



# Clinical Photography

**Improving Your Practice's  
Clinical Photography**

By Spear Faculty

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Spear Education is the premier  
provider of clinical education and  
practice management guidance for  
striving dentists and their teams



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## Introduction

**In today's era of user-friendly technology, anyone can buy a camera and snap photographs. But in the dental practice, photography is most effective when it's done in an intentional, organized manner. Well-framed digital photos help your patients clearly see their smiles and obtain a visual record of their diagnoses, plus they strengthen your communication with the dental team.**

Well-framed digital photos help your patients clearly see their smiles and obtain a visual record of their diagnoses, plus they strengthen your communication with the dental team.

In other words, photography is essential to your practice. Many dentists say it's the most powerful tool they have for treatment planning.

This e-book provides a compilation of Spear Education articles authored by Resident Faculty and Visiting Faculty that will help you refine specific photo techniques.

Following the material in these articles will help you more effectively use photography in your practice, which will result in more meaningful chairside discussions and better patient outcomes. After all, seeing is believing — and taking better photos will allow patients to quickly understand your recommendations for treatment plans.

# My Favorite Photograph: It Tells the Whole Story (Almost)

By Robert Winter, D.D.S.

I started taking this photograph more than 15 years ago. I wanted to capture an image that accurately reflected the teeth, occlusal planes, and gingival levels, within the patient's face. Intraoral images may not do this with the accuracy needed to plan and execute treatment.

My favorite photograph clearly shows the comparison of the interpupillary line and the occlusal planes of both the maxillary and mandibular arches, relative to the horizon. This is essential to plan treatment, whether it is for orthodontic, periodontal, or restorative therapies. The maxillary or incisal/occlusal plane in the final outcome cannot be more than one degree off from level, otherwise it will be perceived as unacceptable to professionals and patients.

To have optimal esthetic and functional success, a critical goal of treatment is to level the incisal and occlusal planes of both arches. During treatment planning, using photographs is extremely helpful. They are a visual representation of your clinical examination and evaluation. It is crucial that the doctor is able to clearly communicate the patient's incisal and occlusal planes relative to horizon to the dental team, and photography is a key element in accomplishing this goal.



During treatment planning, using photographs is extremely helpful. They are a visual representation of your clinical examination and evaluation.



The following steps will help you to achieve the optimal photographic result:

1. The photographer should stand approximately 6 feet from the patient.
2. The patient should stand with their shoulder blades against a wall with their head away from the wall. If the head is against the wall, the head will be tipped backward, and not posturally correct.
3. The photograph should be a portrait image with the patient looking into the horizon. The image must represent the patient in a natural posture. The interpupillary line frequently is level with horizon, but that may not always be the case. Therefore, it is critical to determine if the interpupillary line is canted relative to horizon. This must be captured in the photograph.
4. The patient should hold the lip retractor to expose their teeth.
5. The anterior teeth should be separated 1.0 to 2.0 mm at the incisal edges.
6. The center of the camera lens should be at the level of the incisal embrasures of the maxillary centrals.
7. Frame the photograph to include the forehead and the chin. The embrasure between the central incisors should be at the center of the photo.
8. The viewfinder should be parallel to the horizon.
9. Take the photograph perpendicular to the facial plane at the level of the maxillary arch.

If the image when viewed on the computer does not represent what was observed clinically, it is because the camera was not level, or the head was tipped. The only correction that can be made is to rotate the photographic image. If the image is still not reflective of what was viewed clinically, it should be retaken. Be sure the center of the lens is positioned at the incisal embrasure of the maxillary central incisors, which should be at the center of the image.

The remainder of the story is captured by taking portrait photographs with lips in repose and a full smile. They should be composed by positioning the camera as described above.

## 5 Ways Photography Can Supercharge Your Clinical Practice

Enjoy this free Spear Online lesson with Spear Faculty Member, Dr. Darin Dichter.

Learn more about the best ways to supercharge your patient communication, treatment planning, treatment execution, and interdisciplinary collaboration with clinical photography.

[View Now](#)



# Supplemental Photographs For Airway Screening

By Robert Winter, D.D.S.

If a patient is present in your office and an airway screening is completed, it is valuable to collect photographs to document your clinical findings if you suspect there are airway issues. The following photographs are suggested:

## Throat



Tonsil area using mirror to depress the tongue

Have the patient open wide. Place a mirror or tongue depressor on the posterior aspect of the tongue and have the patient say, “ahhh.” The image should show how open the throat is and if there are any anatomical abnormalities such as enlarged tonsils or uvula.

## Tongue



Tongue - resting position

Have the patient open wide. Use lip retractors, but do not give any specific instructions about the tongue position unless the patient retracts it toward their throat. You want to capture the tongue in a natural, relaxed position. Generally, the tongue will rest on the floor of the mouth. The top of the tongue should be just above the occlusal plane of the mandibular teeth. In addition, note the lateral borders of the tongue for scalloping. The cheeks may also be visible. Note if there are signs of cheek biting.

## The Lingual Frenum



Tongue - lingual frenum

Have the patient open as wide as they can while maintaining contact with the roof of their mouth with their tongue. Document if their lingual frenum restricts the amount of opening. This would indicate a ‘Tongue Tie.’

## Basal View of the Nose



Relaxed



With deep inspiration

Photograph the basal view of the nose when the patient is relaxed, and then when the patient breathes in deeply through their nose. Document whether the nasal valves collapse, restricting the airflow into the nasal cavity. Photographic documentation is a great way to capture information and use it not only for record keeping, but to engage the patient in a guided discovery of their airway.

# Essential Photos to Achieve Predictable Outcomes—Lab Communication

By Robert Winter, D.D.S.

Have you ever been frustrated with a diagnostic wax-up or final restoration returned by your laboratory? There could be several underlying reasons the results aren't what you expected.

There are several questions you can ask yourself when troubleshooting what might have gone wrong. Did you comprehensively complete the prescription form? Did you provide photographs in addition to the written information?

There are three times during comprehensive care or esthetic treatment when clear and concise communication is essential. One of the best ways to improve communication is with accurate photographs. I suggest you provide photographs at the following three phases of treatment.

## Diagnostic Phase

The essential photographs to be sent to the laboratory during the diagnostic phase of treatment are preoperative images. They include:



1 Diagnostic phase: Portrait with lips in repose — lips separated by 4.0 mm



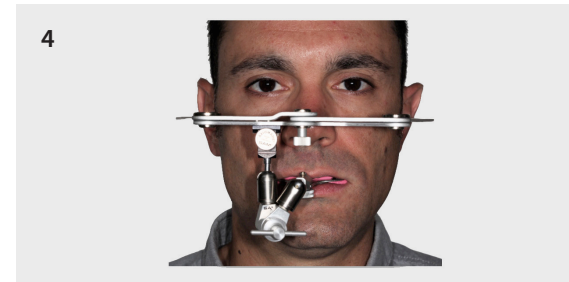
2 Diagnostic phase: Portrait with maximum smile

3



Diagnostic phase: Portrait with lips retracted and anterior teeth separated by 2.0 to 4.0 mm

4



Diagnostic phase: Portrait of the patient with the facebow

4a



Diagnostic phase: Laboratory can compare mounted casts to photographs

Intraoral close-up image (1:2) with the shade tabs of the current shade and the expected shade if different from the current condition. The shade tabs are positioned at the incisal edge of the teeth to the incisal edge of the tab, or if the technician prefers, the gingival third of the tab next to the incisal edge of the teeth. I suggest using Vita Classical and Master shade guides.



5 Diagnostic phase: Shade tabs to compare to teeth



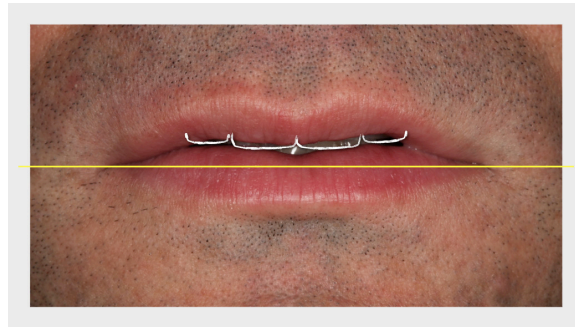
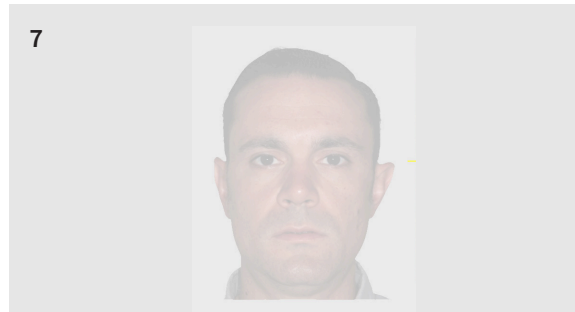
Diagnostic phase: Shade tabs to compare to teeth



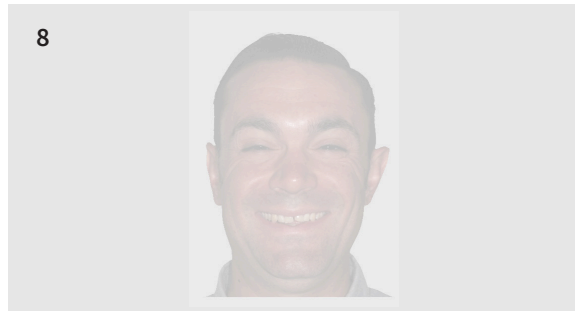
6 Diagnostic phase: Draw horizontal reference lines

One of the best ways to improve communication is with accurate photographs.

CLINICAL PHOTOGRAPHY



Diagnostic phase: Draw desired tooth length



Diagnostic phase: Draw desired tooth shape



Diagnostic phase: Crop and then magnify intraoral portion of photograph



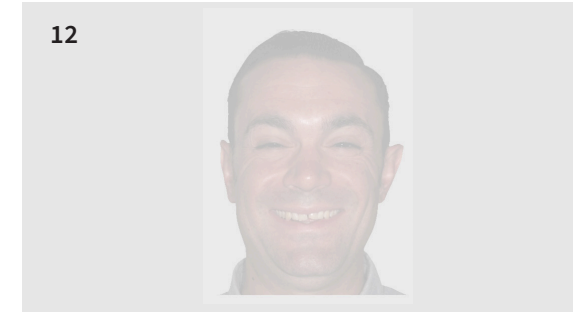
Diagnostic phase: Magnified intraoral portion of portrait photograph



Diagnostic phase: Intraoral photograph should have the same angulation as portrait



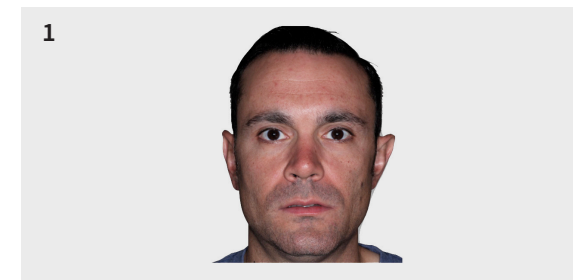
CLINICAL PHOTOGRAPHY



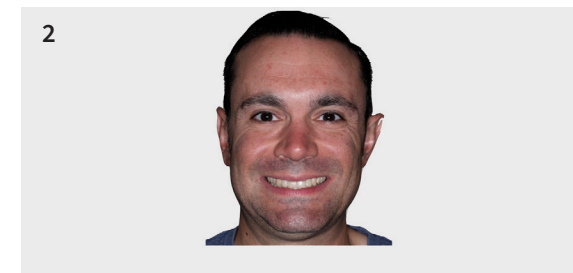
Diagnostic phase: Draw the desired tooth shape

Treatment Phase

The essential photographs to be sent to the laboratory at the time of final restoration fabrication, are images of the provisional restorations.



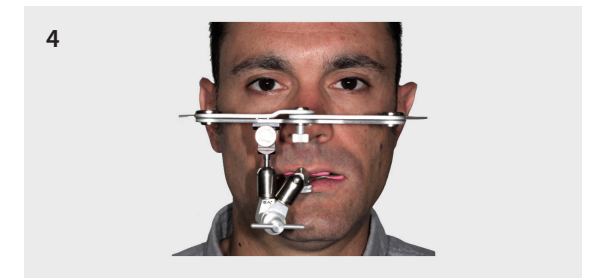
Treatment phase: Portrait with lips in repose — lips separated by 4.0 mm



Treatment phase: Portrait with maximum smile of provisional restorations



Treatment phase: Portrait of provisionals with lips retracted and anterior teeth separated by 2.0 to 4.0 mm



Treatment phase: Portrait of the patient with the facebow



Treatment phase: Intraoral close-up image (1:2) with anterior teeth separated by 2.0 to 4.0 mm

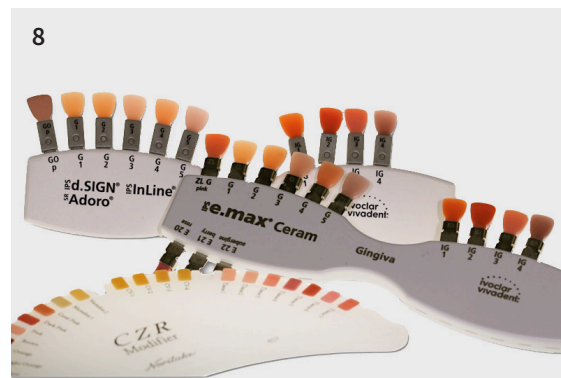
CLINICAL PHOTOGRAPHY



Treatment phase: Tooth preparation with shade guide/prep guide next to the teeth



Treatment phase: Intraoral (1:2) preoperative shade of teeth and shade tab, and expected shade



Treatment phase: If the treatment requires the technician to fabricate a restoration to replace soft tissue, a photograph of the pink ceramic shade guides next to the gingival tissue is required. The shade guide should be from the manufacturer of the pink ceramic the technician will be using.



CLINICAL PHOTOGRAPHY

If Esthetic Adjustment Is Required...

The recommended photographs will be taken of the restoration tried on the prepared tooth using try-in paste. The try-in paste bridges the space between the restoration and the prepared tooth. This is the only way to evaluate the final shade with translucent restorations.



Anterior Single Restoration

In the case of an anterior single restoration, the photos needed are:

1. Full face portrait with patient in maximum smile
2. Full face portrait with lips retracted and anterior teeth separated by 2.0 and 4.0 mm
3. Intraoral close-up image (1:2) with anterior teeth separated by 2.0 to 4.0 mm
4. Intraoral close-up image (1:1) of restoration
5. Intraoral close-up image (1:1) of contralateral tooth
6. Intraoral close-up (1:2) of restoration with shade tabs in view (original and possibly new shade tab)
7. Intraoral close-up (1:2) of contralateral tooth with shade tabs in view (original and possibly new shade tab)
8. Intraoral close-up (1:2) of tooth preparation with shade tabs in view

In cases where multiple teeth are involved (anterior only or anterior and posterior), and occlusal planes need to be evaluated, the photographs needed are:

1. Portrait with lips in repose — lips separated by 4.0 mm
2. Portrait with maximum smile
3. Portrait with lips retracted and anterior teeth separated by 2.0 to 4.0 mm
4. Intraoral close-up (1:2) with the original expected shade tab and the new requested shade tab, if a shade adjustment is required
5. Intraoral close-up (1:2) of the tooth preparations with shade tabs and/or preparation guide tabs. This new photograph of the teeth is suggested because the original photograph of tooth preparations may have inaccurate due to color changes caused by dehydration.

Including photographs with your laboratory prescription should lead to a decrease in remakes, and improve the overall esthetics of your cases.

# Recommended Photography Series

By Robert Winter, D.D.S.

Spear recommends a series of 19 photographs to completely document the current state of your patient's facial and oral status. This series of photographs is used in the "Facially Generated Treatment Planning" concept and includes facial and intraoral views.

## These 19 photos are used:

- As a visual representation of the patient's status that should be incorporated into their clinical record.
- As a communication aide when leading the patient on a guided discovery to identify existing problems and suggest possible treatment options.
- For diagnostic purposes.
- As a visual aid when communicating with interdisciplinary team members.

Composition of each photograph is critical so the information being assessed is accurate. Improper angulation can cause distortion of the photograph, which leads to an improper perspective of the problem. Please refer to my article "Composing Photographs: Capturing the Correct Perspective", for techniques to improve the accuracy of your clinical dental photographs.

## Photos 1-8: Extraoral

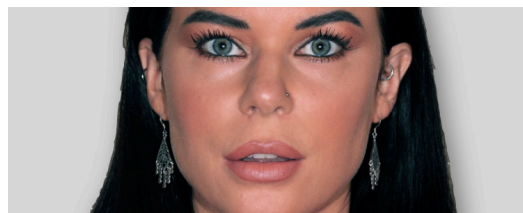
There are eight photographs in this series. The photographs of the head must be taken in a natural position with correct posture.

### Portrait Full-Face Frontal View

#### 1. Lips in repose (Approx. 4.0 mm apart)

##### This is used to evaluate:

- Facial proportions/symmetry/skeletal jaw relationship
- Interpupillary line relative to horizon
- Length of upper lip
- Anterior tooth display



#### 2. Patient's maximum smile

##### This is used to evaluate:

- Facial proportions/symmetry/skeletal jaw relationship
- Interpupillary line relative to horizon
- Relationship to face and horizon:
  - Base of nose
  - Upper and lower lips
  - Incisal and occlusal planes of both arches
  - Gingival display and level
- Tooth display, position, arrangement, and proportion
- Lip dynamics

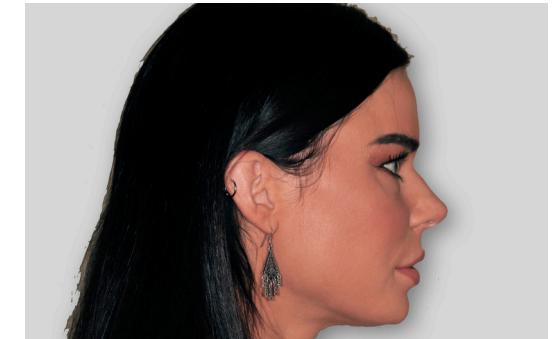


### Portrait Full-Face Sagittal View

#### 3. Right side in repose

##### This is used to evaluate:

- Facial/skeletal jaw relationship
- Tooth display



#### 4. Right side in maximum smile

##### This is used to evaluate:

- Facial/skeletal jaw relationship
- Tooth display, position, and inclination



### Frontal View (Close-Up 1:2)

#### 5. Lips In Repose

This is used to evaluate:

- Anterior tooth display
- Incisal plane



#### 6. Patient maximum smile

This is used to evaluate:

- Tooth display, position, arrangement, and proportion
- Incisal and occlusal planes of both arches if visible
- Gingival display/level
- Lip dynamics



### Three-Quarter View (Close-Up 1:2)

#### 7. Maximum smile right side

This is used to evaluate:

- Tooth display and angulation
- Gingival display/level
- Incisal and occlusal planes of both arches if visible



#### 8. Maximum smile left side

This is used to evaluate:

- Tooth display and angulation
- Gingival display/level
- Incisal and occlusal planes of both arches if visible



### Frontal View

#### 9. Portrait Full-Face

With patient holding lip retractor. Anterior teeth separated by 2.0 to 4.0 mm.

This is used to evaluate:

- Teeth position relative to face
- Incisal plane of both arches
- Occlusal plane of both arches
- Gingival papillae level



#### Photos 10-19: Intraoral

These should be taken close-up at approximately 1:2 magnification.

#### 10. Teeth in maximum intercuspation

This is used to evaluate:

- Anterior overbite
- Tooth condition, position, arrangement and proportion
- Gingival condition, gingival, and papillae level



#### 11. Anterior Teeth. Separated by 2.0 to 4.0 mm.

This is used to evaluate:

- Tooth condition, position, arrangement, and proportion
- Incisal plane of both arches
- Occlusal plane of both arches
- Gingival condition and papillae levels



*" The Treatment Planning with Confidence workshop answered all of my questions. We're given a method for approaching these cases so that the cases can vary, but our approach remains constant. The workshop has really revolutionized how I work with patients. "*

*- Dr. Rachel Day, Day Oral Health*

## Buccal View

12. Right lateral posterior with teeth in maximum intercuspation. This is used to evaluate:

- Tooth/jaw relationship
- Tooth condition, position, arrangement, and proportion
- Gingival condition and papillae levels



13. Left lateral posterior with teeth in maximum intercuspation, taken into the mirror. This is used to evaluate:

- Tooth/jaw relationship
- Tooth condition, position, arrangement, and proportion
- Gingival condition, gingival, and papillae levels



14. Right lateral posterior with teeth separated by 2.0 to 4.0 mm, taken into the mirror. This is used to evaluate:

- Incisal and occlusal planes
- Inclination of anterior teeth relative to occlusal plane
- Tooth condition, position, arrangement, and proportion
- Gingival condition, gingival, and papillae levels



15. Left lateral posterior with teeth separated by 2.0 to 4.0 mm, taken into the mirror. This is used to evaluate:

- Inclination of anterior teeth relative to incisal and occlusal planes
- Tooth condition, position, arrangement, and proportion
- Gingival condition, gingival, and papillae levels



## Anterior Teeth

16. Maxillary anterior teeth.

This is used to evaluate:

- Tooth condition, position, arrangement, and proportion
- Incisal plane
- Gingival condition, gingival, and papillae levels



17. Mandibular anterior teeth.

This is used to evaluate:

- Tooth condition, position, arrangement, and proportion
- Incisal plane
- Gingival condition, gingival and papillae levels



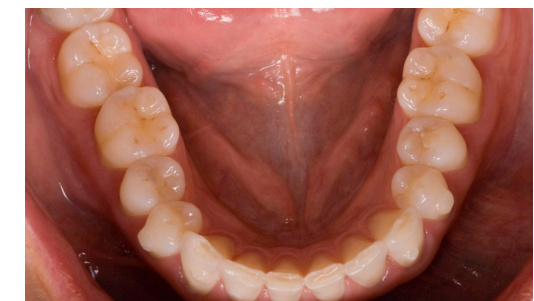
18. Maxillary arch occlusal view taken into the mirror. This is used to evaluate:

- Tooth condition, position, and arrangement
- Arch form



19. Mandibular arch occlusal view taken into the mirror. This is used to evaluate:

- Tooth condition, position, and arrangement
- Arch form



Composition of each photograph is critical so the information being assessed is accurate.

# Troubleshooting Improperly Aligned Photos of the Dental Patient

By Robert Winter, D.D.S.

**Even though a photograph is worth 1,000 words, if the angle of the camera is not properly aligned, the image will provide you with incorrect information.**

"Composing Photographs: Capturing the Correct Perspective" provides you with information on how to compose a photographic image using the correct camera angulation. It is important to understand that the only attribute of a photograph that can be managed in Photoshop, Keynote, or PowerPoint is rotation. Manipulating the image in one of these programs can, for example, correct the level of the interpupillary line or the maxillary and mandibular occlusal planes relative to the horizon.

Errors in composition that cannot be corrected are images that are:

1. Centered correctly but shot down or up at whatever you photographed
2. Off-center (taken from a side angulation)
3. A combination of up or down from level and off to one side

The key to getting the correct angle of the camera lens is having the patient stand with a natural head posture/position staring at the horizon so you can align your lens on a flat horizontal plane at the level of the upper teeth. This gives you a perspective of how all facial lines or planes compare to the horizon.

Portrait images of the patient in repose, smiling, with the lips retracted and the intraoral photographs must be taken with the center of the camera lens at the level of the maxillary central incisors' incisal embrasure.

The patient's head must be in a posturally natural position, frontal plane and anterior-posterior (sagittal plane). With this established head position, the maxillary occlusal plane will be photographed correctly relative to the horizon. The accuracy of the head position, and therefore the images captured, needs to be within one degree of level.

If it varies more than this, significant errors will be incorporated into the treatment plan. It may negatively impact tooth position (incisal edge) and gingival levels, impacting orthodontic, periodontal, and restorative procedures.

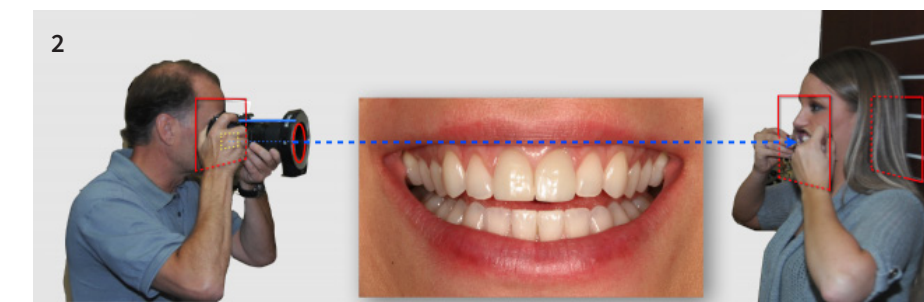
The series of photos shown are of a smile. You can face the same challenges with all other types of clinical photos.



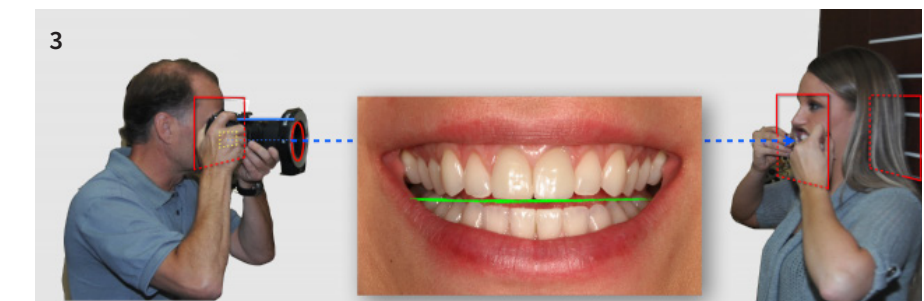
All photographs are taken with the camera body (sensor), end of lens, facial plane and background (if horizontal lines are visible) parallel to each other.

## Photos 2 and 3

The photograph is taken with the correct angulation, centered on the maxillary incisor embrasure and level with the horizon. The incisal edge position and level can be accurately assessed.



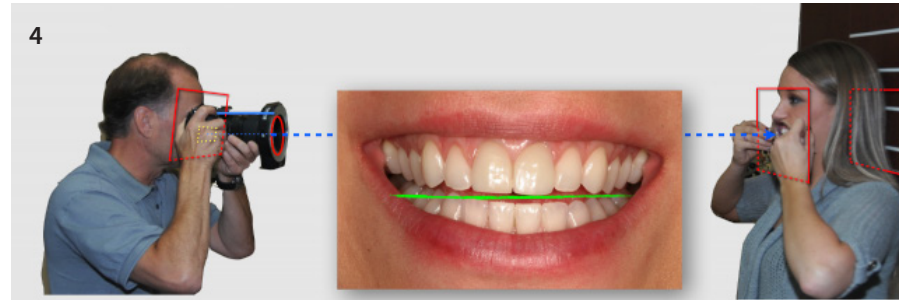
Camera is level with horizon, aligned with the maxillary incisal plane.



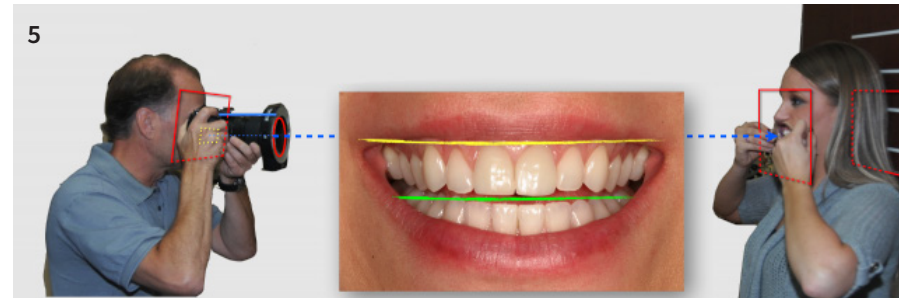
Camera is level with horizon, aligned with the maxillary incisal plane.

**Photos 4 and 5**

If the camera is rotated around the correct center of the image, it can be corrected if you have a reference of the horizon.



*If camera or head is rotated 2 degrees it will result in a rotated photograph.*



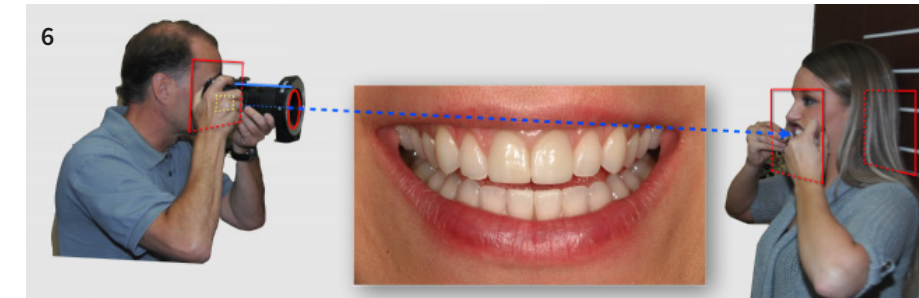
*Correct the photograph in the computer by rotation if you have a known horizontal reference, the upper lip in this case.*

**Photos 6 and 7**

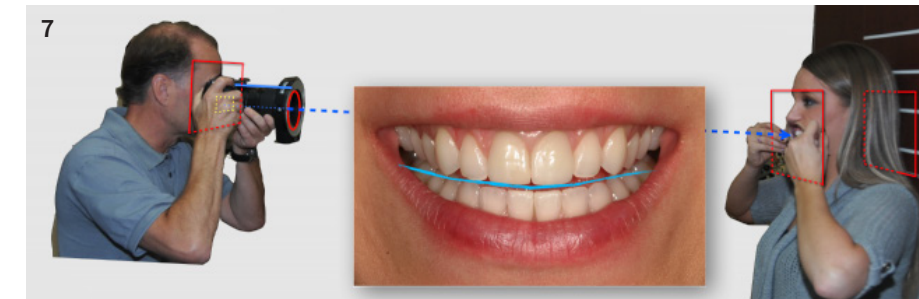
If the level of the camera is held too high and the lens needs to be angled down to capture the ideal center of the image, the perspective of view changes.

The maxillary anterior teeth will appear longer relative to the occlusal plane, and the incisal edges will appear to be following the curve of the lower lip.

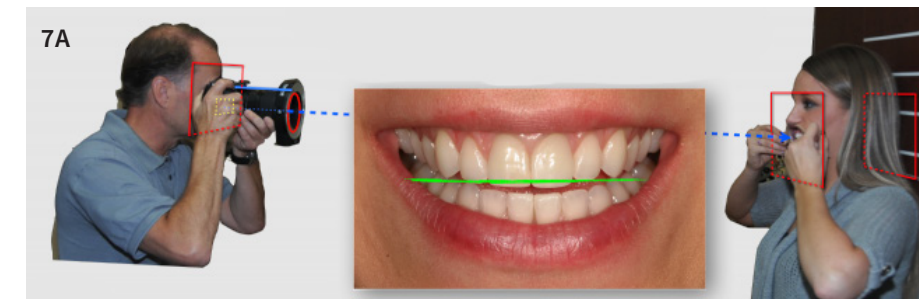
This may result in the maxillary anterior teeth being shortened unnecessarily to “level” the incisal and occlusal planes.



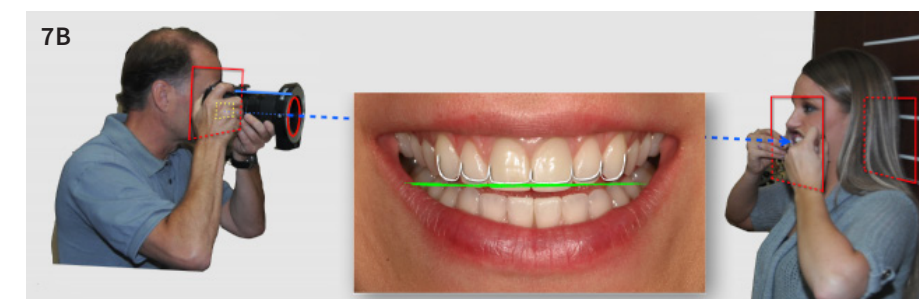
*Too high - shooting down*



*Too high - Shooting down results in upper teeth appearing too long*



*Too high - Shooting down treatment plan - shorten upper teeth*



*Too high - Shooting down treatment plan - shorten upper teeth*

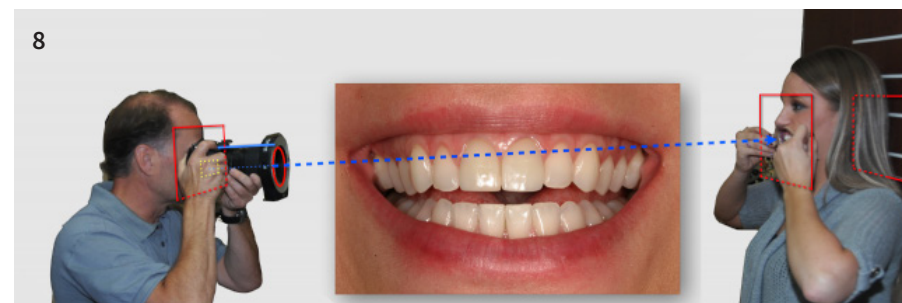
### Photos 8 - 12

If the camera is positioned too low, the camera lens needs to be angled up to capture the ideal center of the image.

Now the maxillary anterior teeth appear shorter than ideal, resulting in unnecessary lengthening of the teeth to “correct” the incisal and occlusal planes.

The other option would be to intrude all the maxillary posterior teeth to “correct” the occlusal plane.

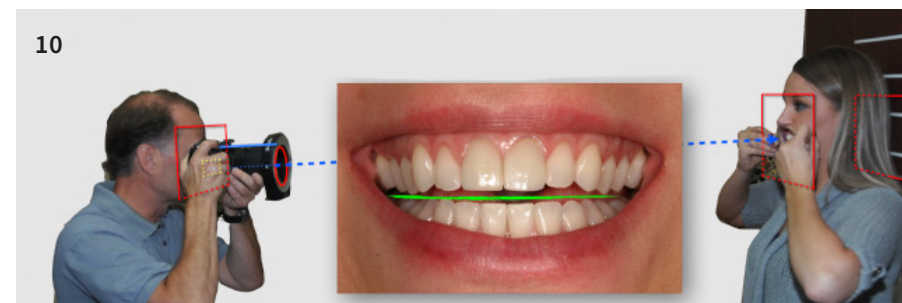
Neither thought process is correct because the perspective of view is incorrect.



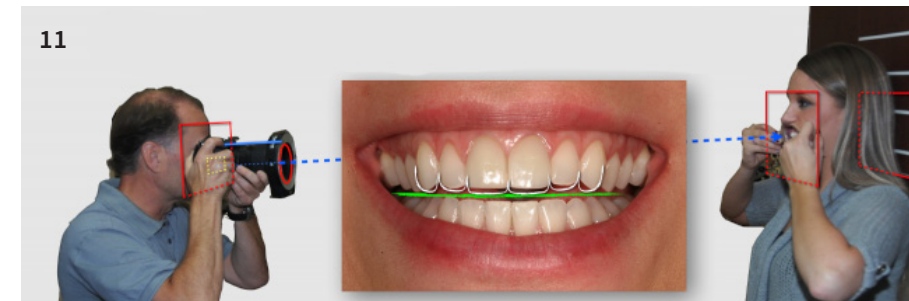
Too low - shooting up



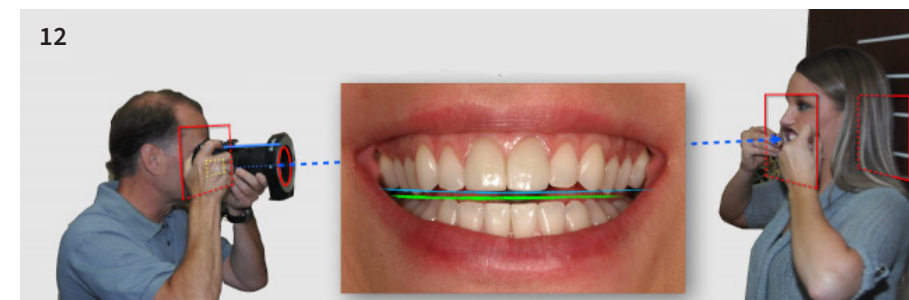
Too low - shooting up results in a reverse smile line



Too low - shooting up RX plan 1. Lengthen anterior teeth



Too low - shooting up RX plan 1. Lengthen anterior teeth



Too low - shooting up RX plan 2. Shorten posterior teeth

Taking photographs slightly from the side (or a combination of too high or low and from the side) changes the perspective of view even more and cannot be corrected.

## Harness the Power of Patient Photography

Digital photography is the most impactful tool to help your patients choose a higher level of care.

Learn hands-on how to utilize photography to improve treatment planning and case acceptance during our two-day Treatment Planning with Confidence workshop.



# Composing Photographs: Capturing the Correct Perspective

By Robert Winter, D.D.S.

When taking clinical photographs, it is crucial that the angle of the image captured is correct when compared to the patient's natural postural position. Communicating this exact perspective is essential for the accurate transfer of information to the interdisciplinary team. If an error is introduced when composing the photograph, there may be significant errors made when treatment planning and ultimately in the result obtained.

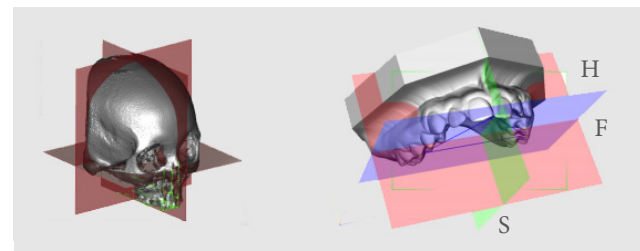
To achieve the optimal esthetic and functional goals during planning and treatment, photographic communication of the three spatial planes is critical.

## The Three Planes are:

**H - Horizontal**

**F - Frontal (facial)**

**S - Sagittal (profile)**



## Horizontal Plane: Level of Camera to Head

The patient should stand or sit in a straight back chair. Do not have them sit in the dental chair because it does not allow the patient to have a natural head posture. If standing, the shoulder blades will rest against a wall, but the back of their head should be away from the wall. If the head is against the wall, the head tips backward and is not posturally correct.

Often, portrait images are taken with the patient in a dental chair with the head tipped back. The photographer must then align the camera body sensor so it parallels the frontal plane and the lens is perpendicular to it. This can be challenging because of the interpretation of the angles that are created.

## Frontal Plane: Facial Plane

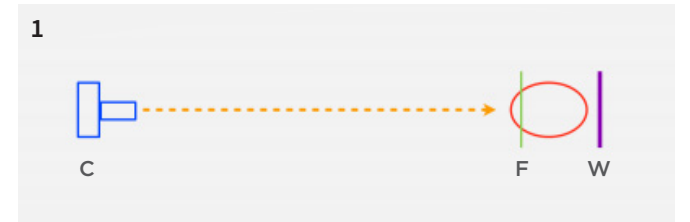
Taking a portrait image of the patient requires a natural head position (posture). When taking an intra- or extraoral photograph, it is easy to rotate the lens in a way which does not capture an existing cant in the incisal and/or occlusal planes. A critical analysis of the interpupillary line relative to the horizon is required.

The interpupillary line extends between the two pupils. Most of the time the interpupillary line is parallel to the horizon, but occasionally it is canted. If there is a cant in the interpupillary line relative to the horizon, it must be captured precisely in the photograph.

To avoid composing your photos in a way that misrepresents or eliminates an existing cant, I suggest the following technique: When taking a photograph, I have the patient stare into the horizon. The center of the lens is aligned with the incisal embrasure between the maxillary central incisors, with the barrel of the lens level with the horizontal plane.

Aligning the camera and the lens in this position will correctly capture any cant in the incisal and occlusal planes of the maxillary and mandibular teeth relative to the horizon.

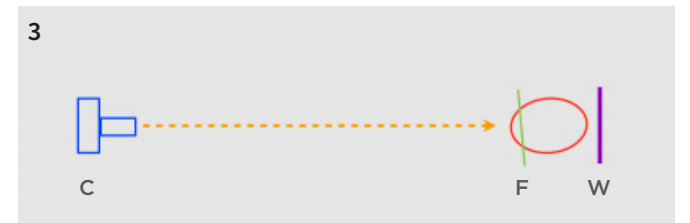
## Having a patient sit in the dental chair for photography does not allow for a natural head posture.



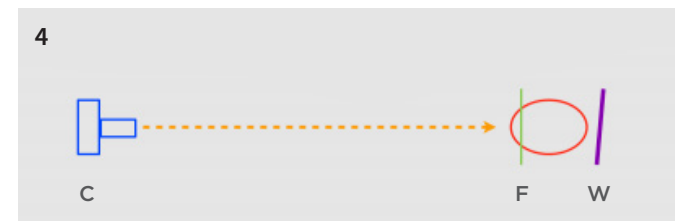
Correct Alignment - camera (C), facial plane (F) and wall (W) are parallel.



Taking the photo from the side - the camera (C) is at an angle relative to the facial plane (F) and wall (W).



Taking the photo with the head rotated - the facial plane (F) is at an angle relative to the camera (C) and wall (W).

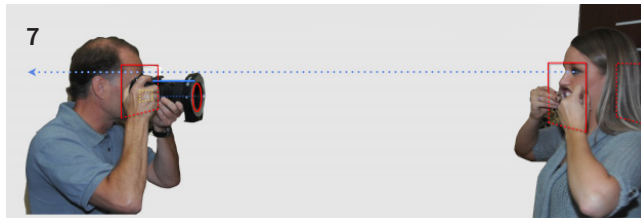


If there is a line on the wall and the wall (W) is angled relative to the camera (C) and facial plane (F), the line can not be used as a horizontal reference.



Patient standing with a natural head posture, camera is level, center of lens aligned with the embrasure between the maxillary central incisors.

## CLINICAL PHOTOGRAPHY



Patient looks into the horizon.



Crop intra smile portion of portrait



Portrait



Magnified image



Magnified portrait



Close-up photograph with some angulation

**The portrait images should be framed to include the top of the head and the upper part of the neck.**

## CLINICAL PHOTOGRAPHY



Close-up photograph with some angulation



Crop intraoral portion of portrait



Magnified image



Intraoral photograph with some angulation

### Sagittal Plane

The sagittal plane is parallel to the sagittal suture and divides the body into left and right. Align the camera lens along this plane, generally the midline of the face. The center of the lens is at the level of the embrasure between the maxillary central incisors.

### General Guidelines

For both frontal and sagittal portrait images, the photographer stands approximately six feet straight in front of the patient. The portrait images should be framed to include the top of the head and the upper part of the neck. The center of the photograph should be the embrasure between the maxillary central incisors.

I always try to level the viewfinder to the horizon. For intraoral photographs, I take straight-on images with the patient standing to help properly align the picture. The side and occlusal images are taken into a mirror, with the patient seated with the chair upright.

If everything is aligned precisely, there will be no need or computer corrections. If there is an error in the rotation of the head or camera body, a correction can be performed in Photoshop, Keynote, or PowerPoint. No other corrections can be made.

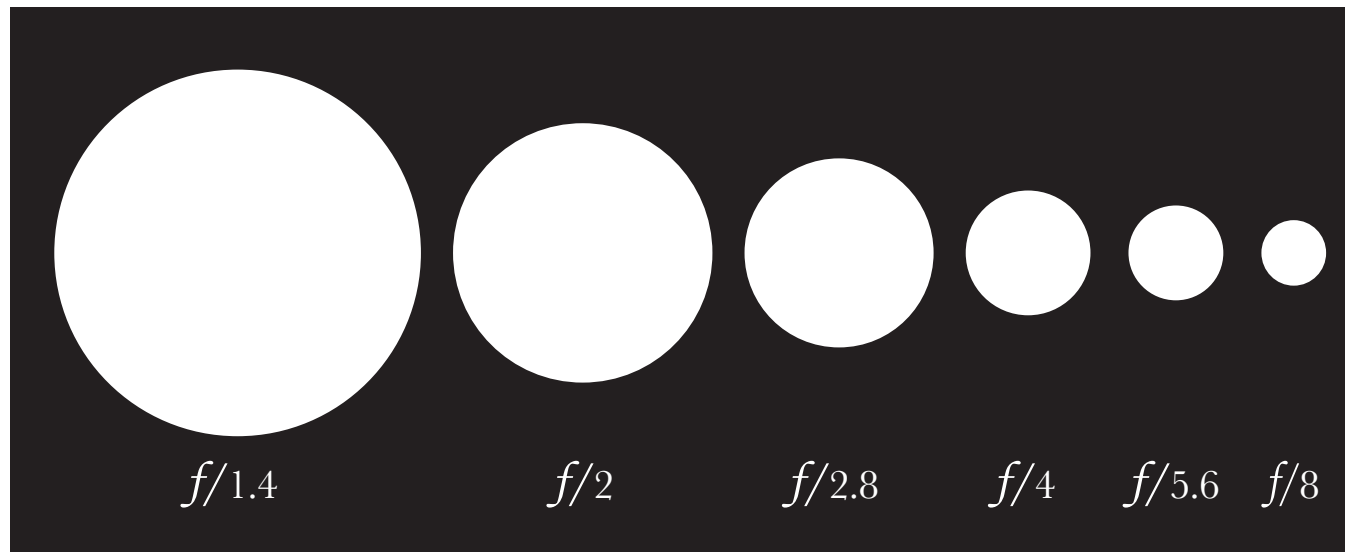
# An Intro To Basic DSLR Camera Settings

By Courtney Lavigne, D.M.D.

I'm going to walk you through some fundamental camera settings to help you get started using photography in the manual mode, where you'll have the most control over the outcome of your photos.

Even if you use a camera that has pre-set portrait and intraoral modes (from PhotoMed, for example), it's important to know a little bit about the settings that are getting you the results you're used to. If you're in the middle of taking a series of photographs on a patient and the pre-settings aren't cooperating, even a limited understanding of your camera can go a long way.

The two most important camera settings you'll work with are the aperture and shutter speed. The aperture is the opening in the lens that allows light to pass through. When you press the button on your camera to take a picture, a hole opens that allows your camera's image sensor to see the scene you are capturing in the photo. The aperture that you set determines how big or small that hole is, which in turn determines how much light is let in. The larger the hole, the more light.



Aperture settings

## Aperture in Focus for Clinical Photos

The aperture setting is measured in "F-stops." Moving from an F-stop of  $f/5.6$  to  $f/8$  halves the amount of light getting through. Moving in the opposite direction, from an F-stop of  $f/5.6$  to  $f/4$  doubles the amount of light coming through.

F-stops can be a huge source of confusion in photography because the larger the F-stop, the less light gets through. This is because the F-stops are actually fractions. F-8 is actually  $1/8$ . Moving from an F-stop of  $f/4$  to  $f/8$  really means you are moving from  $1/4$  to  $1/8$ , which is a smaller number, so less light is let in. This is where the confusion sets in!

Aperture determines the depth of field of the photograph. A deep depth of field means that you can see a lot of things in focus in the photograph. A shallow depth of field means only one area is in focus, and the surrounding areas are blurred.

In dental photography, you want to be sure you are using a deep depth of field so that everything is in focus. When you are taking a smile photo, you want the central incisor to be as sharp as the first molars filling out the buccal corridor. Although a shallow depth of field can get you some interesting photographs and make things look "artsy," you'll want to stick with large depths of field in dentistry.



Shallow depth



Deep depth

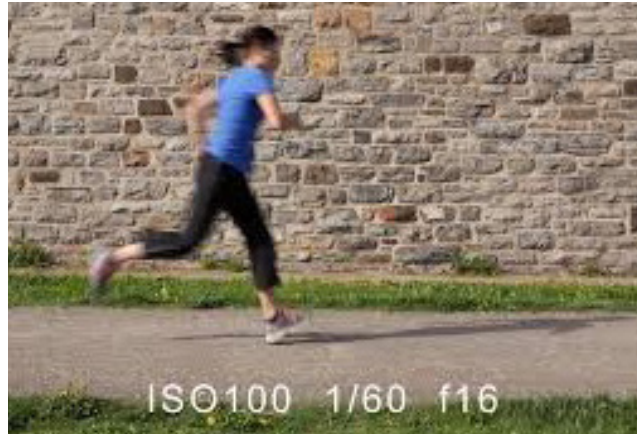
## Shutter Speed

The other factor that determines the amount of light being let in is the shutter speed. The aperture determines the size of the hole allowing light through, and the shutter speed determines how long that hole is open for.

A fast shutter speed lets in less light because it closes quickly, whereas a slow shutter speed will allow the hole to stay open for longer, letting more light in. The slower the shutter speed, the more difficult it becomes to keep an image in focus, eventually necessitating a tripod or something to steady the camera.

Long shutter speeds are great for getting action photos that show movement, such as a runner where you want to see the leg in motion. In dentistry, we want crisp images, so you'll want a high enough shutter speed to capture a photo in focus using hand-held photography.

## CLINICAL PHOTOGRAPHY



Long shutter speed example

### Typical camera settings:

- ISO: 100
- Shutter speed: 1/200
- Aperture: f/32 for intraoral photography, and f/11 for portraits

*On a Canon 60D in manual mode, using a 100mm lens and a Canon MR 14EX II Macro ring flash.*

## ISO and Image Quality in Dental Photography

The third setting you'll want to have a basic understanding of is the ISO, or International Standards Organization setting, which determines how sensitive your camera is to light. A higher ISO means you'll be very sensitive to light, whereas a low ISO like 100 will give you less sensitivity.

As a general rule, the lower the ISO setting, the higher the quality of the image. The greater the ISO, the more sensitive to light and the more "noise" you get in the photo. Noise makes an image appear grainy. You typically have to use a high ISO in low-light settings (at a concert where flash photography isn't allowed), whereas you're able to use a low ISO in bright light settings (at a cookout on a sunny day). In dental photography, because we use a twin or ring flash, we can use an ISO setting of 100 or 200 and keep the quality high and the noise low.

These may not be the perfect settings for your camera, but they are a good starting point. If you grasp what shutter speed and aperture do, you can quickly figure out how to take an underexposed photo and change your setting to brighten it, or vice versa. Keep in mind that you want to keep your ISO at 100 or 200, a wide depth of field to keep everything in focus, and a shutter speed high enough to shoot sharp images.

**As a general rule, the lower the ISO setting, the higher the quality of the image.**

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- Treating the Worn Dentition



# Six Tips to Improve Your Occlusal Photographs

By Courtney Lavigne, D.M.D.

Photography is the single most important tool I have in my treatment planning process. From photos of decay when I open up a tooth, to preps, to final restorations, I take photos of everything. In fact, it was one of my key takeaways from Spear's "Treatment Planning with Confidence" workshop.

But as easily as a good photograph can educate and engage a patient, a bad photograph can do more harm than good. If you're trying to show a patient something on a photo that they just can't see, there's less trust and understanding than a verbal explanation alone.

It took a lot of trial and error to get to a point in our practice where we can reliably take photos that show the patient what we see. Whether you're not taking photographs, you're new to taking photographs or you take them as often as you pick up a handpiece, I hope these tips can help in your daily practice.



## Tip 1: Fight the Fog by Warming Your Mirrors

Fogging is one of the biggest barriers to a clear occlusal photograph. I've tried de-fogging sprays, warm water, water baths, and blowing a stream of air; I've even gone as far as asking my patients to stop breathing. It goes without saying that there are messy disadvantages to all of these.

After much trial and error, I have found that using a heating pad to warm our mirrors is a game changer. We turn the heating pad on before seating the patient, put the mirror in the folded heating pad as we start our series of photos and, by the time we get to the occlusal shots, we've eliminated the stress of "moving quickly" to grab the picture before the mirror cools off. They stay warmer for longer, and you don't have to worry about streaks or water spots remaining from liquid heating alternatives.



## Tip 2: Retract That Lip

We've tried to get the lip out of the way with several different techniques, including cheek retractors at the 10 and 2 or 4 and 8 positions, small lip retractors on either side, and having the assistant manually retract the lip. While you may find success with these techniques, we've had the best luck with these shown below.

They're occasionally too large for patients with limited ability to open. In these cases, we revert to the cheek retractors at 10 and 2. You can find these retractors in metal or plastic.



### Tip 3: Use a Handle

I use manual focus on my lens and have both hands on the camera while I have my assistant position the mirror. The greatest benefit with the handle is to the assistant. It increases their control, allows them to stand further from the patient, and gives them the ability to see the entire set-up for the photo. When my assistant doesn't use a handle, I find her fingers sneak into the borders of the picture, and she doesn't position the mirror as well.

Here's my assistant positioning the retractor and the mirror with the handle on herself:



### Tip 4: Explain What You're Doing!

One of the biggest barriers to occlusal shots is — yes — the patient. In their defense, it's intimidating to have people you've just met sticking large metal retractors and mirrors around in that small, dark space.

Every time my assistant is about to take an occlusal shot, as she removes the mirror from the heating pad and attaches the handle, I have developed a handy script that I run through. It goes a little something like this:

"The last two photos we're going to take are going to show the biting surfaces of the teeth. In order to do that, we're going to use a warmed mirror."

Patients will often ask why it's warmed, and it's a good conversation piece while the assistant is setting up. As my assistant gets ready for her part, she shows the patient the lip retractor and explains that it is going to move their lip out of the way. She also lets them know that it works best if they relax their cheeks.

### Tip 5: Your Biggest Big

The best way to see everything, including the second molars, is to have the patient open really wide.

I work at getting my framing and focus right while asking the patient to simply "open."

Because it takes a few seconds to get this just right, I don't have the patient open as big as I need them to until the very last second. Right before I take the shot, I hit the patient with this line: "Open your biggest big!" and I snap quickly. You'll get a surprising amount of additional opening with this little gem.

### Tip 6: Scratch Free

We recently ran into an issue with scratches on our mirrors. Learn from our mistakes before you have to replace your mirrors like we did. When your mirrors start to scratch, your patients become more interested in the "black streaks on their gums" than the five-surface broken amalgams.

To keep the mirrors from scratching, you can use glass cleaner to wipe the mirrors or filtered reverse osmosis/de-ionized water. Instead of using paper towels (which will scratch your mirrors), we use 80/20 Polyester/Polyamide blend wraps for heat resistance and durability. I ordered the material and sewed the pouches myself.

Make sure the mirrors are completely dry before sterilizing. Avoid putting the mirrors in an ultrasonic cleaner as this is where the scratches occur most readily. Once the mirrors are dry and in their pouches, you can place them in the autoclave.

Photography is the easiest way to educate your patients, and the occlusal shots can be the most informative of all. I hope these tips help make some of these peskier shots smoother for you, your assistants, and your patients.

## Go Beyond Traditional Sleep Dentistry.

*"Patient told me she learned more about her mouth in a 15-minute conversation with me than she did in the previous 15 years with her former dentist."*

- Dr. Ship Maitre,  
Maitre & Crabtree Dental Group

Spear's three-day hands-on workshop, *Airway Prosthodontics and Sleep Dentistry: Prevention to Control*, will change the way you look at your patients.

Learn how to identify airway issues and deliver informed treatment to minimize medical consequences for your patients.



# Why Photography is Essential in Your Practice

By Robert Winter, D.D.S.

**As a *clinician*, I look for consistent and predictable processes to help me properly diagnose and treatment plan patients.**

**As a *technician*, I look for a consistent and predictable process that allows me to achieve the desired outcome when fabricating restorations.**

**Both objectives can be accomplished using photographs. They are an essential means of communication within the dental team, and for conveying information to patients.**

Areas in which photography is essential in your practice include:

1. Diagnosis and treatment planning
2. Documentation
3. Communication with your interdisciplinary team, including your laboratory
4. Patient education
5. Legal and insurance documentation
6. Professional marketing

There are multiple articles available on Spear Digest which provide information on the types of photos you should be incorporating into your practice. In this article, I want to address why photography should be an integral part of your patient's clinical record and treatment plan, and may be the most important communication tool for your practice.

## Diagnosis and Treatment Planning

Preoperative photos capture information important for diagnosing and treatment planning. They provide a baseline record of facial tooth position, occlusion, and periodontal status. My article entitled "Recommended Photography Series", provides a list of clinical photos and how to compose them, providing an excellent foundation for all the above areas.

## Patient Education

I am sure you all have heard the saying "A picture is worth a thousand words". While visual aids such as models and brochures can help explain a general procedure to a patient, detailed patient specific photos can improve patients' understanding of the condition of their dentition and help educate them on their unique dental diagnosis and proposed treatment plan. This is especially true when explaining to patients why they require the treatment you are recommending. Clinical photos can be used as a visual tool in the guided discovery process, encouraging patient participation and involvement in the planning of their care. Photos of similar cases you have treated can be used to show patients the outcomes of those with comparable problems, conditions, needs or desires, and help them understand the process and final outcome, promoting case acceptance.

## Communication with Your Interdisciplinary Team

Pretreatment or in-treatment progress photographs, in addition to mounted/diagnostic casts, are the easiest way to communicate with the patient and the dentists you may refer to for specialty treatment. The photos can be sent through HIPAA compliant encrypted email or used in face-to-face discussions. The Spear templates can be used to create clarity in all team communication.

The best way to communicate with the technician who will be working on the case, whether it is a diagnostic wax-up, surgical guide, or definitive restoration, is through digital photography.

Photographs provide important information to the technician, improving the esthetic and functional outcomes and patient satisfaction. Important photos include the requested shade tab next to the natural teeth, and the prepared tooth/teeth with a shade tab.

## Legal and Insurance Documentation

Clinical photography provides a visual record of patients' current condition, problems identified during treatment (fracture lines, etc.), and the care provided. They provide detail which is difficult to capture in a written narrative. Photos are used to supplement written documentation by showing the extent of treatment required and/or provided. When submitting insurance claims, photographs can be used to support the narrative and other documentation provided. Clinical photographs in their raw and unedited state can be used to document patients' dental status before and after treatment, helping to prove appropriate treatment was rendered in the event of a malpractice suit.

## Professional Marketing

Before and after photos are a powerful tool in showcasing your skills and patient outcomes. Patients want to see what you can do, and having clinical photos on your website, digital office screens, and in books patients can browse in your waiting room, are the best ways to demonstrate the type of care you are able to provide to your patients.

If you do not already use photography in your practice, now is the time to do so. It is an important tool for elevating your practice to the next level, and essential for improving communication and facilitating improved patient outcomes.

# Four Vital Images for Your Dental Lab

By John Carson, D.D.S., P.C.

So, you have been reading and learning what photographs you need to take for you and your patient so you can make a proper diagnosis and take them on a tour of their mouth.

That's it, right? I mean, what other pictures could you need? Well, don't forget your laboratory technician!

Sure, they will love all the photos you took at your exam (at least they should) but chances are they will be able to do a better job for you and your patient if you send them a few extra images. In this article, I will cover four "extra," although we really shouldn't call them extra as they are more like vital images for your lab.

## Full Face, Lips Retracted, Teeth Apart

This one's huge! If you ask Bob Winter, he will tell you this image is his favorite since it tells nearly the whole story and lets us compare the interpupillary line and the occlusal planes of both arches to horizon. My ceramist LOVES this image, so for me, this one is a must!



One key that I like to emphasize with this image is having a known horizontal reference (like the level picture frame in this example) or perfectly vertical reference in the image.

## Pre-Operative Shade

Sure, you can just write down which shade you want and heck, if you are doing a full mouth that might be OK; but if you are trying to match color, you are going to be way better off with a well-taken shade photograph. The biggest tip I can give you here is that you need to nail the exposure and position of the shade tab.

OK, so I said you have to "nail" the exposure. While that is of course ideal, I will add that if you are going to err, do so by slightly underexposing the image as you can recover from that to some degree as compared to an overexposed image. In this case, you have lost way more information but even worse, you are often times sunk.

Beyond proper exposure, you also need great shade tab position. The key here is to have the tab exactly the same distance from your flash as the teeth you are referencing.

Again, precision is vital. If your tab is closer to the flash than the teeth are, it will get more light than the teeth. If the tab is further from the flash, it will get less light than the teeth. Either way, you will not have the most accurate images that show what you want and your lab needs.



One more thing! Notice I said pre-operative shade photo when I described this image.

Do not forget you need to take this image at the VERY start of your procedure, before you do anything else!

The reason is that you do not want the teeth to dehydrate (which they will do as you work), since they will then appear lighter and your color match will be off.

## Cross-Polarized Shade

This can be an optional image depending on your ceramist, but I can tell you my ceramist and I love this image. The purpose of this image is to help him see even more detail by eliminating any reflections from the flash. It almost lets him see below the surface.

To get an idea of what this does, take a look at the image below. It is the same image I referenced for the pre-operative shade example above, but it was taken with my polar\_eyes filter in place, which provides this cross-polarization.



If you are saying to yourself, "uh...that's not showing me much," I agree. This is not the best example of the value this image can have, since the existing crowns do not have a ton of character. It does, however, illustrate the difference in the image you get with the filter in spite of the fact that it does not give you tons of extra information in every case.

For an example in which we do get tons of information, contrast that example to this case! Here is the pre-operative shade photo.



And now the cross-polarization photo:



As you can see, we can see additional character and how we might want/need to layer and characterize the restorations.

I will say that not every lab will find this image useful; furthermore, as you have seen above, it will be more useful in some cases than others.

So before you spend money on the polar\_eyes filter or invest your time and effort into building your own version (which, yes, you can do), I recommend you make sure your lab will find it useful, since getting this image will require you to invest in new equipment.

There are lots of ways to adapt filters to your camera to get cross-polarized images. Perhaps the easiest is the use of a filter for your camera from a company called polar\_eyes, which you can pick up from Photomed.

## Preparation Shade

You might also call this a “stump shade,” but please don’t ever call it that with a patient! They will say to themselves, “stumps? I have stumps?” As you can imagine, they will probably not have a good image in their mind!

Given this, we always call this a preparation shade in my office so we have one consistent name we always use, even when patients are not present.

The same rules apply here as with the preoperative shade photograph when it comes to position of the shade tab. It needs to be in the same plane as your preparation so it gets hit by the same amount of flash.

Typically, your lab will want you to use special shade tabs (as you can see above) that correlate to material they have to make custom-colored dyes so they can best simulate the preparation shade, so ask yours what they would like.

Just like the cross-polarization image, this image will provide lots of critical information for some cases, while it will be less critical for others. For example, if you are using a material with a lot of light transmission, you’d better have a good image of the preparation shade. If, on the other hand, your restoration will completely take the preparation change out of play – say, for instance, a PFM with a 360-degree metal margin – then it might not matter after all.

Get with your lab and set some time to discuss these images and which of them they would find useful so you can keep elevating the care you provide for your patients!

# Managing Batteries for Dental Photography

By Donna Stenberg, D.D.S., M.S., P.A.

**Utilizing rechargeable batteries in the dental office can be a great idea – especially for the flash systems used with dental photography. One problem that does come up though is how to manage all those batteries.**

I’ve found that if I simply keep the batteries together in groups of either two or four it makes life easier. The batteries can be held together with something as simple as a rubber band.

In addition, I can keep “batches” of batteries together. Rechargeable batteries can’t last forever and if one battery, or group of batteries is wearing out this system makes it easier to locate the battery group that isn’t working.

Another tip is whenever I get a new set of batteries I’ll mark the month and year on the battery with a permanent marker. This way I’ve got a reference for the age of the battery.

Implementing photography into a clinical practice requires creating new systems or revamping existing office systems. Identifying details like battery management will help ensure that the camera is ready when it’s needed. I hope these tips help keep your rechargeable batteries off the to-do list and back in to a system that supports using photography in the dental office!

**Identifying details like battery management will help ensure that the camera is ready when it’s needed.**

# Lab Communication: Shade and Surface Texture

By Gregory Kinzer, D.D.S., M.S.

**The way to communicate shade and texture to the laboratory technician can vary depending on where you are working in the mouth.**

In the posterior part of the mouth, it is not uncommon to simply write down the requested shade on the lab script and call it a day. However, in the anterior esthetic zone, this practice almost always falls short. I'm quite certain I have never seen a tooth that perfectly matches the shade guide.

So, in order to communicate shade (figure 1 and texture (figure 2), I feel that the use of digital photography is essential. Given that shade and texture are completely different, the photos needed to communicate them must be taken differently as well.



Figure 1: Shade



Figure 2: Texture

## Photography for Communicating Shade

When taking a photo for shade communication, you want to remove the flash reflection from the tooth as best you can, or at least move the reflection to a different part of the tooth as shown in figure 3.

Instead of orienting the camera perpendicular to the tooth, the camera must be oriented from above (approximately 20 degrees). See figure 4. This moves the flash to the cervical area of the tooth to better show the true shade within the body of the tooth. The shade tabs, shown in figure 5, are then held in the same plane of space as the tooth for the photo.

Today, accurate shade information can also be communicated with "shade taking" devices; however, it must be noted that these devices are not reliable for communicating sub-surface color, translucency, and effects.

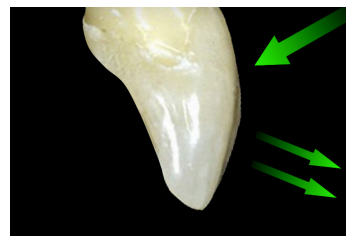


Figure 3

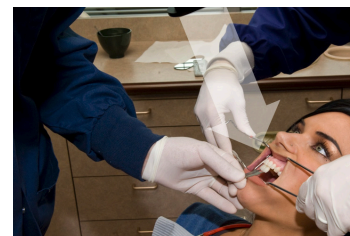


Figure 4



Figure 5



## Showing Surface Texture Through Photos

Communicating the surface texture is actually accomplished in the opposite way that shade is communicated. When communicating texture, you actually want the flash reflection in the photo. This is achieved by orienting the camera perpendicular to the tooth.

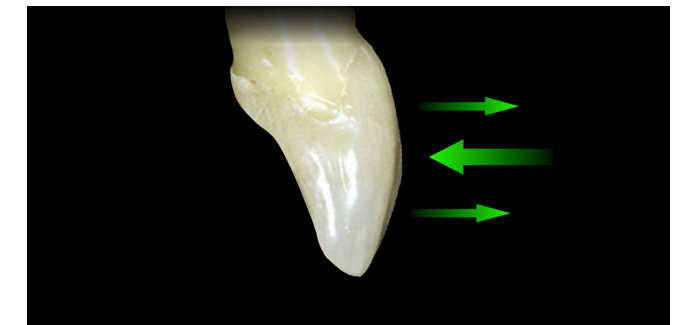
Photography is really the only way to communicate texture to the technician. If photography is not used, the only thing the technician can use to determine how much texture to place in the restoration is the texture of the stone model. As can be seen in the figure to the right, when looking at the stone model, it appears as if the teeth don't have any surface texture at all, but the clinical photo reveals otherwise.

The reality is that it doesn't take much surface texture to create reflection on the tooth, and photography is the best way that this surface can be communicated.

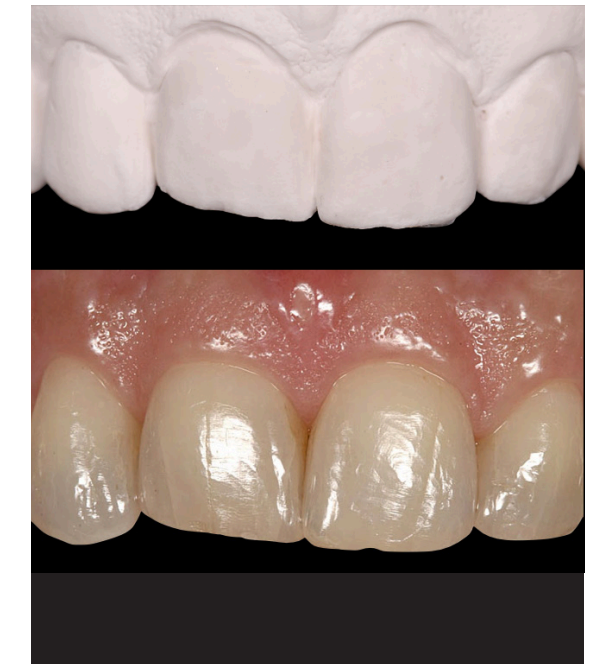


When looking at the stone model, it appears as if the teeth don't have any surface texture at all, but the clinical photo reveals otherwise.

The next time you are taking photos to communicate shade and surface texture, make sure you note the angulation of the camera.



When communicating texture, you actually want the flash reflection in the photo. This is achieved by orienting the camera perpendicular to the tooth.



# Finishing Photos: Start the Conversation

By Donna Stenberg, D.D.S., M.S., P.A.

**I like to think I do a pretty good job at developing the esthetics of a smile. For years I have done my orthodontic set-up with indirect bracket placement. I have the photos and the Panorex right there to aid me in constructing the most ideal position for tooth and root alignment.**

I work to develop a smile line that follows the smiling curve of the lower lip. I note the gingival levels and display in the full smile. In some cases I might even have a diagnostic set-up to guide me to the proper orthodontic finish. I like to think this careful planning will bring the patient to the finish line, “fait accompli” and a timely removal of the braces. I have also known the pain of hearing from my beloved referring dentists after I have removed the braces that the result is not quite what they expected. Try telling a newly de-banded patient we need to put braces back on. It is uncomfortable enough for me not to want that to happen again, ever. I have learned from Frank Spear’s seminars that we don’t know (treat) what we don’t see. And if we don’t look, important details can slip by us.

I realized that I spend a great deal of time diagnosing and developing my treatment plan and mechanics strategy to be as close to “right” as I could be. In the planning phase, I frequently seek out the help of my interdisciplinary team who are members of my Spear Study Club. So I asked myself, why would I not evaluate the same esthetics plan before I removed the braces? Why would I not seek the help of my interdisciplinary team at this important step? It is like testing the cake before removing it from the oven. It is a simple step to add finishing photos to my orthodontic treatment progress procedures. Using the pupils as my horizontal line (barring any significant existing asymmetry) my team takes a center teeth together, “teeth apart” and full smile photos six months before we anticipate removing the braces. It is usually added to the same appointment we take the Panorex for evaluating final root position.

And oh, what a world of things you can see! When enlarged on a screen with a horizontal reference line added, you will notice changes that are needed while you still have time to make adjustments. It might be noting differences in wear right-to-left that may need to be addressed by the restorative dentist. Erupting an incisor with a chipped edge so it can be polished to match its partner. It might be canting with the right not level with the left side. You could find a tooth-size discrepancy or an extended gingival margin from altered passive eruption.

The value of the interdisciplinary team blooms when I send the photos to my referring dentists and ask them if I am on the right track. Each practitioner has a new set of eyes to see nuances that the other may not see. In an implant case, for example, the site development is critical for both the surgeon and the restorative dentist. Let their eyes coach you so the best finish for the patient can be achieved. Close to home in the orthodontic practice, photos also give you an opportunity to “show off” the amazing changes you and the patient have accomplished, to an admiring parent who sees the value of choosing you for the care of their child. It may even help the parent think about their own smile and how it could be improved. It might be their turn next. Pictures truly speak a thousand words. Go ahead and look. Start the conversation.



Dr. Frank Spear

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