



FS 35510

Clinical Use of AlignRT

SCOPE AND OBJECTIVE

The clinical use of AlignRT to:

- 1) Aid patient set-up based on skin surface;
- 2) Monitor patient position during imaging & treatment;

RESPONSIBILITIES

Suitably-trained radiography staff are responsible for the clinical use of AlignRT according to the method detailed below.

DOCUMENTATION

Data entry for AlignRT	RAW145
On set verification & radiation treatment of the Breast	RAW122
On set verification & radiation treatment of the Thorax/Upper Abdomen	RAW087
DIBH Pause and Check poster	RAR042
Treatment Imaging: Guidelines for IR(ME)R referral & operator authorisation	RAW125
Deep Inspiration Breath Hold Treatment- Breast & Thorax	RAW150

METHOD

- Ideally, AlignRT should be used for set-up & monitoring on all fractions.
- Align RT is suitable for use with Bolus patients providing they have been scanned without Bolus
- Before attempting clinical use, check the AlignRT daily QA has been performed, and that patient data entry has been performed as per [RAW145](#).
- The deltas displayed by AlignRT are based *only* on the selected ROI – therefore this must be drawn appropriately, including SCF, if treated and laterality of the ROI confirmed as being correct. (see [RAW145](#)).
- When imaging with Align RT, ensure its cameras have a clear view of the patient, and that the patient skin surface is not covered.
- Warn patient that there will be several bright flashes of red light during the set-up & treatment process.
- If Align RT is not available (breakdown or machine transfer), revert to standard breast set up procedure as per [RAW122](#), for those patients with tattoos.
- If transferring between the Clinac and the Truebeam, the longitudinal values will be different, causing the ROI to be insufficient for matching.

Open Patient in AlignRT (Clinac)

Open Align RT application & log-in as a 'therapist' user.

The Align RT Interface on the Clinac will retrieve the relevant patient from the list when the Plan is called from Aria. Use the following sequence:

- Select **Treatment**
- In Aria 'Mode Up' the patient
- In Align RT confirm correct **Site** and **Plan**, & check the isocentre co-ordinates against the planning protocol
- Select correct reference surface (either '**DICOM**' or the appropriate '**VRT** surface')*
- Confirm '**Isocentre ROI**' is present & displayed
- Confirm **Skin Tone** (normally 'Medium')

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Open Patient in AlignRT (Truebeam)

Open Align RT application & log on as a “therapist” user.

The Align RT interface on the Truebeam will retrieve the relevant patient from the list when the Plan is called from Aria. Use the following sequence:

- Select **Treatment**
- Motion Management and Devices will open (new patients), make the relevant selection in Aria
- Confirm correct plan no, select 1 of the following options:
 - 1) Devices : None for Patients not using Align RT, Select Auto Authorise on Align PC
 - 2) Devices : None for Patients using Align RT for non-gated beams, select patient on Align PC
 - 3) Devices : Align RT for Patients using Align RT for gated beams, select patient on Align PC
- Select either Permanently or Session depending on status
Change to status can be done by opening Tools and selecting Motion Management and Devices.
- In Align RT confirm correct **Site** and **Plan**, & check the isocentre co-ordinates against the planning protocol
- Select correct reference surface (either '**DICOM**' or the appropriate '**VRT** surface')*
- Confirm '**Isocentre ROI**' is present & displayed
- Confirm **Skin Tone** (normally 'Medium')

Use only the Truebeam Real Time Coach (labelled) for patients on the Truebeam.

***Caution:** *AlignRT will default to the latest '**VRT**' reference surface either on Clinac or Truebeam- therefore the user must ensure they actively select either the DICOM surface or the correctly-dated VRT surface – whichever is appropriate (see below).*

Using AlignRT to Aid Patient Setup on Tattooed Breast / Thorax Patients

- Perform initial patient positioning using skin marks, as specified in [RAW122](#) or [RAW087](#) .
- Use AlignRT as follows, to fine-tune patient position (ensure couch rotation at 0°):
 - Double-check the appropriate 'Record Surface' is selected (*DICOM* for fractions 1-3 at least)
 - Position the patient on the Breast Board or Wingboard either by using tattoos for alignment before fine tuning with Align RT or by moving the patient sup/inf to align the anterior (CT reference) tattoo. Move the table to the parameters in Aria of a treatment field, if on Truebeam this can be done by selecting Couch Load.
- Select 'Monitoring', correcting any rotational deltas by patient manipulation and the translational deltas by couch movements (as close to zero as possible).
- **Pause monitoring** and take a 'Treatment Image' in AlignRT. This will provide a more detailed image for major rotations, offsets, arm & chin positions etc. Information given by an arrow indicates the patient should move in the opposite direction of the arrow. Red Arrow indicates a Roll, Green Arrow indicates the Pitch. The Pink overlay represents the Reference Image and the Green the patient's current position, both should be closely overlaid to each other.
- Leave Monitoring on, exit the room.

Using Align RT to Aid Patient Setup in Tattooless Breast Patients

- Position patient on the Breast Board/ Wingboard as specified in [RAW122](#).
- Measure the distance from the SSN to the approximate centre (anterior CT reference position). Mark with a pen and adjust the patient position sup/inf by moving the patient until the pen mark is running approximately through the CAX.
- Use the Couch Load function or manually move to all the planned couch parameters in Aria.
- Select Monitoring and set up the patient, correcting the rotational deltas by patient manipulation and the translational deltas by couch movements (as close to zero as possible).
- **Pause monitoring** and take a 'Treatment Image' in AlignRT. This will provide a more detailed image for major rotations, offsets, arm & chin positions etc. Information given by an arrow indicates the patient should move in the opposite direction of the arrow. Red Arrow indicates a Roll, Green Arrow indicates

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the Pitch. The Pink overlay represents the Reference Image and the Green the patient's current position, both should be closely overlaid to each other.

Leave Monitoring on and exit the room

All Set-ups

- Follow DIBH Pause and check [RAR042](#) (where appropriate)
- Perform pre-treatment *radiographic* imaging as specified in [RAW125](#) & analyse the image/s, whilst continuing to monitor the patient on Align RT (where requested).
- Apply any couch shifts required from the radiographic imaging, retract imaging panels & ensure gantry is not obscuring the Align RT cameras, then:
 - Capture a new '**VRT**' reference surface at this couch position (**Capture – Reference**). This will reset the threshold values to zero & allow monitoring of the patient position during treatment delivery.
 - Where requested: Select **Gating On** to monitor patient movement during Treatment Delivery, **Verbally** confirm **Gating On** before giving a treatment exposure.

Note: This *VRT* reference surface may also be of subsequent use for patient set-up, depending on how close the radiographic imaging was to the Align RT set-up – see below.

- After all beams have been delivered, pause **Monitoring** & close the patient record on the Align RT workstation (saves automatically),.

Problem Solving

If a set up is problematic, **pause monitoring** and take a 'Treatment Image' in AlignRT. This will provide a more detailed image for major rotations, offsets, arm & chin positions etc. Information given by an arrow indicates the patient should move in the opposite direction of the arrow. Red Arrow indicates a Roll, Green Arrow indicates the Pitch.

If the Lateral Value is wildly off this could be due to an offset being used at CT and not being adjusted in Aria which could cause the ROI to be insufficient for matching. A laterality check of the ROI should also be confirmed.

If a set up is wildly off in multiple directions with large values, check the isocentre values are correct in Align RT, and confirm the correct ROI has been drawn on. If there is no obvious reason for poor set up, ask patient if they have noticed any changes to their contour e.g. haematoma / seroma. Refer set up to the Senior Radiographer on unit to aid problem solving.

CONTINGENCY PLAN IF SURFACE GUIDED RADIOTHERAPY UNAVAILABLE

Non-DIBH Patients: Position patient on Breast Board/Wingboard, straighten, measure distance from SSN to the approximate centre (anterior ct reference position), mark with a pen. From this point set the Anterior FSD (on appropriate treatment record form), perform couch shifts manually to Isocentre position (on treatment record form). Radiographically image as specified in [RAW125](#) to verify treatment position.

DIBH Patients: Allow to miss treatment for a maximum of 2 days. If the unavailability of SGRT is going to exceed 2 days, either have a Free Breathing Plan generated and with the Consultant's approval treat on it for a specified no of fractions.

NB There is a manually gated Contingency Plan in [RAW150](#) which may be used.

Patients who set up <0.4cm for fractions 1-3

Continue to use Align RT daily to set up patient against the **DICOM** Reference image. Perform daily 'MV-during' images on either a medial or lateral field for the duration of the treatment course: if this MV-during is within 0.4cm tolerance, the set up is working and so proceed to weekly radiographic images specified in [RAW125](#). If daily MV-during is out of tolerance, schedule 'MV before' imaging for the next 2 fractions specified in [RAW125](#) until consistency in set up is achieved. Refer for further imaging if course tolerance is reached as specified in [RAW125](#).

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Patients who have >0.4cm shifts

Annotate to use the VRT from the previous fraction (eg. "Use VRT from dd/mm/yy), Use the VRT to aid patient set up, perform radiographic imaging as specified in [RAW125](#). (As usual, take a VRT Reference image after the shifts, for the purpose of monitoring patient position during treatment delivery.)

Subsequent Fractions: Select the **VRT** Reference image instead of the Dicom Reference, use the VRT to achieve patient position. Radiographically image as specified in [RAW125](#) and apply any shifts, take a VRT as usual. Once a successful set up within tolerance has been achieved, approve this VRT for daily set up. Do this by going into the Record Section on the work station, select the settings icon and approve the desired VRT. This is confirmed by a green tick against the relevant date. Set up a Patient Alert in ARIA Summary indicating which VRT to use for set up.

Patients who have Random Errors >0.4cm showing no consistency of direction

Continue to use Align RT *and* radiographically image as specified in [RAW125](#) (until tolerances met for 2 fractions), a corrective VRT is suggested or until the end of the treatment course.

Daily ROI Procedure

Edit all ROI'S **Offline** for the last VRT of each session or the **Approved VRT** if appropriate.

During treatment delivery if an ROI requires to be edited to ensure better topography, use the Edit ROI icon **Online** on the Treatment Screen and do so.

Use of Bolus

- Use **Barts Bolus** without tissue paper covering it, and if possible **without tape**.
- Set up to **Dicom** surface in the **isocentre field**, ensuring all deltas as close to zero as possible.
- Pause Monitoring, apply the **Bolus**, switch to **Bolus Field** and acquire a **Reference VRT**. Draw a ROI only on the first fraction to be similar to that applied to the Dicom surface. Select 'Monitoring' and leave the treatment room.
- Continue to monitor intrafraction motion whilst Radiographic Imaging is performed and shifts are computed
- Apply any required shifts - **acquire** a new **Bolus Reference VRT** immediately after moving couch.
- Subsequent fractions do not require an ROI to be drawn on each day.
- Edit ROI if required, complete treatment delivery.

Non Bolus Fields (same plan)

- With the **Bolus field** still selected, confirm that the deltas are still good against the post-imaging **VRT**. Then, carefully remove Bolus from patient, switch to the **isocentre field** and immediately acquire a **Ref VRT**. Deliver the **non bolus fields**. (scf + post axilla) ** If the deltas are not good on bolus removal take a **Treatment Image** to indicate if it is patient or bolus movement. Adjust as required.
- Check the Dicom surface ideally it should reflect the imaging shifts made (should be of similar magnitude and be in the opposite direction).

VMAT Breasts

- Set up to Dicom surface, confirm patient position at isocentre with AlignRT
- Perform required imaging, apply corrective shifts and immediately take a VRT.
- Select **Gate On** (where requested), **verbally confirm** and monitor intrafraction motion during treatment delivery
- **Online** CBCT may be imaging modality of choice, proceed as above, ensuring imaging arms are fully retracted *before* taking the Ref VRT, and once radiographic shifts have been applied.

Any difficulties with daily use of AlignRT should be referred to a Treatment Team or the Advanced Imaging Lead Radiographer. Any issues with AlignRT malfunction should be reported to Radiotherapy Physics.

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Version	Date	Changes
1	Sep 2017	First revision, all new text
2	Nov 2017	Extended use for actively assisting set-up.
3	Feb 2018	Extended use for monitoring & use of VRT references
4	Jan 2019	Use of Bolus, VMAT
5	May 2019	Clarified use of bolus daily procedure, added pause & check, added Truebeam.
6	Aug 2019	Workflow changes and added tattooless set ups.
7	Nov 2019	Removal of FSD Monitoring/ addition of Treatment Capture

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