



Bellus3D Dental Pro



DENTAL TECHNOLOGY SOLUTIONS

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Introduction: Bellus3D Dental Pro

While digital dentistry and design software have certainly proven their powerful abilities, accuracy, and speed, they have noticeably been lacking the ability to communicate important information we need from the patient. This is most apparent when it comes to the challenge of capturing the proper positions of the mandible and maxilla to insure correct functional occlusion when using virtual articulation (i.e. a digital facebow).

We are all aware that when viewing anterior esthetics on a screen, what we see is accurate only IF we are viewing the screen and teeth from the correct perspective: Too far to the right or left, and embrasures look canted. From above or below, the teeth will look too short or too long respectively. This “2D-3D isometric distortion” is the culprit when what comes back from the mill is not what you thought you designed, or when you find yourself doing a lot of grinding and adjusting at the bench.

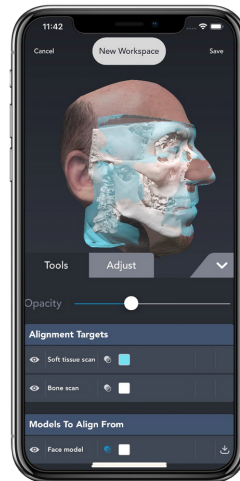
Enter Bellus3D Dental Pro Face Scan software! For the first time, not only can we now define and control these things, we can actually have the patient right there with us while we are doing it!

Introduction: What is Bellus3D Dental Pro?

The Bellus3D Dental Pro Facial Scanning app requires the operator (usually the dentist) to have either an iPad Pro or iPhone 10 or above with Facial Recognition abilities. Development is currently underway on a Windows 10 App which requires a special ARC-1 camera from Bellus. With it, the dentist can take a full face 3D scan in under 10 seconds and then make it easily available to the lab. This is possible because of a collaborative partnership between Bellus3D and 3Shape. It is specifically designed to work seamlessly with the 3Shape Trios IOS by communicating directly through the integrated 3Shape Communicate portal. This allows the lab easy access to the intra-oral scans taken by the doctor and to the Bellus3D patient scan through a secure HIPPA compliant server, both integrated into the App.

Together, this gives the lab access to everything needed to align the jaw scans to the 3D face scan and then bring all that into the 3Shape design software putting the 3D patient right on your screen. That said, it can also utilize both desktop scans done in the lab from standard models and other IOS systems, as long as .STL files can be produced and exported. It can therefore be utilized with other design software like Exocad, DentalWings, etc.

On top of all this, Bellus3D also has the ability to allow the alignment and utilization of CBCT scans, if available, to accurately identify the condylar position for more accurate virtual articulation placement and function, as well as in the design of guided surgery stents for large implant-supported cases.



CHAPTER TWO

Taking a Bellus3D Dental Pro Face Scan

Taking a Bellus3D Dental Pro Face Scan

As mentioned, the 3D scan can be taken using an iPhone, iPad Pro, or Windows 10 laptop equipped with a Bellus3D ARC-1 camera.

The discussion here will be limited to the iPad Pro and the iPhone, as the Windows system is not yet ready for release. While the patient can hand hold the device to take a 3D Face Scan, using a Selfie Light setup lends itself to much more consistent and higher quality results. This is due to the patient's general inability to hold the camera perfectly still, along with typically less than ideal room lighting both in its brightness and wavelength. Selfie lights are around 5000K which improves the accuracy of the color rendering. That's good, but brightness is paramount. The more light, the faster the shutter speed of the camera and therefore the sharper the images that are stitched together to produce the 3D image. Seven of these 2D images are also saved separately and can be viewed as desired to visualize the patient from various angles, ranging from straight on to left and right profiles.

Selfie systems are readily available on Amazon and are available as tripod supported "Stand up" systems or "Sit Down" table top systems. Which is best is somewhat a matter of preference, but there are definite pros and cons with each. Stand up systems require more floor space to accommodate the tripod legs and can be a little unwieldy and somewhat obtrusive in the office (or lab). Patients also come in a variety of heights requiring vertical adjustment of the tripod, and are often not completely stable on their feet making keeping their head still even more difficult.

A desktop setup is a lot smaller and allows the patient to sit while taking the scan. This seems to yield the best results in general.



Taking a Bellus3D Dental Pro Face Scan

Capturing the actual 3D scan is most definitely the easiest part of using the entire Bellus3D Pro app. You simply touch the New Scan button and then select the type of scan: Face, Face & Neck, or Full Head. Again, the choice is a matter of preference but the most common by far is the Face scan. You should try all three and decide which you prefer but keep in mind that the full head requires more head movement by the patient.

Once you select the type of scan, adjust the iPad so the camera at the top center is at the eye level of the patient. This is a little counter intuitive to do, as the tendency is to place the center of the iPad at eye level. When the patient is in the correct position, the oval ring around the head will change from red to green. It is always a good idea to do a practice scan so the patient knows what to expect. This usually produces a better result. It is best to allow the patient to touch the “Start Scan” button on the right side of the screen so they can control the entire process. Once started, a voice will prompt the patient to first move their head

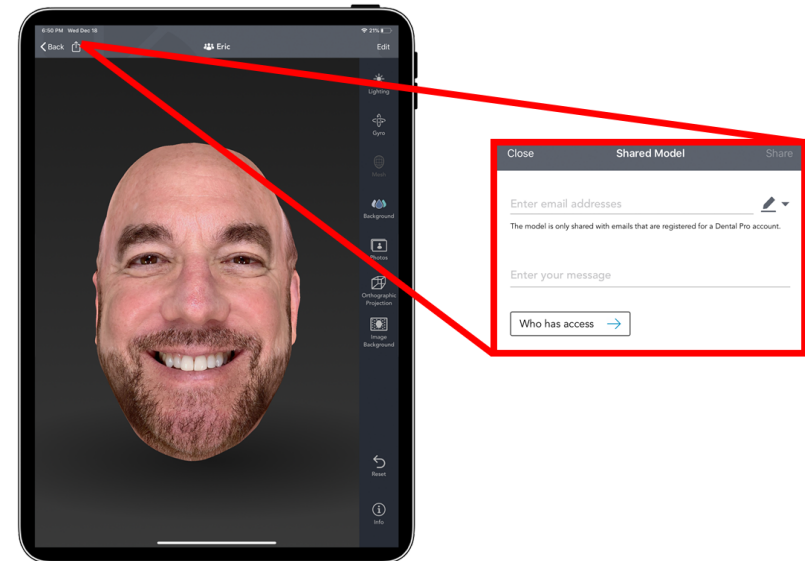
to the left, then back to center, then to the right, then back to center. Capture complete.

IT IS ABSOLUTELY ESSENTIAL THAT THE PATIENT SMILE AS BROADLY AS POSSIBLE before and during the entire scan. Practicing this first with the patient will help get a better and more useful scan. The more teeth that are visible, the more “anatomy” is available to align the 3D facescan to the surface scans of the patient’s arches. The ultimate usefulness and accuracy of the 3D Face Scan relative to the patient's actual surface scans is totally dependent on the accuracy of this alignment. This will be discussed in the next chapter.



Taking a Bellus3D Dental Pro Face Scan

Generally, the 3D face scan is taken in the dental office and needs to be shared with the laboratory. At the top left of the screen - when viewing the finished scan - is the “Share” icon that allows the dentist to simply enter the registered email address of the lab to share the scan. Obviously, the lab must have an active Bellus3D account linked to this email address to be able to access the scan. At this point the lab receives an email notification that a 3D face scan has been sent which will automatically appear in their app. Once the lab also downloads the Trios surface scans from 3Shape Communicate, the lab has everything they need to align and export the scans into 3Shape (or other) for designing the case.



CHAPTER THREE

Selecting Scans to Align

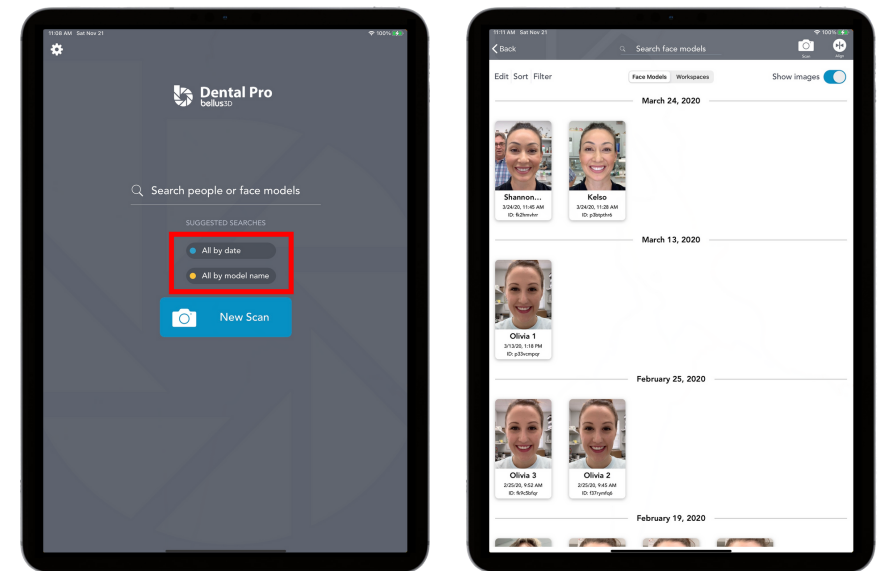
Selecting Scans to Align

As discussed, the 3D Face Scan can be easily exported to the lab's Bellus3D account by clicking the emailed link from the dentist. All that is left is to retrieve the actual Trios arch scans from 3Shape communicate, align the 3D face scan to them, create the esthetic guides, and export into 3Shape for designing the case. Keep in mind that when importing the Trios arch scans (Jaw files) from 3Shape Communicate, they are automatically converted to the required .STL format (from 3Shape's proprietary .DCM format) in the background during the import process.

If the lab scans poured models in house, they can be easily uploaded to 3Shape Communicate (the lab just creates a "fake" Trios account) and then imported from there back into Bellus 3D Pro just like actual Trios scans. This way the necessary .STL conversion is also accomplished much more easily than doing it manually from Dental Manager, which is possible, if desired.

After the 3D face scan is retrieved using the link in the email, the jaw files are imported from 3Shape Communicate for aligning.

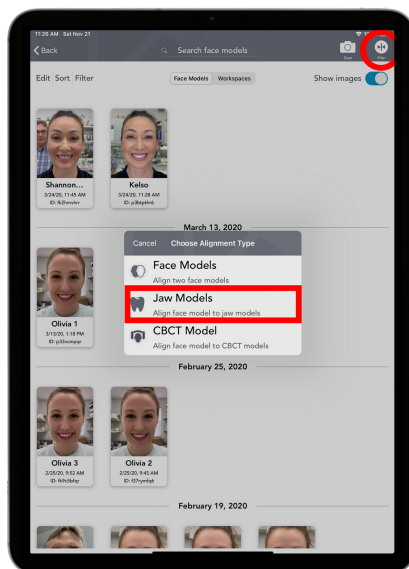
- 1 First, pick how you would like to view your library of 3D Face scans, All by Date or All by Model Name. This then shows the matching 3D face scans.



Selecting Scans to Align

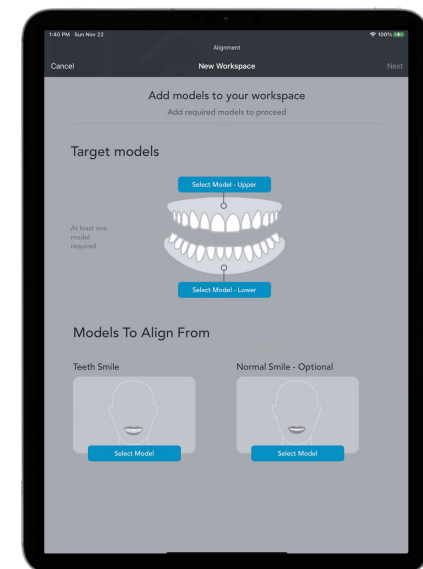
- 2** Now it is time to align the 3D face scan to the Trios surface scans and process them. Remember, this CAN include model scans that you have uploaded to your “fake” Trios account.

To start the process, tap the “Align” button in the top right corner of the screen. This will bring up the dialog box to select what type of scan you want to align with the 3D face scan. Usually this is the “Jaw Models” but you can also align two “Face Models” or a “CBCT Model” if desired.



- 3** Once the alignment type is selected, the Alignment screen is displayed.

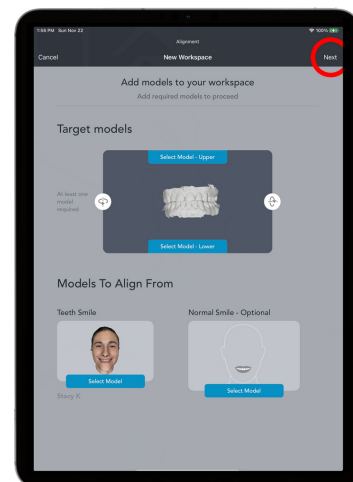
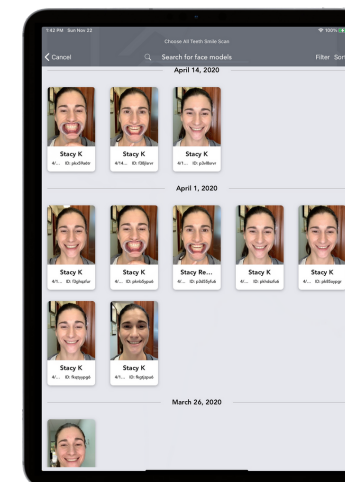
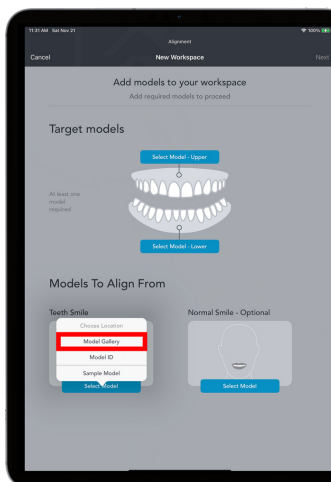
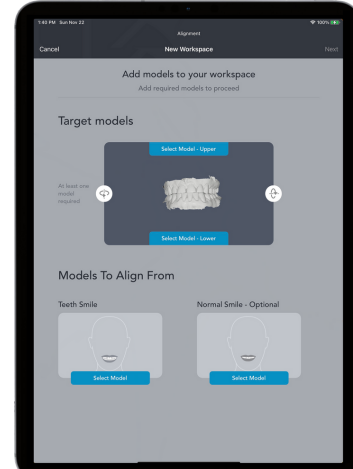
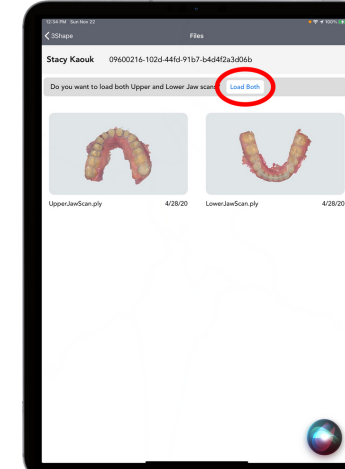
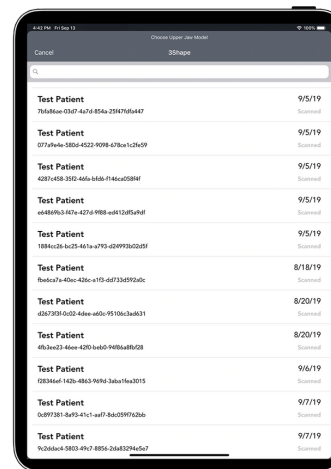
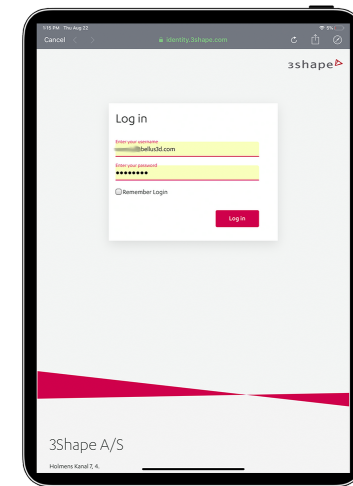
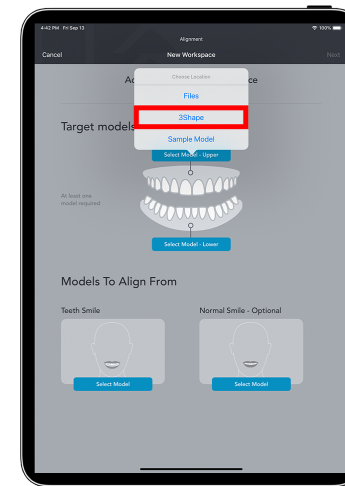
Generally, all you need to align is the Upper scan since the spatial coordinates of both the upper and lower scans are embedded in the .STL files. This means the lower arch will always follow the upper arch to the same relative position that was created when the bite was scanned and aligned.



Selecting Scans to Align

4 Touch “Select Model-Upper” and the appropriate dialog box appears. Select “3Shape” and you will then see the log in page for your 3Shape account. Fill in the credentials and select the surface scans for the appropriate patient. This displays the associated patient jaw scans. Pick “Load Both”. Next select the “Models to Align” for this patient. Choose “Teeth Smile” as that is the one that will be easiest to align to the surface scans. If you also captured a 3D face scan of a normal smile, you can align that as well to have it available during the design phase. Generally, a normal smile does not show enough teeth to align accurately to the surface scan on its own. This is where and when you would use the “Align Two Face Scans” option in the preceding step.

Once everything you are wanting to work with is selected and displayed, go to the next step: “Aligning the scans”.



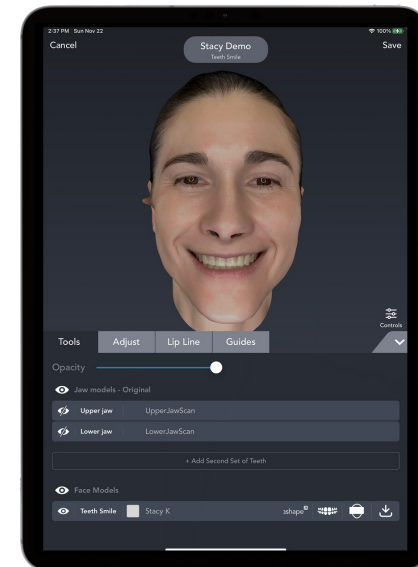
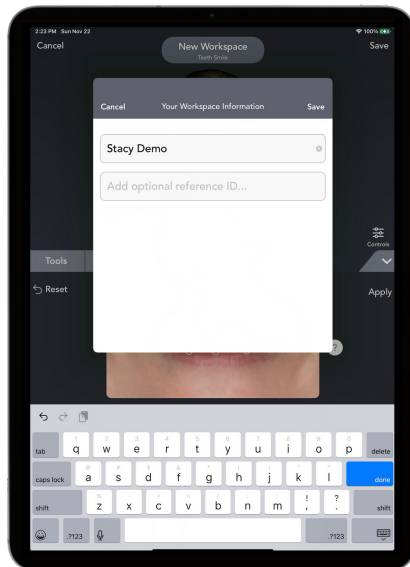
CHAPTER FOUR

Aligning and Exporting Scans & Guides

Aligning and Exporting Scans & Guides

You will notice after touching “Next” that a message stating “Alignment Complete” appears. This is a very rough alignment ONLY and is NOT sufficient for exporting into 3Shape. It is ONLY a way to get the jaw scans and the teeth in the 3D face scan roughly in the same place so you can begin the precision alignment process. YOU SHOULD SAVE AND NAME the workspace before ANYTHING else so you don’t lose any work here. This is where all the magic happens!

There are four work areas in the workspace: Tools, Adjust, Lip Line, and Guides.



Aligning and Exporting Scans & Guides

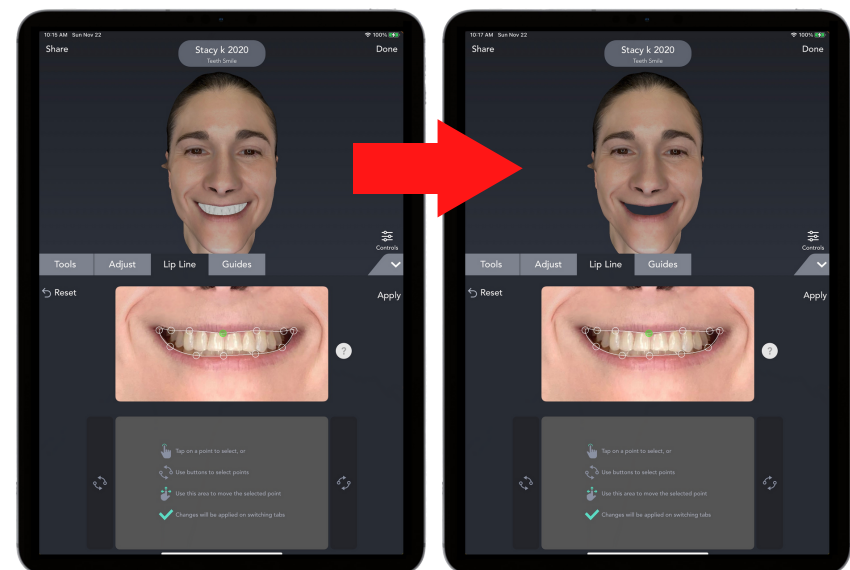
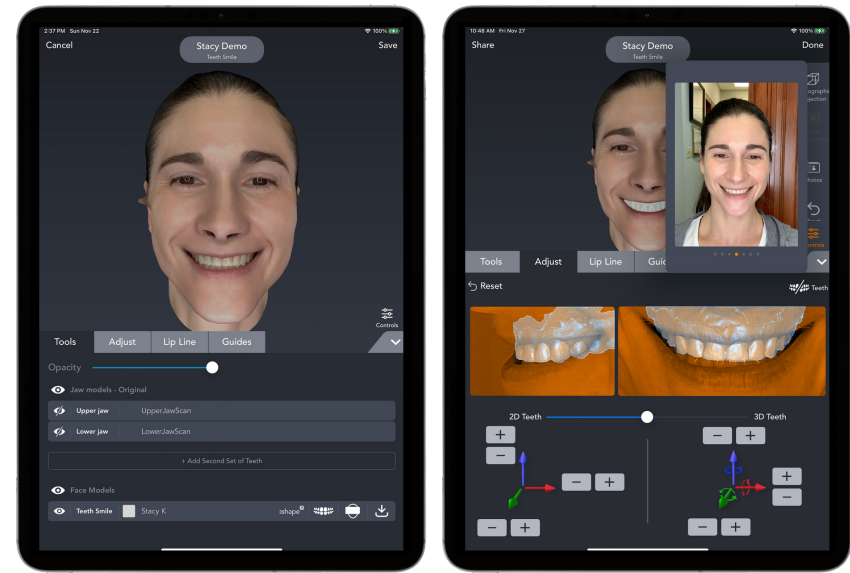
TOOLS allows you to select what you would like to view, adjust the opacity of the face, and to change the color of the jaw scans.

You can also view the Orthographic Projection of the 3D head, change the background, and very importantly, view a five shot selection of the series of 2D pictures that were stitched together to produce the 3D head model. IT IS A GOOD IDEA TO CHECK THESE AFTER TAKING THE 3D SCAN TO ENSURE THEY ARE ALL CLEAR.

In the bottom right corner is the “Upload” icon that is used to export the 3D Face model so that it can be used in 3Shape during smile design. We will get to that in a moment.

Even though “Lip Line” comes after “Adjust”, this should be done first, followed by “Adjust” and then “Guides”. After this is all done, the results are exported for use in 3Shape.

LIP LINE is a simple editing tool that cuts out the teeth in the 3D head scan so they can be replaced with the jaw scans leaving the lips for reference when modeling the smile design in 3Shape.



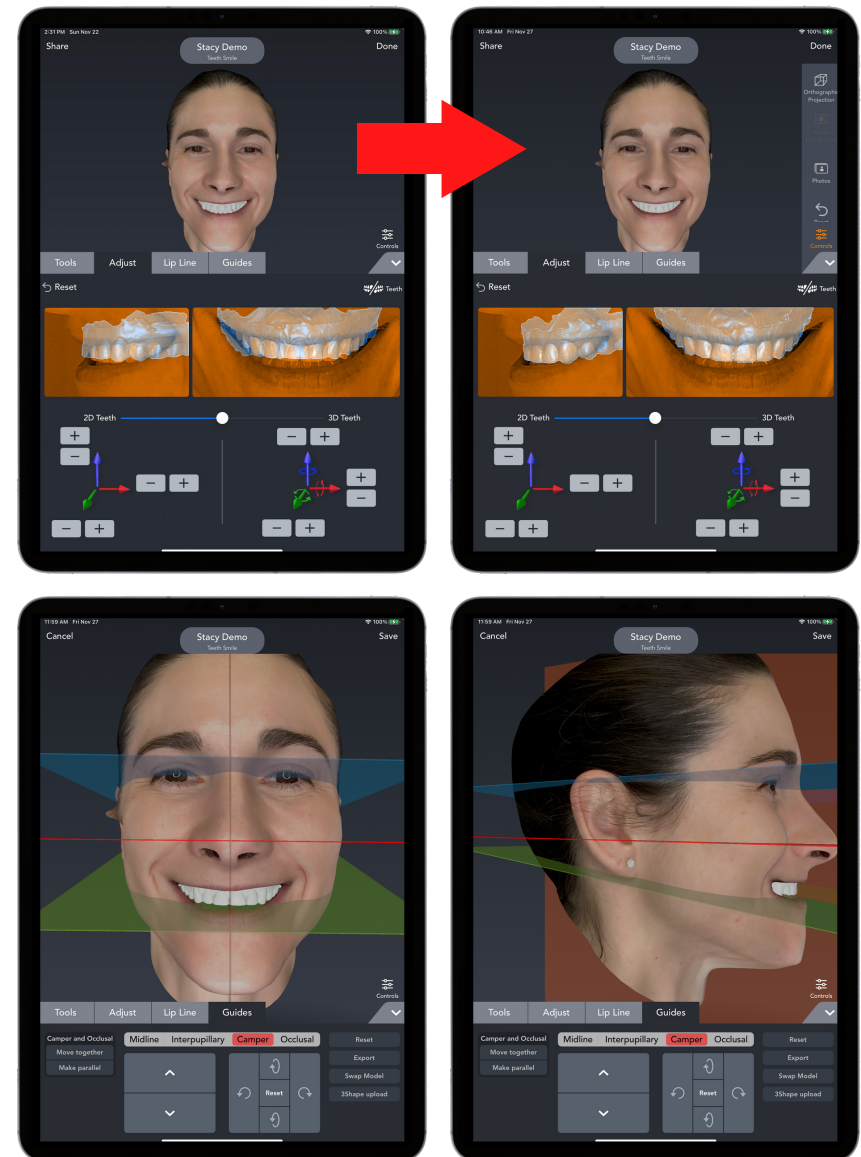
Aligning and Exporting Scans & Guides

ADJUST allows for precision alignment of the jaw scans to the teeth in the 3D head scan. This step is by far the most tedious. Once you have spent a little time understanding the 2D and 3D tools it will get MUCH easier and faster. This is the most critical step as it determines the accuracy of the placement of the jaw scans into the patient's head and therefore the accuracy of the smile design relative to their face when modeling.

GUIDES is where the Midline, Interpupillary, Camper, and Occlusal planes are adjusted to the correct positions on the 3D face scan. These are then exported along with the 3D face so they can also be used in 3Shape during smile design modeling.

Correct placement of the guides is critical for proper viewing when modeling the smile design.

The midline is self explanatory and should align with the central facial embrasure of the maxillary centrals. The Interpupillary line defines the horizontal and is used for making sure the incisal plane is correctly oriented. The occlusal plane is used to align the virtual articulator to ensure proper placement and function. The Camper, which just might be the most important, defines the correct frontal viewing angle for looking at the overall smile design during modeling in 3Shape.



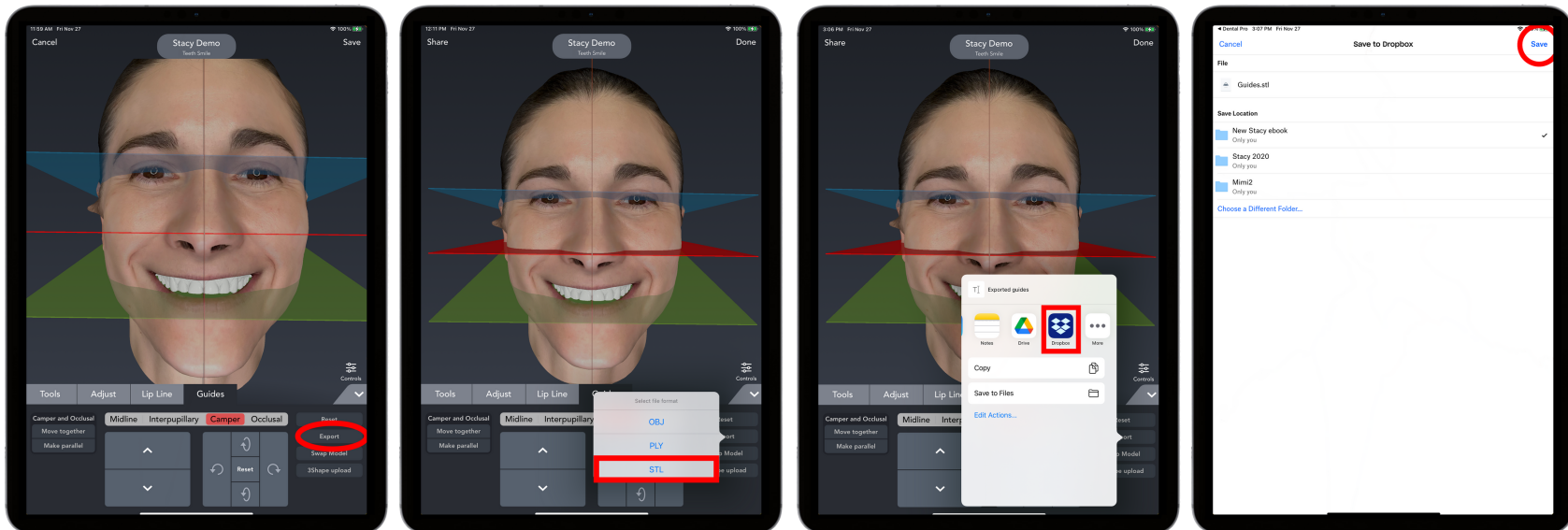
CHAPTER FIVE

Exporting to 3Shape

Exporting to 3Shape

Once the alignment of the jaw scans to the 3D face scan is done in the “Align” step, and the guides are correctly aligned to the face, all that remains is to export these out of the Bellus3D Pro App and import them into 3Shape. While there are any number of ways to do this, using DropBox seems to be the simplest. Creating an account is free and easy and should be done if you do not already have a Drop Box account.

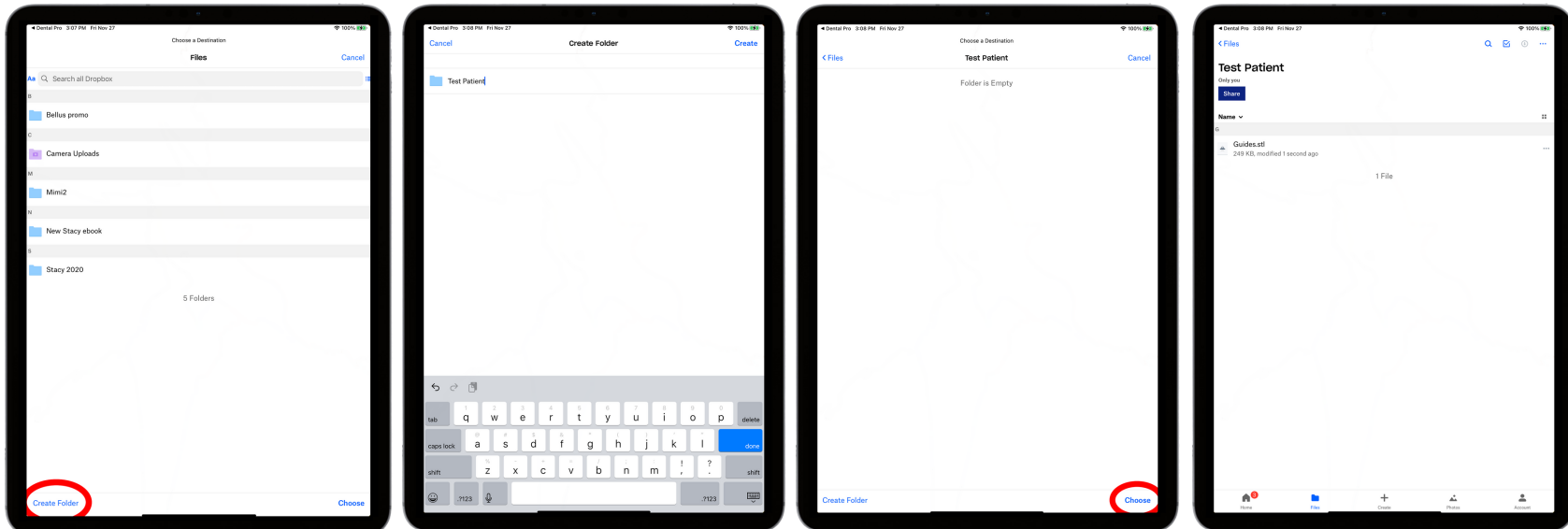
- 1 Once you tap “Export” and choose “STL” as the format, the dialog box appears where you can choose the export method. Choose “DropBox”. Tap “Save” in the upper right corner.



Exporting to 3Shape

2 Next, choose “Create Folder” at the bottom and name it for the patient; “Test Patient” in this example. You will use this same folder in the next step to add the aligned 3D head.

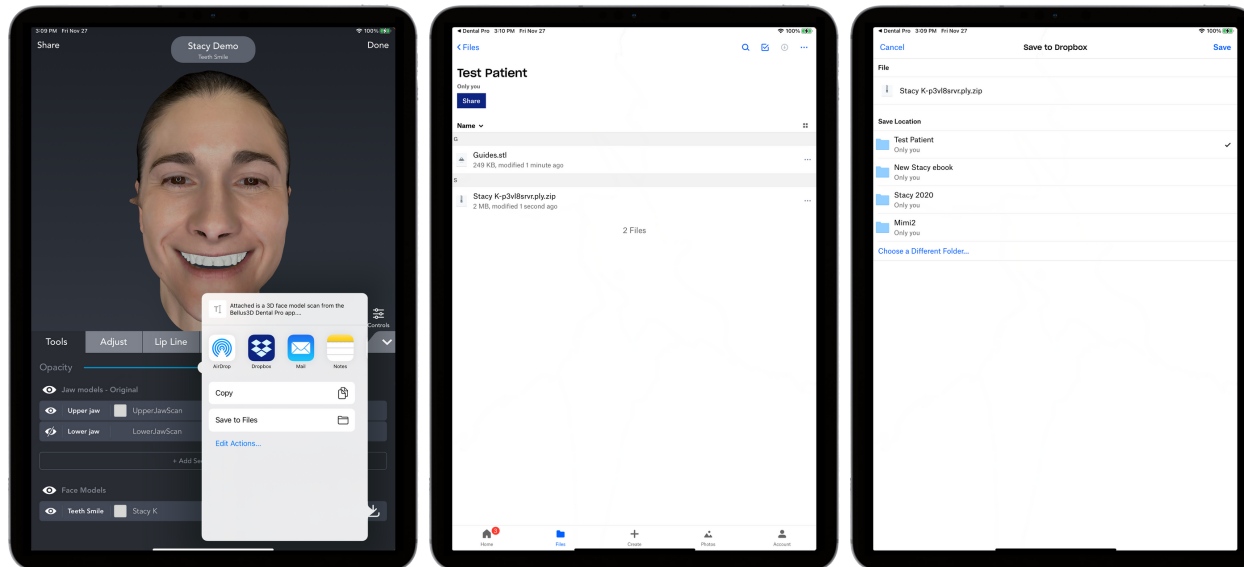
3 Choose this folder (bottom right) and the “Guides.stl” will be saved there.



Exporting to 3Shape

- 4 Next, navigate back to the “Tools” tab and touch the “export” icon in the lower right corner. Again, the DropBox option will appear. Select it and then note that the same patient folder is already checked (selected) in the next dialog box. Simply touch “Save” in the upper right corner and the Aligned 3D head will be automatically zipped and saved along with the “Guides.stl” from the previous step.
- 5 These files will now be available at your design computer in its DropBox so long as you have enabled it on that computer.

From here use the same procedure you would to align any additional scans in 3Shape. They will automatically align since the spatial coordinates carry over.



CHAPTER SIX

Copying Bellus 3D Pro Files Into the Case

Copying Bellus 3D Pro Files Into the Case

In 3Shape Dental Manager, locate the case for the patient.

I prefer to create a “Bellus” folder in the root directory of that case. This prevents confusing or losing the Bellus information. Simply right click on the case, go to “Advanced” then “Explore Order”. This will take you to the root directory. Create a new folder there and name it “Bellus”. Now locate the DropBox folder for that patient and copy/paste the two files: The patient zip file containing the 3D head scan and the Guides.stl. Paste these into the “Bellus” folder you just created. Now just unzip the patient file and you will see a total off 3 files: Guides.stl, a .jpg “patient” file, and a .ply “patient” file. The .jpg file is NOT used directly in 3Shape but MUST remain in the same folder as the other 2 in order for the 3D head to display correctly in 3Shape.

CHAPTER SEVEN

Aligning and Utilizing Bellus3D Pro In 3Shape

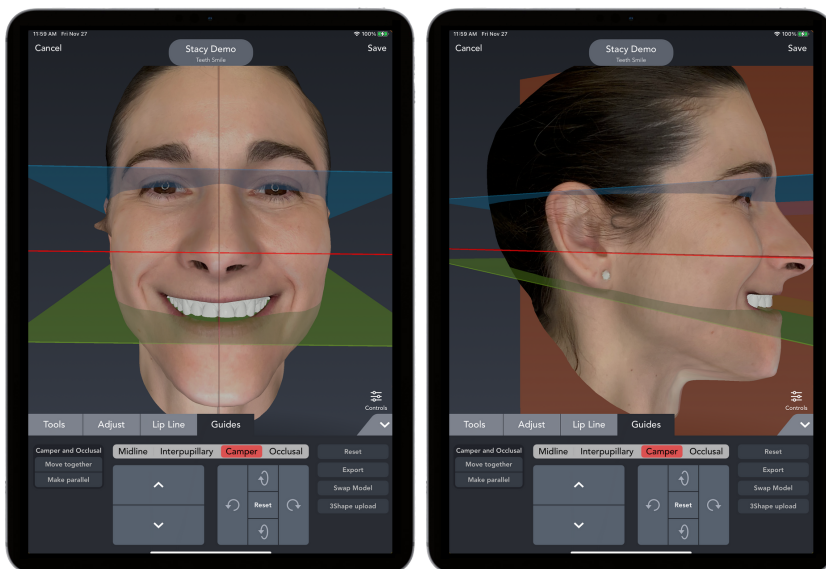
Aligning and Utilizing Bellus3D Pro In 3Shape

- 1 Now, start the design for the case. Click the Icon in the right column to “Align Additional Scan”. In the dialog box, click “Load” at the bottom of the box and navigate to the “Bellus” folder. Select “Guides.stl”. It will align the positioning guides automatically to the surface scans for the case.
- 2 Next, select “Load” again and this time select the .ply “patient” file. Again, 3Shape will automatically align the 3D head to the surface scans in the case. Now you have everything you need to utilize the Bellus information during smile design and for correct maxillary placement in the Virtual Articulator.

- 3 The “Guides” are used for determining the horizontal (Interpupillary line) and determining the proper viewing angle for the smile design. Remember, if viewed from above the teeth will appear too long, from below, too short. Viewing from the left or right will case embrasures to appear slanted.

The correct viewing angle is absolutely essential to ensure that what you will look like what you designed! This is the reason we often get teeth that are too short or too long after either milling or printing them.

To view the smile straight on from the proper angle, tilt the head until the The “Camper” line becomes a thin line, not a “plane”. Its actually quite easy to see when you are viewing the face straight on. Do the same for the “Midline” (should also appear as a thin line, not a plane) to ensure you are not viewing from slightly left or right.

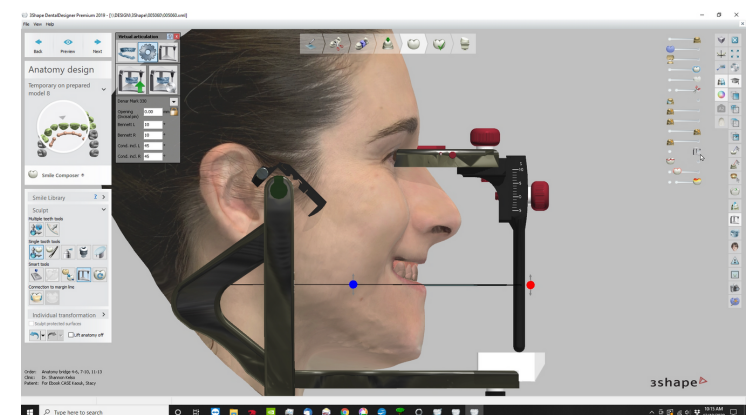
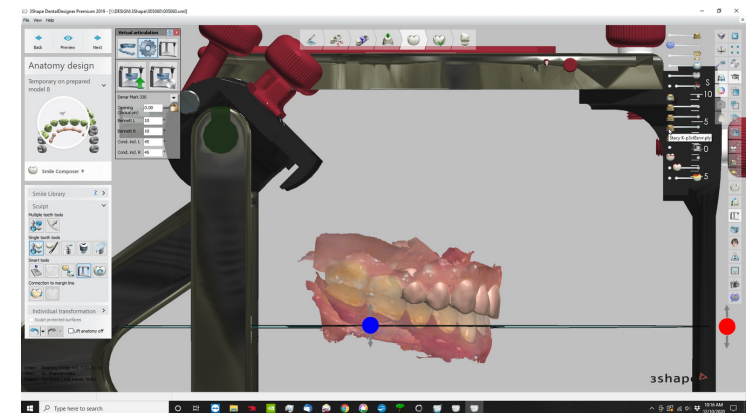
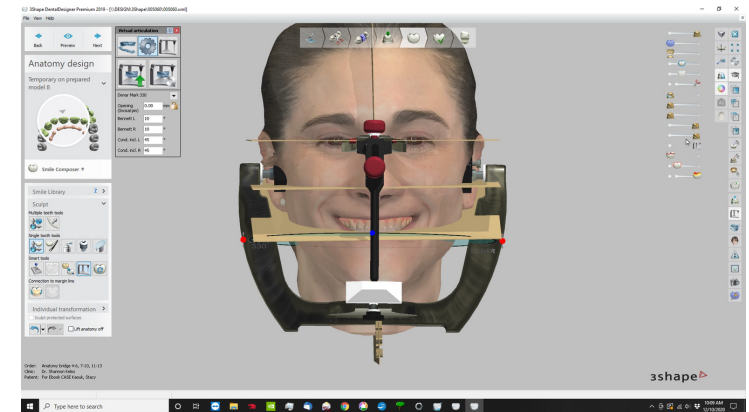


Aligning and Utilizing Bellus3D Pro In 3Shape

4

Before adjusting the function with the Virtual Articulator, it is essential to place the maxilla in the correct position relative to the condyles. By placing the condyles of the articulator over the patient's condyles (either just in front of the tragus of the ear OR by aligning a CBCT scan to the patient's maxilla and using the image of the actual condyles), the maxilla will be positioned the correct distance from the condyles. By centering the top bow of the articulator between the eyes you will also capture the correct down tilt of the maxilla. Looking from above will ensure the articulator is centered left to right.

This way, the Bellus guides can also function as a “digital” facebow.



Bellus3D Dental Pro

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Request a free consultation from one of our Sales Representatives.



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Resources:

1. RESOURCE

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DENTAL TECHNOLOGY SOLUTIONS

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