani 2. The fact that it was dark, had various layers, and was thrilling to the finish was another reason for me to come on aboard. Since the story was based in Kota, the first thing I decided was to keep it as natural as possible with a little bit of style and look. It was important for me to keep the essence of the film intact, while keeping the audience at an edge. The fact that we were going to shoot in summers in Rajasthan pushed me to start ways to make it look moody and select locations wisely.

There are many possible locations you can choose for a particular film sequence. What are the elements you

look for in a location to select the perfect location for a scene?

I believe the most important part about choosing a location is how well it justifies the scene. To give an example, in the first sequence when Sunny commits the crime, I had to analyse the kind of place a psychopath would take his victim. It wouldn't be a common place, but a space that resembles his mind. It could be an eerie, dark and isolated spot. So, a location should be chosen completely on the basis of the scene and the character's personality. There are other factors as well that count, such as the ability to light up the place, or the ability to create the required look.

Shooting at an outdoor location comes with its own challenges. In terms of lighting up the location, what were

the challenges you faced?

We shot in Kota in the month of May-June when summer is at its peak. The temperature shot up to 48°C-49°C. Nights were even more difficult because of the humidity. During the day, it was challenging to shoot as we had to maintain the contrast and continuity of light. We also skimmed a lot with 60x60 chimera cloth. We shot on the highway searly in the morning and late evening...but had to compromise on a number of shots. In the process, I learnt to use the harsh sunlight. With the help of correct grading, it aided the film too... to emphasize on the harshness of situation Rani Mukherjee was in... and the fact that she had to solve the case in those 48 hours.

Did you work entirely with natural light or did you use artificial lights during the day?

I hardly used HMI or bigger lights during the day mainly for two reasons. First, we had less time. Second, due to the heat and harsh sunlight nothing was working apart from skimmers.

I tried to work around with natural light by bouncing sunlight on a 12x12 ultra bounce to get a softer and even light. To get contrast I used mostly used skimmers with black for negative. The harsh sunlight sometimes made me skim with a chimera as the actors were barely able to keep their eyes open.

Since it is all digital today, did you use higher ASA for outdoor shoots at night?

I wanted a cleaner image, so I didn't push the ALEXA to more than 800 ASA. All I did was boost the light with a little bit of artificial light as a fill. In a sequence, we were shooting inside an under-construction area, I used minimal lights, some practicals and a small eye light.

How did you light the interior sequences?

I believe in lighting for the space and not the characters and let them play around in the scene. Using practicals or light coming from the window and just extending it to the characters, and mould them enough to make it as believable as possible. In the Police station scenes, I made light boxes with warm tubes to contrast with the cooler window daylight. In the climax scene also I used bulbs which were aged and then rigged Soon well Lights to extend it to the characters.

A particular sequence in the film was of Diwali. Was it anaesthetic requirement or a lighting requirement?

Diwali is a festival that celebrates good's triumph over evil and the whole set up symbolized that.

It was a narrow lane, and all I had to do was just the light from the top or wherever I could find the space. There was very less usage of light. Sometimes, I just shot with the available light of crackers and the Mirchi lights put up by the art department. Crackers and other things were a part of lighting from the beginning.







Every DP has their own style when it comes to capturing a lot of movement. Which did you prefer to use---zoom lens or block lens---in such situations?

To be honest, I am not a big fan of zoom lens because I feel that it dilutes that situation and takes you away from a scene.

To be able to get closer with the characters, and bring out the range of emotions, I mostly used handheld with a 28mm and 35 mm Master Anamorphic Lens.

Which particular brand of block lens did you use in this film?

We used the Master Prime Anamorphic series of Lenses. They are fast, and hence, were useful in shooting scenes in low light conditions. In low-light conditions, the focus needs to be sharp with enough depth of field. Do you prefer to shoot at a higher aperture like 4-5.6 in the night or use the existing light and shoot at 1.4-2?

I think to make an image organic, a lot of it has to do with the use of available light, and then add some small lights. Therefore, I mostly shot at T2.0-T2.8 to extract that. But there were situations where I had to light more to get focus and I tried to still get away with making the images as natural as possible.

What are your basic instructions to the operator of the steady cam to avoid disturbances in composition?

Over the years, you develop a relationship with the operator. Sandeep Shetty and I have bonded over the years. We also worked in Pari together. So, he is acquainted with the style and composition I require from my operator. It was really easy. Not once did I have to tell him what to do. He was just bang on. Sometimes, yes, it is difficult with other people, who might not get it right. But I didn't face any of these problems. He did a damn good job.

How did you shoot the drone shots in the film?

I wasn't present for most of the drone shots. They were actually done by my second unit Ayan Saxena and the drone operator Karan. We used an Inspire-2 with a Sony X7 camera. We tried to shoot in a better lighting condition because the drone shots look very different from the original ones. The first three shots of the film were shot by drones. I was present for those particular shots. We shot them in the real mela in Kota. The couple of scenes I wasn't present for were quite good, such as the chase sequence. I think it added to the pace of the scene.

If you find yourself in a challenging situation, how do you reinvent yourself to do something different?

Every situation has its fair share of challenges. The best is to evaluate and plan accordingly and in the process come out with something new. To be open to new things and to be flexible is









better I guess.

An art director in a film plays a significant role in setting up. What was the manner of your collaboration with the art director in this film?

Collaboration is the most important part for all teams actually. When we start a film, we device a Colour palette first. The sets, the kind of ageing we require for the particular location, the costume colours and such other things which form the basic look of the film. The production designer gives the right mood to the environment. Later, everything becomes easier for the DP. Sukant da is like a saint. I really enjoyed the whole process.

Rani Mukherjee, in this feature film, is playing the role of a female police officer, which is different from the other glamorous roles. What was the basic discussion about her makeup in the film?

The biggest challenge was to make her character come alive. I wanted to keep the makeup bare minimal. She had natural freckles which were also not touched.

The lesser the makeup, the more she resembled her character. In the initial part of the film, she can be seen as neat and fresh because she has just arrived in a new city. Gradually, as she goes deeper into the dilemma, there is even lesser amount of makeup. The hair is also not in place. In the ending scenes, there sweat and bruises with no makeup. All this was done during the look test. Thankfully it all gelled well.

Mardaani 2 is not a glamorous film, but the choice of costumes still adds value to it. Was there any specific instruction given for Rani's costumes in the film, apart from her police uniform?

Leepakshi was in charge of the costumes. Our initial discussion was to make it as natural as possible in pastel shades, and not very loud. The costumes needed to make the character stand out. Also for a sequence where Sunny stabs Rani, the blood needed to be seen on the trousers both on the road and underwater. It was tricky but with some tests the right hue and saturation was picked.

Are there any fast camera movement shots in Mardaani 2?

Yes. There were a couple of shots in the film where we used 'Bolt'. The first one is when Rani breaks the door and comes inside to be captured by Sunny. The camera moves really fast to see a ball being lobbed at the other end and then turns back only to be hit.



"

The second shot is of the two ladies throwing paint on Sunny. The camera travels with the speed of the paint being thrown at him. I must say it's a great piece equipment to devise some killer shots.

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Alumni of FTII, Supratim an Indian Cinematographer was born in a farmer's family, in the West Midnapore district of West Bengal, famous for 'Patchitra' - the oldest audio-visual art form of India. Art started nurturing in him at an early age (Senior dip, First Class in art under West Bengal State Academy). He finished his Photographic Studies from Fergusson College, Pune with a First Class and Art of Cinematography from the prestigious Film and **Television Institute of India, Pune. Supratim has** shot some noted films based on Bengali and Hindi literature like "Sahaj Pather Gappo" (IFFI 2016, International Competition, National award winner, JIO MAMI JURY Award, Film fare East award, etc.), "Panchlait" (IFFI 2018), "Avijatrik" - The Wander lust of Apu" (the concluding part of the novel Aparaji to on which the last two films of Apu Trilogy being made is in post-production right now)In this interview he tells the Editor of Cinematography Art' about his experience of working on the film 'Abyakto -The Unsaid'.

'Abyakto –The Unsaid' is a debut film directed by Arjunn Dutta. It has been part of the Indian Panorama IFFI, Goa 2018 and nominated as one of the two films from India in the World Competition Section for Debutant directors for the Centenary Award in IFFI, Goa same year. It won the Audience Choice for Best Regional Film at Indo-Ge rman Film Week, was screened in London Indian Film Festival and Dhaka International Film Festival in World Cinema Section.

It went for competition at Singapore South Asian International Film Festival, The South & South East Asia Film Week in Kunming-China and Caleidoscope in Boston, where it won the Most Progressive Film Award. It has been screened in Mumbai, Pune, Bangalore, Kolkata, Hyderabad, Aurangabad, Trissur, Delhi, etc. and has been part of prestigious Indian Film Festivals. It recently won the Best Director's award at the 3rdGuwahati International Film Festival, organized by the Assam Government.

HOMEWORK

One of the biggest challenges of shooting 'The Unsaid' was to not let the budget be a hindrance in the path of achieving what we wanted to achieve. The shooting of the film had to be completed in 10 days. Shooting for not more than 12 hours every day was the only way we could shoot due to budget constraints. In Kolkata, Bengali film industry works 8hours per shift which doubles in the next 4 hours in terms of making all payments to junior technicians. So, money was a major driving force.

We had to plan shooting every scene in terms of time we are going to spend behind it. The story unfolds during monsoon except few flashback scenes. So, we decided to shoot in the monsoon to achieve the gloominess of the season with rain machine and usage of much diffused lights

and bounce lights using lot of diffusion cloths and filters. The director, though this was his first feature film, was very clear in his vision and the particular look of the film. He actually saw the film in front of him which made my work easier.

Ninety percent of the film was happening inside a huge mansion ('Haveli' as we are familiar with) and the rest in a modern flat, around Howrah station side, roads, tea stalls, road side eateries and inside two different cars. We planned to finish shooting the house in 8 days and the rest in next 2 days. For such a situation, a basic requirement is a sound technical team and an honest approach of the entire unit, or else finishing a mammoth task in 10 days is impossible.

We didn't have the time to question or doubt it. Going back to school days-

"a film is made in pen and paper, rest is execution". So was this!

WHEN BEGINS THE ACTUAL JOB

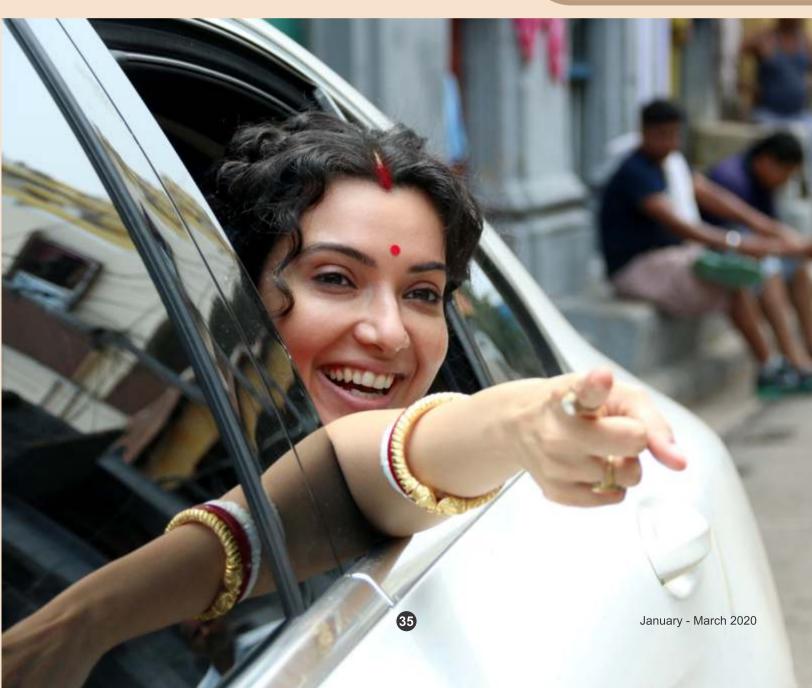
The script of the film demanded very soft, feather weight, poetic like visuals yet realistic and believable. Script wise we had to shoot majorly in two different seasons- monsoon and summer. The director lives with a script for the maximum time. It may be days, months or years. We, cinematographers, most of the time get along from the preproduction time.

In terms of generating every frame each time, it's very important to go back to the script and the director's mind. Staying tuned with him is very important. And then finally the realization comes that the film is growing in the unit bit by bit. All we had











in mind was that we could not afford too many takes because of time and budget. I planned to shoot the film entirely based on the available lights and the practical lightings on set. Simulating sunlight, bulbs, oil lamps, small tube light, street lights, fire, in a proper manner is what I love doing the most. So, I planned for this film too,' punching water, reflections and smoke.

WHEN LIFE GETS DIFFICULT

Seasons behave differently at various places in India. To cite an example, Mumbai monsoon never sees the sun for almost two months at a stretch. It is always gloomy, and moist. But Calcutta is a little different. Sun often appears in between rains.

Now this becomes very tricky when you have to maintain continuity. So, the shoot planning has to be changed promptly as per the lighting situations. We had to change the location or zone rather, where the sun was peeping in. One scene we shot in the living room

incomplete cloudy atmosphere and the immediate next scene which we had planned to shoot next day in the balcony had sun beams falling harshly on it.

Now even if you cut down the direct sun, the atmosphere still gives different levels of brightness as compared to the cloudy day. So, we changed zones and relocated to zones where shadows are exposed outside the window or door, and we could manage with rain machine to maintain the moist damp look. Another way to deal with such situation was to shoot that scene when sun has set but the day light was still persisting, which we eventually did for smaller scenes.

Because we could not afford retakes, we used to do the blocking first, rehearse the scene well, and then finally shoot. The entire film hardly has any retakes. Another fascinating side of the director I explored was his way of looking at the scene in one go. He does not like taking too many close ups. Shooting one shot is his favorite.

So, sometimes in some scenes we don't have close ups except the main master shot. Later on, people have appreciated how the blending has happened of shooting one shot along with the script so beautifully. Personally, I feel retakes makes you lose the purity of a shot. Some where the sanctity evaporates. So, this film was making us disciplined in terms of finishing our work in stipulated time. Everyone was pouring in their best to finish the shoot in a disciplined way keeping the quality intact.

We had one huge mansion and we had to select zones where we could depict three different families living in three different houses, which was the most difficult part of the shoot. One common thing among the houses is as per script they were situated in the older part of the city. The physical properties of the mansions, houses, balconies, rooftops, courtyards etc. of the older part of the city is somewhat similar. Very carefully keeping the visual different

from zone to zone in terms of lighting and camera angles we could create three different houses in the same mansion. I never differentiate the production designing department to be separate. Working shoulder to shoulder in terms of color, texture and feel, both the departments excelled beautifully. Keeping the characters in mind we chose colors of the walls, furniture, costumes as per their personalities and the underlying currents flowing all across the film.

The ninth day shoot was completely to be shot outdoor. Due to rain we could shoot till the available day light only, though we had plans of shooting in the evening but, as rain started pouring in we had to pack up. So eventually, we shot the film in nine and a half days.

POST PRODUCTION

Very similar to all the other films of mine, I try to light it right. Do all the corrections as much as possible to get the real look in the shoot itself, so that I don't have to spend much time in grading the films. This is a habit I have inculcated from my photography studying days in Fergusson College. This



makes job of a colorist easier too, as he is also clear about what exactly I am looking for. There were two seasons precisely which needed to be distinctly visible. During shoot I have used filters like moonlight white and few shades of amber, which gave the colorist a clear idea of two different images.

GOLDEN RULES

I have always followed my heart. In lighting and framing following my

instincts always help me achieve what the director had narrated to me. The script is the Bible, believing in it and living in it are two different things. Both have to blend. If I can live with the script, I am able to create that space or else all efforts are in vain.

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Rupesh Kumar, hails from Ranchi. He has done post graduation in motion picture photography from SRFTI and actively working as DOP since 2001 in India. He has ample experience of shooting fiction and nonfiction projects including commercials, TV shows, web content and feature films. He is learned the craft under the legendary cinematographer Mr Subrata Mitra who shot many of Satyajit Ray's films. Rupesh feels fortunate to experiment with cameras since childhood as he comes from a family of Photographers; his father Mr Akhouri Pramod has been a veteran photographer. He also gives the credit of adding humanistic value at work to his Buddhist faith and eternal mentor Dr Daisa Kuike Da.

Jhalki is Rupesh Kumar's 1st major work in Hindi cinema, which he shot in 2017; Jhalki is released on 14th November 2019, which is being appreciated on several platforms, which support serious and meaningful cinema around the globe. Including dozens of awards on various national and international festivals, the film got best cinematography award in a festival (A show for a change) in US this year as well. DHUMKKUDIYA is his next feature film coming up which is already started creating buzz in many film festivals. In this Interview, Rupesh talks about various Challeges faced while shooting Jhalki with Editor Cinematography Art, Naresh sharma

When we started the shooting Jhalki, It was the extreme and adverse weather condition in Mirzapur, UP. It was the peak of summer in 2017 when we landed amidst average temperature rising to 45-50*c during the daytime. As general efficiency, movement, performance and coordination at work slows down in such conditions, we decided to shoot mostly in mornings and afternoons and of course sometimes we shot at night as well. The actual time window for completing

scenes had to keep short and swift considering many factors. Soon as shooting started few crew members started falling sick one after another. It was worse when one of our main actors was unwell. It could have bought us to call off the shoot but amazingly she recovered. Whole unit courageously challenged the heat, dust, storm, and completed the schedule successfully. Thankfully I managed to keep myself healthy, fit and hydrated too and kept motivating others to do the same. I still remembered once we were shooting a dramatic scene on a crowded road under scorching sun, temperature must have been around 49* and suddenly our prime camera Arri Alexa SXT got badly heated and refused to start again. There wasn't much arrangement to keep it cool whatsoever. We had to wait for hours to resume. Meanwhile ambient light changed. These situations are very disturbing for a cinematographer. One of the dusty and hot after noons we were shooting on a busy roadside, I was sitting and sweating on the top of a crane composing a shot; suddenly two angry bulls barged in below the crane out of nowhere. There was a great panic for that moment. Anything could

have happened. Luckily those fierce bulls just missed the base of the crane by inches and moved away. There could have been a fatal accident.

Working with kids is not Esay. The story of Jhalki is about a 9 years young girl and her little brother who is just 7 years, needless to say that we had to shoot most of the scenes with kids. Arti and Goraksh both are bundle of talent but they had very little experience of facing cameras. To get best convincing performance out of children the setup and conduct had to be very kids friendly and non-obtrusive in a sense. The overpowering shooting setup and presence of crowd makes it very difficult for actors specially kids to perform. We tried keeping things simple and effective in terms of blocking and lighting, giving extra rooms for kids to feel at ease and deliver the best. I developed good rapport with kids, which helped in communicating and giving basic instructions like maintaining looks, focus marks, positioning etc. we constantly monitor their health, comfort and moods alongside their parents and production department. Initially there was a major apprehension regarding their output but these brave kids pulled it off brilliantly. I couldn't think of a better Jhalki and Babu anyhow.

There is always a great excitement and challenge for a cinematographer to shoot in remote real locations with fresh and unseen visuals. Without full proof plan it is tough to function efficiently on difficult locations like riverside, sand dunes, railway tracks, remote village lanes and hazardous factories etc. Our base hotel was in Mirzapur city, so each day we woke up early, traveled long distance to reach the shooting spot well before time. At times we had to park our vehicles at a far distance from actual spot means limiting my resources with only basic equipment and restricted support system. It was frustrating to rework and limit our plans due to inability of getting heavy equipment on site. Apart from that we had to shift from one location to another swiftly more than once in a day. We invested lots of time in loading unloading, shipping and travelling in difficult territory, which finally looks fabulous on screen but I personally feel that we could have done better job provided more time and planned logistics. No complains though as I knew it was going to be exciting in a different way.

We had to face non-cooperation from locals, mainly factory owners and unions who were reluctant and apprehensive as the film might show their business under bad light. Our Director Mr. Brahmanand Singh and Tanvi had tough time convincing such opposition. Many of our major locations, which we locked during recce, got canceled last moment. Our well-plannedschedule draft becomes literally redundant. We had a sensitive subject

MATE HALL COMMAN SCOTAL

MATERIAL SCOTAL

like child labor and needed to get into the thick of reality to capture the core. After few refusals we managed to find optional location but in such condition the floor plan and lighting goes for a toss. We had to apply gorilla approach at many locations. Shooting was held up once for hours by factory union's adamant raid on the set. The place is notoriously known for illegal activities as well. We had to move carefully with crew and actors. We were not allowed





to interact unnecessarily or reveal script to anyone who wasn't part of crew. Our cool headed director had great local connection which came handy in avoiding unpleasant disruption. Thankfully every time whenever there were adverse conditions we didn't give up. Each member of unit fought like a warrior and thus we delivered without fail.

As we were shooting a caused based film with a moderate budget, I didn't have the luxury to hire expensive equipment apart from one Arri Alexa Xt and one Alexa mini. Limited package of day balanced lights and just a crane with track trolley for moving shots. Rigging lights and shot choreography under such limitation was a huge challenge.

I missed a jib or a drone at times. The size of the unit was also not too big so each crew member had to double up to make things work in time. I remember heavy heart I asked to collect few white

it was Very first day of the shoot we started without any lights because our light van couldn't reach on time. With

bed sheets and dhotis from local village, which served in bouncing sunlight and that's how we completed the first day's shoot. It was heart breaking for me but such condition gives an opportunity to experiment and explore creativity. The light van joined from second day.

There was a constant dilemma in composing shots or lighting between achieving rusty realistic but classy cinematic look at the same time. Neither I want the film to look like a

documentary, nor like a stereotype mainstream film. The locations were quite fascinating but intimidating. Ugly and crude reality all around where one goes to look for a frame, which can be larger than life, authentic and cinematic as well. Few locations were just gorgeous where I didn't have to worry much about but otherwise there was mostly mess all around. I maintained calm, gave room for lot of Internal thoughts, interacted with the environment and acted with wisdom, creative and humanistic approach. Another internal challenge was not to get carried away but maintain visual synergy and poetic flow throughout the film. We had an Osmo gimbal and a Panasonic Gh4 for subsidiary shots though I wasn't too keen of using other cameras apart from Alexa with master prime lenses because I feel it affects the consistency and harmony in the over all look and feel of the film. Still there are few shots, which had to be taken with subsidiary cameras, which I tried matching with my colorist during color correction session. Colorist did a fabulous job but I still feel those shots do not match perfectly.

Lighting for night scene in open vast field was a nightmare, as I mentioned we didn't have access to height as in rostrums or jumbo stands etc. Lighting up such huge location from ground level and creating depth was quite difficult. Cinematographers get inspired with existing source and simulate the same at times but our night locations didn't give much clue. I had to mostly assume and visualize to light up within the available resources. There was a sudden storm and gush of rain during a night exterior

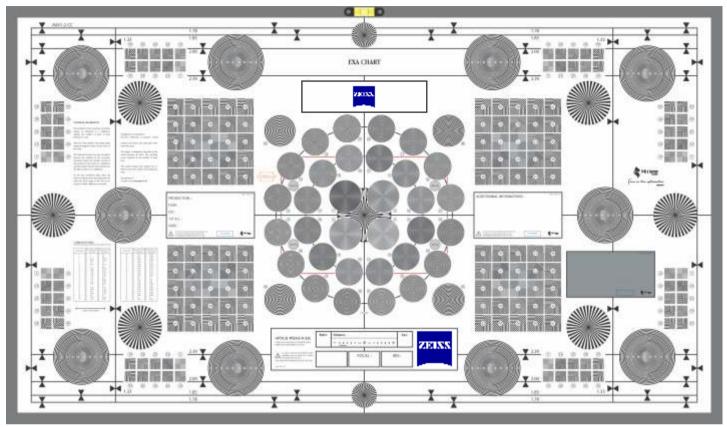


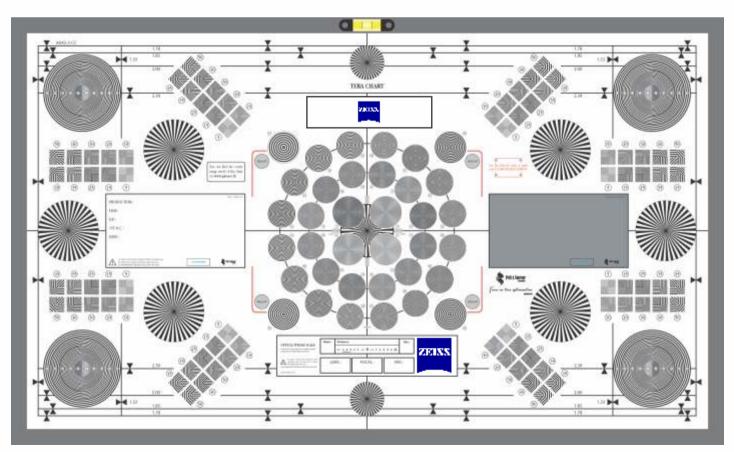
January - March 2020

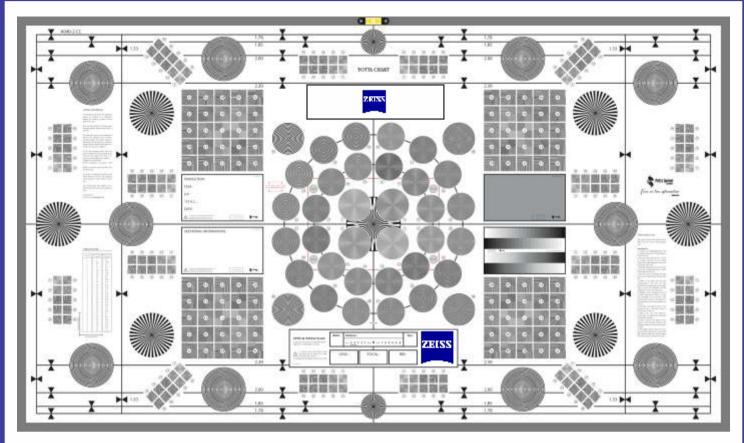
Interview With

Stéphane Paillard











Did you design this particular resolution chart or did you improvise on various charts? Brief me about the various images of resolution available here.

Yes, I designed the charts entirely. It was based on my experience as user for almost 15 years. The technical drawings were based on the ones by Léon Foucault, a 19th century physicist and astronomer, who invented a way of

testing the resolving power of lens. Nothing changed after one and a half century, except that we are speaking about cinema lenses, not astronomical lenses. I, actually, wanted to address the main critical problems you face with camera lens testing through this charts. Therefore, I made these to add some mathematical sense to the physical way of testing lens. Today, with such accurate new lenses and sensors, you need that kind of technology to precisely test the

elements of your lens. With a projector, the light goes outside the lens. Thanks to the P.A.T. Charts, you can now test your equipment with an amazing printing quality and in a natural way: the light goes inside the lens.

When we talk about resolution, there are different kind of shapes on chart. Why did you opt for a certain kind of shape and what does each shape define? If there is a chart and a lens present, how would you measure it?

Actually, there are only two kinds of "mathematical" targets: "linear" and "circular" targets. Today, we usually use circular targets, which people prefers for digital cameras. But I was born as assistant camera in the 90's, with film cameras, and we were mostly using linear targets, made of vertical, horizontal and diagonal lines. This is the one I was talking about with Léon Foucault. The circular targets are, inherently, geometrically diffrent to the linear targets, but their mathematical reading are the same. For example, if you're looking at number 20, the line thickness will be identical from linear to circular targets. Your eye will easily find the most confortable reading.



What do the numbers assigned to the targets denote?

This is where mathematic comes to physics. Numbers go from 4 to 55. As soon as you go to the centre of the main target, the lines become thiner and thiner and numbers go down, until 4. The numbers in the concentric and linear targets, in twentieth of a millimetre, express the number of pairs of lines printed on 1 millimetre. In other words, if I divide 20 with the chosen number, I will have a certain number of pairs of line per millimetre printed on the chart. Therefore, if I divide 20 by 4, it will give five pairs of lines printed on the chart on one millimetre. Similarly, if you have chart number 20, and you divide it with 20, you will have one pair of lines printed on one millimetre on the chart. This is a way of avoiding comas to nominate each target. One pair of lines consists in one black and one white line. The website www.pat-acc.fr provides the correlation table.

Now, what I suggest is to shoot the charts at 50 times the focal length. You may wonder why 50? First, because you will test your lens at an engraving distance closed to the middle of the focus ring. Also, 50 is perfect, because "five" is a simple multiplier, easier than

40 or 60. So, this means that chart number four, that equals 5 pairs of lines printed on 1 millimetre on the chart, multiplied by 50, will now give 250 pairs of line printed on one millimetre on the sensor: 5x50 = 250.

Today, no sensor can reach that definition! The best sensor on the market will reach number seven on the P.A.T. charts. This means this testing tool goes further to the best shooting equipment. Using the P.A.T. Charts, you have a real head start for many years on the sharpness test of the sensors and lenses.

Now, as example, you are testing a Red camera with a Monstro 8K full frame, one of the best sensors on the market today. You place the image plane of the camera at distance 50 times the focal length of the lens to be tested from the chart. For a lens 50mm, you place the camera 2500mm = 2,5 metres from the chart. If you're testing old lenses from the middle of the 20th century, the resolving power that you will get will be linked to the quality of the lens. You will see aberrations in the edges and you will be able to see chart number 21 or 22, maybe over. By comparison, using a high technological contemporary modern primes, like a Zeiss Supreme

Prime for example, you'll be certainly able to see thinner targets, 10, 9 or 8.

You now have to look at the results on a monitor. With film cameras, you just analyse the results on the photograms with a microscope. With digital cameras, The results you will see and analyse will depend on the choise of the monitor. You can easily imagine that the definition you will get using a 720p HD monitor to look at your test of an 8K sensor and new accurate lenses. To be very efficient in your test, the idea is to homogenize the quality of your equipment. In that case, using a 4K or 8K monitor. Which seems quite normal for everyone actually.

To resume, the P.A.T. Chart allows you to do subjective physical test with very high definition and mathematical way of analysis.

What do you mean by "subjective test"?

The high definition printing of the P.A.T. Charts allows you to test lenses and sensors at best. Whether you test your equipement or you compare different lenses or sensors, the reading of the results depends of you, your eye. The chart just gives you the definition you need, and beyond, for your test, but

also numbers to interpret your result. A couple of month ago, we test the new anamorphic chart of te range with different lenses. We recorded the test and played the little movie, about 2 minutes, on the computer. It was so easy to compare. Definition, barrel distortion, aberration was now so evident to analyse!

The circular lines get visibly thinner. I also see kinds of rectangles or squares. The numbers are present at multiple places, and when you test the chart you say number nine. How do you define these numbers?

Charts are composed with 3 kinds of targets. The very popular back focus "Siemens" targets, the "stars", for a quick check calibration. Then, you will see linear and circular targets. As said, my eye is more matured to linear shapes. The P.A.T. Charts are made for every generations.

One thing to note, all the elements of the chart are placed symetrically: on the horizontal axis and on the vertical axis.

Also, I developped 3 sizes of spherical charts. The composition, the size and the numbers of the elements and of the targets will depend on the size of the chart, but will basically be the same from one size to another. The choice of the size of your chart will depends on the size of your sensor. Using the same lens, the angle of view won't be the same with a sensor width 25mm than with a full frame sensor. The rental company can choose the chart depending on the type of its cameras.

Here the aspect ratio is 1.33,1.78,1.85, 2.0 and 2.39. So, if you wanted to check, say a cinemascope lens, would you frame this particular part which is 2.39?

I developped a special chart, with special shapes, for anamorphical lenses. But, for every other ratios, even spherical 2.39, I will answer: exactly. These frame leaders come from my film experience, because in the old times, we had to send the frame leaders to the lab for projection. Except 2.0, they are all international official frames.

Of course, for this test, you don't place the camera at distance 50 times

the focal length, as I have already said. Today, with digital camera, we don't do that kind of test anymore that much. If you're shooting into 2.39 or 1.85, the camera generates everything. But if you have to do that, you can. I remember a commercial I did as 1st AC, and people from the ad agency didn't know which frame to use. So, in view of the shooting, I did 4 different frame leader test. At the end of more than 24 hours working on set, we did the commercial four times, changing each times the ground glass for the same acting shots.

In terms of resolution, what is the ideal number a good lens must give?

As I was saying, you have to consider the sensor, the lens and the monitor. So, if you're using an 8k sensor with Zeiss Supreme lens on a 4k monitor, you will not see the exact resolution of your sensor. This is subjective; you have to compare. No table will tell you about the resolution of lenses, you need to provide the information first, with test. It can only be compared, but with so many elements on the market! The P.A.T. Charts are made to define at best the sharpness of your shooting equipment, in a very natural and easy way of testing. When you're preparing a film, one of the first thing the team knows is the media: cinema white screen, TV, internet, etc.

Earlier in a film we used to print and project it, or we used to check the desired resolution by visually looking at it. Now, everything is in sensors of the digital base. So, how do you decide whether the lens is worth it or not?

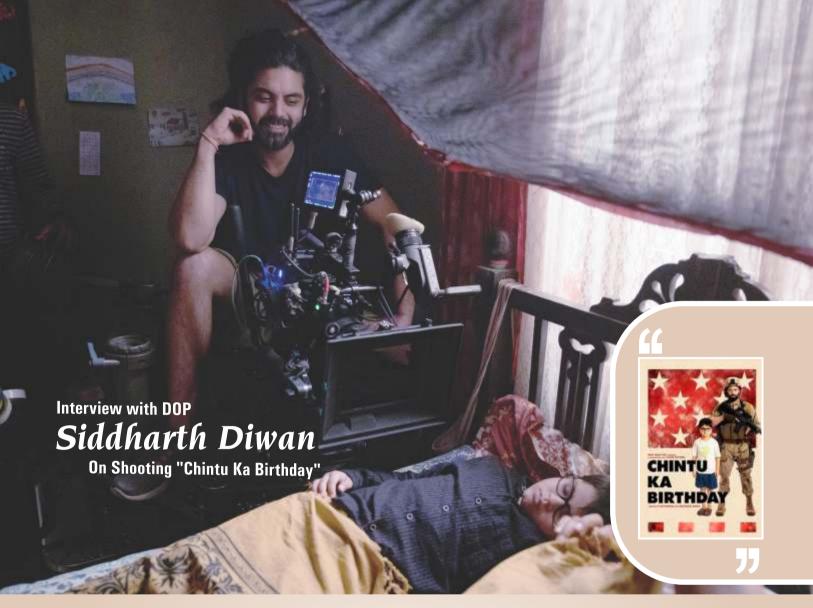
Choosing and using specific

equipment depends on the individual. If we talk about Zeiss cinema lenses, we would say they have cold temperature and are cold lenses. On the other hand, Cookes are warm lenses. Usually, we will use Zeiss if we are going outside in the mountains, trees, and sites with such details. If we are shooting an intimate film, where you need skin tone and everything, we will find Cooke more suitable. But somebody could say the contrary, or like the difference; it's very subjective. This is why I like the feeling of cinema. Cinema comes from passion. and from the heart first. It comes from the way you communicate your feelings. Therefore, I can't compare which lens is better. It will depend on the picture we do. If we want to use the old lenses for commercials and pictures, which were popular in France 10 years ago, will they be better than the new ones? Technically, no. But will they be better for the movie that the director and DOP want to do? Yes. So, it's not a mathematical way of testing a lens and knowing which is better. It's a physical way of feeling your lens and camera. What I'm saying not just comes from an optical man's experience, but also a user man's experience of making more than 200 features, commercials, long picture films, TV, movies, and feedbacks from the DPs and the directors. This is the result of these experiences. And I don't want to say if this lens is good or not. We just check and then talk about that to make the movie we want.

FEEDBACK:

Stéphane Paillard - pat@pat-acc.com





As a majority of work was done inside a set, how was your interaction with the art director in terms of giving you space for setting up lights on the ground, or from the catwalk?

The reason we were on a set was because we couldn't have possibly shot this film in Baghdad. In an ideal world, I would have shot this in a real house or location. But then, we thought that just because we are on a set, it doesn't mean that we should move the walls and give space to the camera. We should treat it like a real location. The only liberty I took was that we didn't build ceilings everywhere as there were certain shots where we needed the top angle. So, we had to remove the ceiling. It was also a cost factor as you save a lot of money when you don't have to build a ceiling. We were clear as to where we needed a ceiling. And then, we would build just that much. Apart from that we treated it like an actual location and dealt with the

restrictions that comes along with it.

Did you build a catwalk to rig your lights?

Yes, we did.

Since it was Satyanshu & Devanshu's first feature film andthere weretwo new child actors, I wanted them to have as much freedom as possible. Directors wanted to shoot linear and we shot the whole film linear. I took maximum advantages that come with shooting on set of the set. I did a pre-light, which speeded, up our work process. I designed all the lighting in such a way that with just a couple of switches here and there, I could change from day to afternoon to evening to night within a few minutes. The biggest advantage of having catwalk was I could entirely light the set form outside and had minimum equipment inside the house. It was an attempt to make the set feel like it's their home.

There are three situations in the film in terms of lighting. When it was day and there was an outdoor source of light coming through closed windows, did you use any daylight source inside from the catwalk or from the ground to boost up the light ordidyou prefer to use the tungsten practicals for the daylight situation?

The film starts in the morning around 10 am which progresses into late afternoon, and by evening the practicals are switched on. Then, we go into the night where the practicals are the only source and By the end of the film, there is no electricity in the house and we only have candle lights in the entire space.

So when the film moves towards evening part I did the balance with some amount of light coming from outside, and a little bit through the practicals. There was a balance of both. I approached it in a very naturalistic way. I

always imagined how in a realistic situation the evening light would interact with the practicals in a house.

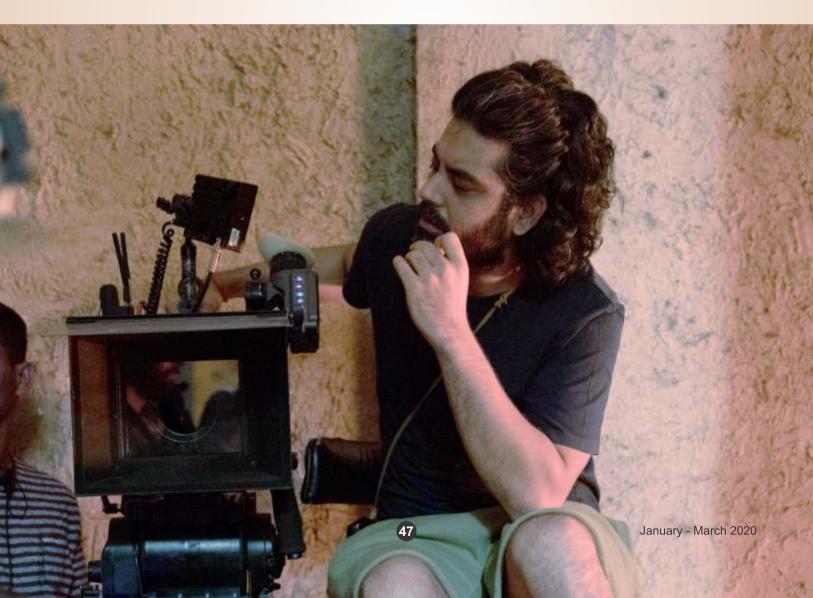
There was a sequence when the lights go off, which is more or less an evening or night situation. What was your primary idea to keep as the source of light at such a situation? There was an outdoor light coming in and was bluish in nature. The risk factor here is that it might become very dark, and at the same time, people might want to see the faces too. How did you manage those particular situations where the only source of light is from outside?

In such situations, I always find balance. I tend to get light from outside, and not put too many sources inside. For the wide shots, you go with the mood. If the characters are catching the light, it is okay, and even if they are going out of the source, which is okay too. I always do my homework where I decide if I need to light up the faces or if it is okay not to see the faces and just hear them talk.



Sometimes, you feel differently on a location. The overall mood is important. There are times when you feel that you need to see the faces of characters because its important to see what they are feeling and their expressions for the moment. I plan my lighting accordingly. In wide shots, you get away with it, but

for closeups, you wrap up a little light on their faces. You still have to maintain the contrast ratio so that it doesn't feel like suddenly there's a new light in the room. So, I just try to cut it and put it in a way that it blends and looks like a part of the environment.





You just mentioned that you would like to wrap up the faces of actors with existing light. Normally, most of the LEDs are diffused. Do you have a priority in diffusion material---Lee Company or Rosco Company?

When I am doing heavy diffusion, I end up using a lot of400 of Lee
Company. A lot many times, you put heavier diffusions on your sources and it

starts adding up a little. But in Lee, the renditions are more accurate. There are certain kinds of diffusions that are a must for me like I always put a light opal in front of any light just to take the edge out. Now there is new series called Zigron specially designed for LEDs. I have started applying those quite a bit too. But for me, Lee is the natural way to go.

The sequence with the birthday

cake and candles are the main sources. Did you manage with the existing source or did you add a few more lights to enhance the feel?

No, I added some more sources. I was dealing with different skin tones, and they were not reacting to the natural light in the same way. Because I shot with anamorphic lenses and I generally don't like to shoot full open so I took the decision of shooting on an aperture of 2.8 - 4. I wanted a certain depth for the house to be felt more. The candles did not give the optimum exposure levels so we made a source that was a cluster of bulbs on a ply wrapped around with the hand made paper. I also used bunch of candles beside the camera to light up the faces as they mixed beautifully with the existing sources and gave me the correct exposure levels.

Did you prefer to use zoom lens as it is easier to have the desired small variations in focal length, or fixed block lens, and move the camera as required?



48



I always use block lenses. I use zoom lens when either I want the multiple glass aesthetic to it or if a certain shot design demands the change of magnification within th shot.

As it was a low budget film, which specific camera did you want for this particular film?

I shot the film on Alexa mini with Master Anamorphic lens. As a DOP you are always sensitive towards your requirements. You push for it because it is for the film. On a low budget film there is a constant effort with the production team to pull off certain requirements and compensate for it somewhere else.

DI plays a big role in a cinematographer's work in today's time. What was your input to the DI artist when he was collaborating for the colour correction?

I always design the entire look of the film in camera and keep those final touch-ups for the DI. I generally don't deviate in a big way from the source material but I always try to give a sense of vibe to the film through DI. As the voice of this film is very optimistic, so even in the darkest of the darkest moments we have tried to give it a sense of hope. The main driving force and the philosophy of the film comes from Vinay Pathak's character that is an extreme optimist and out of all the films I have done, this film has probably the most optimistic world view. My colorist was Andreas Bruckland we constantly had a chat to follow the same approach of

hope and optimism. It is about having a view of a better world that awaits us so I told him to follow it through the film.

The director brings some kind of value for the DOP that adds on to your skill. What was the contribution of Devanshu and Satyanshu in terms of director for you to do your work better?

Both brothers are very romantic about the idea of filmmaking. I really enjoyed the whole process with them as I also tend to indulge in the philosophy of things like why are we moving the camera, why should we light up in a certain way etc. This is the driving force for all my decisions. Once I know why I am doing it, how to do it becomes easy.

It actually was a very film school kind of experience where we used to sit everyday and talked about the philosophy of each scene.

Cinematography also evolves from the director's vision. It is not like that I am working in isolation. We collaborated and actually came together on the decision of why this film will be shot in a certain way, what will be the progression, and how will the scene change. We shot the entire film in the same location, so we had to keep it exciting and maintain the engagement level.

Feedback: siddharthdiwan@gmail.com





"Whitepoint Optics lens can give tough competition in the coming time for many lens brands as it offer best of the both worlds- reasonable price and high quality lens manufacturing material they use which gives a distinctive bokeh to the screen Image " says Amitabha Singh, well know cinematographer in India. He adds further that another import thing about Whitepoint Optics is that it offer variety of focal lengths with a difference of only 10mm towards the wider side and 150mm,250mm,350mm and 500mm in telephoto range, which many brands in the market are not able to offer for the DOP.

Whitepoint Optics showcased their lens in BRODCAST INDIA SHOW in October 2019 at RED camera stall where many important cinematographers like Binod Pradhan,R M Rao, Vishnu Rao, Gopal Shah showed their interest and attended the lens demo.

Whitepoint Optics is a high-end lens designing & manufacturing company

from Finland. The company is best known for their Whitepoint Optics Ts70 series. They are built using the legendary medium format Zeiss Hasselblad glass with new bespoke mechanics. They are housed in a bespoke mechanism which is exclusively handmade in Finland. The lenses have a unique rich filmic look. Their lenses offer a unique bokeh that no other lens can match. This is due to their tailor-made lenses with full round iris. If you ask any DOP today why they like a particular lens . many of them would say they like "Look and feel" of that specific brand Whitepoint Optics emphasize on providing the best lens to get the right look and feel for your story After all, they believe that the lens to a DoP much like the paint brush to the

The focal lengths of the lenses range from 21 – 500mm, catering from to Super35 to the Arri Alexa 65 (TS70 lenses only), Red Vista Vision, Sony Venice and other large format and full format imaging sensors without

vignetting or distortion. WPO ts70 series image circle is 82mm and WPO HS 46mm. The lenses are available in PL, EF and E-mount.

The set comes as prime or additional Tilt-Swing mechanism (max. 9 degrees) which is simple to lock and release. The front diameter of the lenses throughout the set maintains the same consistency making it ideal for accessory use (114mm). The set offers a sharp yet pleasingly balanced and smooth look that is only possible from using handmade legendary glass.

Whitepoint Optics Ts70 series consists of eleven lenses with different focal lengths between 30-500mm. They cover anything from traditional S35 sensors to full frame to Arri Alexa 65 and even beyond. Whitepoint Optics Ts70 series have been used in multiple international shows like Rising Dion, Titans, How It Ends by top cinematographers like Greig Fraser, Hoyte Van Hoytema, Boris Mojsovski and many others.

W. WHITEPOINT



















30mm T3.5 – 22 Close Focus: 0,35m Length: 155mm Weight: 2.75kg













T4 – 32 Close Focus: 0,35m Length: 151mm Weight: 2.63kg

40mm















80mm T2.8 – 22 Close Focus: 0,65m Length: 115mm Weight: 1.54kg

100mm T3.5 – 22 Close Focus: 0,80m Length: 121mm Weight: 1.52kg













120mm T4 - 32 Close Focus: 1m Length: 147mm Weigh



















Whitepoint Optics Ts70 series was followed by Whitepoint Optics Hs70 series. They are specifically designed for full format users. Whitepoint Optics Hs70 series use the same recipe as the Ts70 series, but are faster and have more options in the wide end. The full range of Whitepoint Optics Hs70 series comes also with eleven lenses covering focal lengths between 21-350mm.

* WPO HS - series is based on a

same Hasselblad V-series glass as Ts70. Speed and focal length conversions are made with WPO 0.7x Speed Converter (NEW). The converter can also be bought separately so that a set of 6 TS70 lenses can easily be converted to 6 different focal lenghts.

Lens Mount: PL, LPL, E, and EF -Stainless Steel

Front Diameter: 114mm

Matched Focus/Iris Ring Locations: Yes (all focal lengths)

Iris Blades: 14

Iris Shape: Circular through all stops Focus Scale: Metric/Imperial

TS70- series Image circle: 82mm HS- series Image circle: 46mm

Tilt-Swing (Optional for TS70 lenses): 9 degrees (without vignetting or distortion Super35 to the Arri Alexa 65).





















T2.8 - 22

Length: 156mm













Weight: 2.73kg 42mm T2.5 - 16Close Focus: 0,45m Length: 125mm Weight: 1.85kg



























84mm T2.8 - 22Close Focus: 1m Length: 155mm Weight: 1.95kg

Length: 126mm

Weight: 1.65kg



















Whitepoint Optics Neo Super Baltar series is the first one by the company made from modern glass. While the lenses are brand new, the recipe by Bausch & Lomb is originally from the same era as Ts & Hs70 series. Released in the early 1960s, Super Baltars immediately established themselves as the optics of choice for major motion pictures and television. The Godfather I and II were both shot with Super Baltars. as was Alfred Hitchcock's The Birds and the iconic TV series Star Trek. The original optical prescriptions and

blueprints used to make the original Baltars and Super Baltars were rescued from certain death in a landfill by a B&L optical engineer named Bill Peck when the company got out of the photo and cine lens business.

Optical Designer Brian Caldwell has then used years to re-manufacture the lenses to their exact original formula. The look matches the iconic Super Baltars as accurately as humanely possible.

> **20**mm T2.3

> 25mm T2.3

C35mm T2.3

LWD35mm T2.3

> 50mm T2.3

> 75mm T2.3

100mm T2.3

152mm **T3**

229mm T4.4

These amazing optical cells are now engineered in high precision mechanical housing by White point Optics. Since the glass is brand new it's now possible to build a matching copy if more sets are needed or if the lens element is damaged. The NEO Super Baltar lenses have a beautiful organic image with plenty of vintage character.

Sales Director:

Tel. +1 310 554 9735 julius.pillai@whitepointoptics.com julius.pillai@whitepointusa.com



















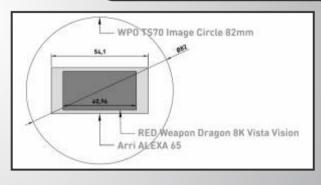














































It is a practice in CRAFT FILM SCHOOL to invite professionals for demo of the models which will help our cinematography students. Last week we invited LUMIX to showcase their 3-models which are talk of the town . Panasonic Delhi office at Appointed team of 2 Engineers for CRAFT Vikram Sharma and Girish Monga ,who conducted the workshop in CRAFT about various features Lumix DC-S1R ,DC-S1 ,DC-S1H. Among the various models i am fascinated with The LUMIX S1H and narrating here some of the features which are valuable to cinematographer.

Best Combination of 24.2MP CMOS Sensor and Venus Engine

The LUMIX S1H gives you breathtaking image quality without compromise. By delivering ample light condensation per pixel, the 24.2-megapixel CMOS sensor offers a wide dynamic range and sharp, natural expression even at high sensitivity settings. Together with the low-pass filter, the sensor delivers high resolution with minimal moire. Leveraging the power of the Venus Engine, the camera offers an impressive maximum

sensitivity of ISO 51200.

Newly-developed Dual Native ISO

The S1H is equipped with Dual Native ISO sensitivity, a revolutionary technology that first featured on Panasonic's professional video cameras, notably the flagship VariCam. Through a process that reads the sensor more efficiently, Dual Native ISO offers the advantages of very high sensitivity for low-light shoots while suppressing noise levels.

As such, the camera can switch from a standard sensitivity to this higher sensitivity with almost no discernible noise degradation. With 640 and 4000 base ISOs in V-Log, the S1H allows today's cinematographers phenomenal flexibility on set when they wish to capture more extreme lighting scenarios.

Multiple Formats and Aspect Ratios with Full Range of Video Recording Modes

Notably, these include full-area 3:2 6K24p, C4K (4,096 x 2,160) and anamorphic modes. The 35 mm full-

frame CMOS sensor built into the S1H offers 6,024 x 4,016 effective pixels at stunning 6K resolution across its entire area. This is therefore a full-frame digital camera that, for the first time in the world, achieves video recording at 6K/24p and 5.9K/30p (3:2 or 16:9 aspect ratios respectively).* Even when downsampling images to C4K (or less) the S1H delivers superior quality resolution. The various formats above can be encoded with superior HEVC compression or the rich tones of 4:2:2 10-bit.

High quality data up to 4:2:2 10-bit can also be output via HDMI onto an external video recorder when set to 10-bit recording mode. The HDMI output is enabled simultaneously with the internal recording. The S1H covers every recording mode and option to fully satisfy professional requirements. And as the filtering menu has been streamlined, it is now much easier and faster to find and select the precise mode you want. For quick recall, use the 'My List' feature to register those you use most frequently.

V-Log / V-Gamut The S1H features V-Log / V-Gamut with a wider 14+ stops

of dynamic range.

This is compatible with the Cinema VariCam Look and precisely captures everything from shadows to highlights, as well as faithfully reproducing the color and texture subtleties of human skin. Designed also for color management consistency, S1H-recorded footage is compatible with V-Log footage recorded on VariCam/AU-EVA1 or S series cameras as well as V-Log L footage shot on the LUMIX GH5/GH5S. The V-Log View Assist enables you to view a simulation of the final look (hue, saturation and brightness) of your video image in camera using the Look Up Table (LUT) while you are shooting.

With Look Up Table (LUT) installed on the camera, the video you record with V-Log can be modified to match the characteristics of your monitor display. The VariCam IDT for ACES can also be applied to footage shot on the S1H.

Robust Video Expression Features (VFR, HFR)

From basic functionality to advanced technology, the S1H is designed to offer outstanding, multifaceted video performance. VFR (Variable Frame Rate) functionality supports both overcranking and undercranking.

Users have access to 2.5x slow (24p/60 fps) in C4K/4K and 7.5x superslow (24p/180 fps) in FHD.* HFR (High Frame Rate) videography now includes autofocus and audio recording, allowing users to create slow-motion video in post-production thanks to 48p/47.95p recording in Cinema4K/4K and 120p/100p in FHD.

HDR Video & HLG View Assist HDR (High Dynamic Range)

video recording is available, processing both the brighter and darker parts of an image together, just as the human eye naturally perceives them. The camera also records video with a designated gamma curve compatible with ITU-R BT.2100, as well as offering the option of Hybrid Log Gamma (HLG) in Like2100.

The HLG View Assist output mode allows you to visually confirm the gradation and exposure of video shot in HLG mode, depending on the monitor or viewfinder installed in the camera. It can also be used for stills shot in HLG (HLG Photo mode).

Image Stabilization

The S1H features powerful camerashake suppression in the body thanks to an algorithm developed by Panasonic that precisely calculates shake information from not only the camera's gyrosensor but also from the image sensor and acceleration sensor. The 5-axis Body I.S. enablesan accurate level of correction, even making it possible to use a 6.0-stop slower shutter speed.* Shake suppression is also highly effective even when a cine lens, anamorphic lens, or older lens is attached. Furthermore, 6.5-stop slower shutter speed** can be used thanks to 5-axis Dual I.S.2 stabilization when the Body I.S. is combined with the Optical I.S. of the LUMIX S series

Anamorphic Desqueeze Display

If you are shooting with an anamorphic lens that compresses the image width to an almost unrecognizable extreme, the S1H camera allows you to view a simulation of the final 'desqueezed' CinemaScope format (2.39:1 or 2.35:1), in one of five magnification options, 1.3x, 1.33x, 1.5x, 1.8x or 2.0x, stretched out on the camera monitor. This lets you decide the composition you want, and better visualize the impact of the final project.

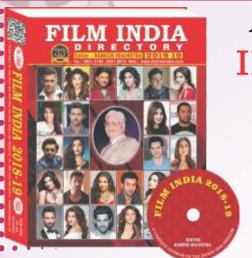
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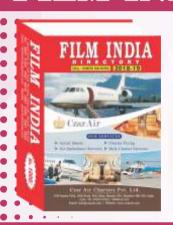
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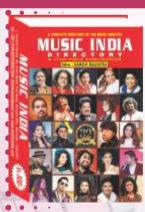
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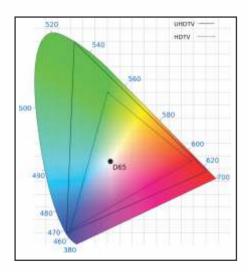
KNOWLEDGE SERIES PART-XI

By JS Sharma

The X Y of Camera and Lighting Illumination affects the recorded or observed colors of objects. Objects in pictures taken under tungsten light will tend to be reddish and they tend to appear pale under fluorescent light. These color shifts due to the illuminant changes in the image needed to be corrected to the expected color under some reference illuminant. The human visual system has the ability to discount the color shift due to illuminant change, which is referred to as color constancy, yet color constancy is incomplete. Ever since the beginning of LED lighting, these concepts have changed immensely. We have gone from discussing the color temperature of the light source to CRI, TLCI and plenty of other balancing concepts when it comes to finding the right balance of colors.

One of the most important tasks for a digital camera is illuminant estimation, that is, to infer the illuminant information from upon the scene it captures or diminish the effect of the illumination to obtain data which more precisely reflects the physical content of the scene. The grey world assumption is the simplest approach to estimate illuminant. However we will not be discussing that, but the correction of color shifts once the illuminant is known through measurement or estimation.

D65: As per ISO 10526:1999/CIE S005/ E-1998, CIE Standard I I luminants for Colorimetry, D65 is intended to



represent average daylight and has a correlated color temperature of approximately 6500K. CIE standard illuminant D65 should be used in all c o l o r ime t r i c c a l c u l a t i o n s r e q u i r i n g representative daylight unless there are specific reasons for using a different illuminant. Variations in the relative spectral power distribution of daylight are known to occur, particularly in the ultraviolet spectral region, as a function of season, time of day, and geographic location.

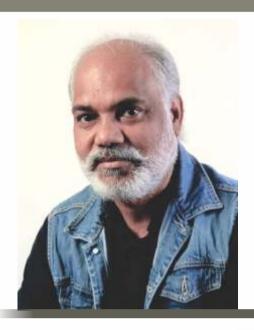
The driving force behind the idea of D65 is to ensure that a single standard for lighting can be used across products, manufacturers, and industries.

Even when the subject in question does not have a white color (e.g. red paint), D65 is still used as the starting point to me as urether ereflected color. Why? Just like with CRI in lamps, different shades or spectral compositions of white light can produce different appearances. This is why a D65 light source is crucial for accurate color perception and evaluation. Unlike correlated color temperature (CCT), for which the same CCT value can have different green/magenta hues, D65 unambiguously defines an absolute spectrum and color point.

How does it matter to us?

Well, for instance, consider the white balance of your camera has been set more towards red whereas the lights that illuminate have hue of green in them. In such a case you won't be able to get the precise color of the images that are being recorded. Unless of course, you do it on purpose. Also, it becomes critical during a multi-shot scene. In case you are making use of two different cameras say RED and ARRI Alexa.

The D65 for either one of them will be a bit different. For instance, one of them reproduces red that is closer to your naked eyes but the other one is more good at capturing blue efficiently. This will lead to confusion for the post-



production team especially when they are trying to find the right color balance for white. Hence, while doing a multicamera setup it is advisable to pick the same camera. Even then this varies but not to a great extent.

On the other hand, it works the same way when making use of two light from a different manufacturer. One of them might have a little hue towards a particular color and the other might not. This is essentially why the new LED lights have Hue control in them so that one can balance it.

After done with all of this you will have to match the white on your Camera to the white that is being used to illuminate the setup.

(Note: It is important to understand what the first "C" in CCT stands for - correlated color temperature. A single CCT value, including 6500K, can have many green/magenta hue variations that all correlate to a color temperature of 6500K.)

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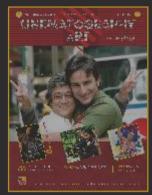






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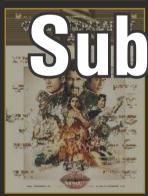






























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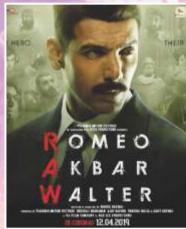
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