REACHING NEW HEIGHTS WITH SGRT

# Effectively Transitioning to Tattoo/Mark Free Radiation Therapy for All Treatment Sites

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Stamford Health, Bennett Cancer Center

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# Stamford Health

## Stamford Hospital – Bennett Cancer Center

- 305-bed not-for-profit community teaching hospital
- 2 TrueBeams - v. 2.7 - 6DoF couch
- AlignRT Advance v. 6.3
  - Postural Alignment
- Tattoo-less



COLLABORATIVE MEMBER

Dana-Farber Cancer Institute | Brigham Cancer Center

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# AGENDA

- Barriers to Adoption
- Basic Workflow & Workflow Adjustments
- Benefits over Tattoo based Setups
- Ensuring Accuracy & Reproducibility
- Troubleshooting
- Keys to be successful

# Barriers to Adoption

Change

Lack of experience

Comfort & Familiarity

Cost

# Barriers to Adoption

Change

- Tattoos - long history in RT
- Re-thinking & Re-framing
- No permanent reference point
- If not handled correctly it can lead to confusion & resistance

# Barriers to Adoption

- Lack of experience
  - Learning curve
  - Incorporating SGRT into workflows
  - Problem solving
  - Troubleshooting

# Barriers to Adoption

Comfort & Familiarity

# Barriers to Adoption

Cost

# Basic Workflow
# &
# Workflow Adjustments

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# Basic Workflow

Prepare

Clinically straight & **Indexed appropriately**

Drive couch to ISO

Check the Longitudinal & Lateral position

Setup patient

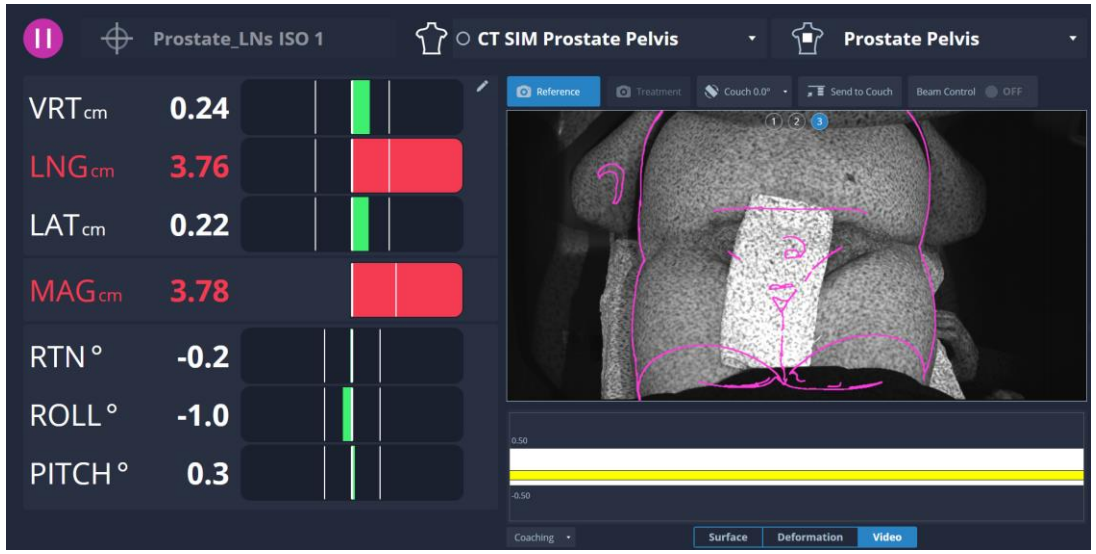
- Rotations (Rotation, Roll and Pitch)
- Translations (Vertical, Longitudinal, and Lateral)

Perform any pre-treatment imaging

Apply imaging shifts

Reference capture

Treat with IFM



# Workflow Adjustments

Incorporating SGRT

Re-thinking Positioning & Immobilization

Patient Education

Downtime Procedure


Practice
SGRT Surface
Jon's Face
RT cm 0.17
NG cm 0.65
AT cm -0.23
AG cm 0.71
N° -1.0
OLL° 0.3
TCH° -2.8
Reference
Treatment
Couch 0.0°
Send to Couch
Beam Control OFF
1 2 3
0.50
-0.50
Coaching
Surface
Deformation
Video
26.6 fps
Field Status
System Status
1/31/2025 1:57 PM
Deltas out of tolerance

# Benefits over Tattoo Based Setups

Accuracy

Safety

Efficiency

Simplicity

Patient Satisfaction

Assistance with challenging set-ups

# Accuracy

20,000 points vs. 3

So much more information!

Postural Alignment

- Monitoring chin position
- Tracking Bolus position during treatment
- CCTV goes out, you still have your live video feed!

Surface Deformation

3D Photo

# Safety

Always setting up at your isocenter - Key safety feature!

No more:

- Incorrect shift
- Wrong direction
- Throw away those sticky notes!

Patient movement

- “Great unblinking eye in the sky”
- “The therapist that never looks away”
- “Independent observer”

# Efficiency

Faster & Easier setups

Less wasted movement

Build in SSD Feature!

**SAVED SSDS** L_Breast_BH - 10/31/2023 7:21 PM

| Field ID | Gantry (º) | Couch (º) | Plan (cm) | **Current (cm)** |
|---|---|---|---|---|
| **1 LMG L_Brst_BH** | **312.0** | **0.0** | **90.0** | **89.8** |
| **2 LLG L_Brst_BH** | **136.5** | **0.0** | **89.7** | **90.2** |
| **2a LLG L_Brst_BH** | **136.5** | **0.0** | **89.7** | **90.2** |
| **kV01 AP Setup** | **0.0** | **0.0** | **94.9** | **94.7** |
| **kV02 LLAT Setup** | **90.0** | **0.0** | **93.9** | **94.0** |

# Simplicity

Simplified process with less margin for error

Tattoo-less/mark-less means:

- Finding small tattoos
- Losing marks
- Re-treat with multiple tattoos

# Patient Satisfaction

Tattoo-less/Mark-less means less:

- Stress & Anxiety
- Maintaining marks

Improved patient comfort

- Immobilization considerations have changed. Less is more.
- “Active” vs. “Passive”
- “Restricting movement” vs. “assistance maintaining a comfortable position”
- Open-face masks

## BACKGROUND

**Radiation therapy** is a type of cancer treatment that uses a machine called a "Linear Accelerator" which focuses beams of energy (x-rays or electrons) to kill cancer cells.

Prior to treatment, a patient starts with a Computed Tomography (CT) simulation, known as a "mapping" session. This CT is used by our radiation therapy team to determine the exact location, shape, and size of the tumor to be treated.

Patients are set up on the table in a position that can be *reproduced* each day for treatment.

Patients typically **lie flat** on the treatment table.

For treatment, the patient is positioned on the treatment table as established at the CT simulation. The Linear Accelerator moves around the patient to precisely aim at the cancer.

On the patient's first day, a Verification Simulation ("Dry run" or "Dress rehearsal") is done. The patient is set up in the treatment position using **alignRT** and then taking imaging of the area to ensure our actual position and setup match the treatment plan. This ensures that we are delivering the prescribed treatment to the exact location.

Introducing: alignrt®

**Also known as:**
Surface Guided Radiation Therapy (SGRT) is a camera technology used to image the external surface contours of the patient's body without the use of radiation.

SGRT is used to precisely match the patient surface data from the CT simulation to the patients' surface position real-time while delivering treatment. It also allows for "Six degrees of freedom" of movement for a more accurate positioning: (1) Vertical (2) Longitudinal (3) Lateral (4) Rotational (5) Roll and (6) Pitch

## Problem: What if the patient is unable to lie flat?

PT #1

An 85-year-old female with basal cell carcinoma of the right temple with extreme kyphosis.

PT #2

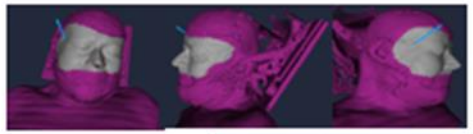
A 76-year-old male with squamous cell carcinoma of the right temple and temple/ear, and neck issues.

These two patients **were unable to lie flat for treatment**. This presented a challenge in creating a reproducible and practical treatment plan for daily set-up and more importantly, maintaining precision during the daily treatment delivery. Had we been unable to develop a reproducible and precise setup, the patients ***would not have been able to receive radiation therapy treatment***.

## STRATEGY

We needed to create a reproducible setup that the patient could tolerate without movement for approximately 30 minutes. This position needed to be comfortable, tolerable, maintainable and reproducible. This was achieved by creating a custom immobilization device for each patient.

A treatment plan was created to customize how the Physician's prescribed dose would be delivered to the treatment area due to the unusual position and complexity. We used the SGRT system to aid in daily setup, maintain accuracy during treatment delivery, and to monitor the patient for movement during treatment.



alignrt® REPORTS

## OUTCOMES

PT #1

Skin lesion has resolved and she is getting some local healing.


PT #2

Skin lesion has resolved and the superficial ulcer is receding.


## CONCLUSIONS

Our team worked together to create a setup and position that allowed the patient comfort and the ability to hold still for each 30-minute treatment session.

With the aid of our Surface Guidance System, (alignRT) we achieved our goal of precise and reproducible setups.

This proved to us that SGRT is beneficial for both setup and motion management for any treatment site on the body.

We also proved the ability to maintain submillimeter accuracy in most any treatment position, with the potential to offer faster and higher precision treatments for those patients that are challenged with other comorbidities.

### alignRT Benefits

- Patient position confirmation.
- Assistance with complex set-up.
- Assistance maintaining positional accuracy & precision.
- Postural alignment.

### Patient #1 Treatment Details:

- Average treatment duration = **25:55 min**
- Fastest treatment duration = **11:00 min**
- Average Imaging Shift Magnitude = **1.1cm**
- Average Imaging shift Rotation = **1.4°**
- Average Imaging shift Roll = **2.3°**
- Average Imaging shift Pitch = **1.3°**

### Patient #2 Treatment Details:

- Average treatment duration = **21:43 min**
- Fastest treatment duration = **12:19 min**
- Average Imaging Shift Magnitude = **0.6 cm**
- Average Imaging shift Rotation = **1.6°**
- Average Imaging Shift Roll = **2.4°**
- Average Imaging Shift Pitch = **1.7°**

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# Ensuring Accuracy and Reproducibility

# Tips

ROIs

Reference captures

- This session only
- This and Future sessions

AlignRT features

- Postural Alignment
- ROI Metrics
- Surface Deformation
- 3D Photo

# AlignRT Features

## Postural Alignment

- Provides real-time feedback utilizing high-quality live video
- Adjust the patient's body position
- Posture correction

## ROI metrics

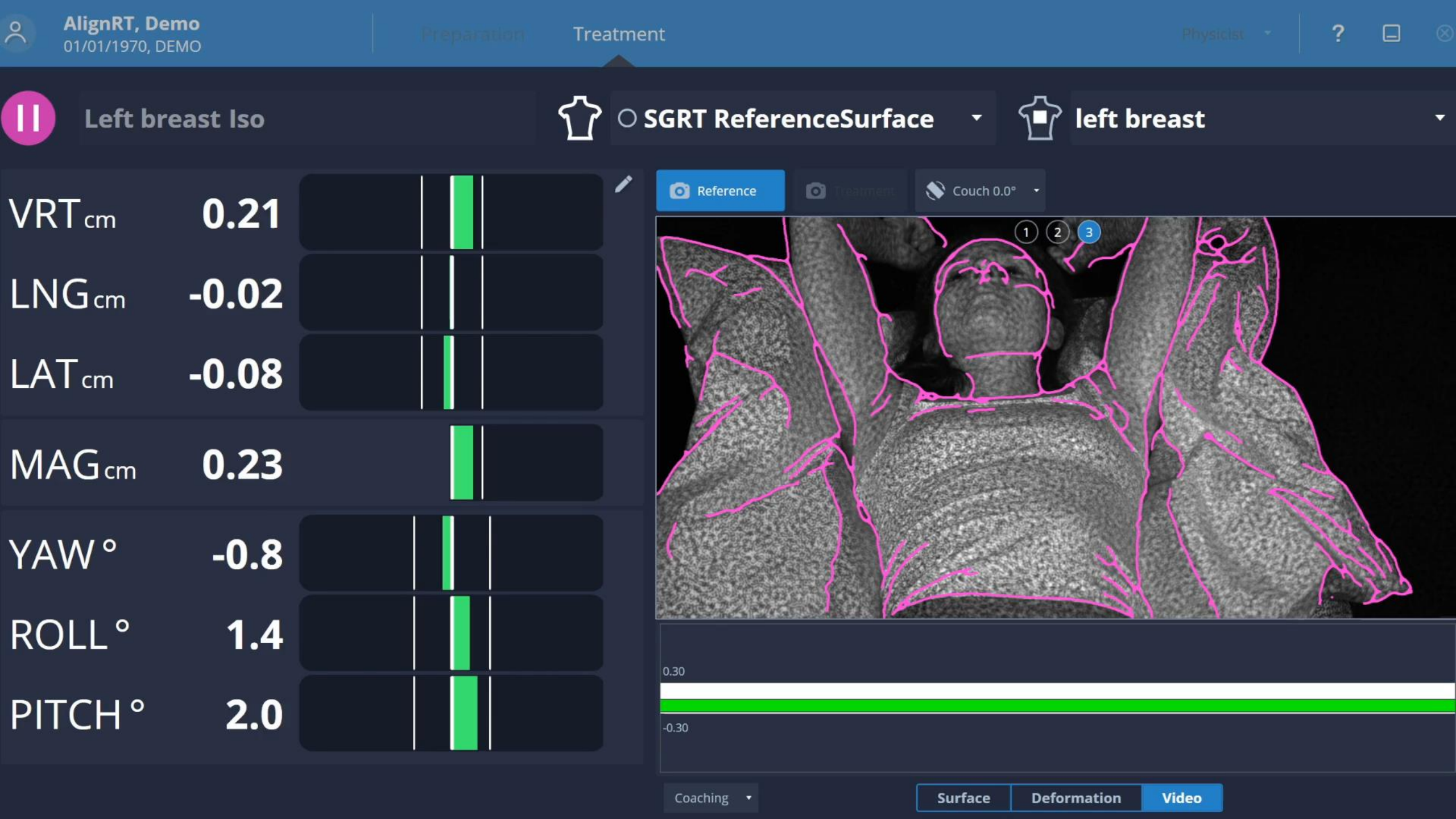
- Draw suitable ROIs
- Immediate feedback concerning the topography and size
- Accurate monitoring of the patient

## Surface Deformation

- Visualize any variation of the surface
- Delineate any areas of surface changes

## 3D Photo

- High-quality detailed images
- Clearly identify patient anatomy vs. other obstructions


AlignRT, Demo
01/01/1970, DEMO
Preparation
Treatment
Physicist
Left breast Iso
SGRT ReferenceSurface
left breast
VRT cm 0.21
LNG cm -0.02
LAT cm -0.08
MAG cm 0.23
YAW ° -0.8
ROLL ° 1.4
PITCH ° 2.0
Reference
Treatment
Couch 0.0°
1
2
3
0.30
-0.30
Coaching
Surface
Deformation
Video

DIBH

SGRT Surface

ROI1

VRT cm -

LNG cm -

LAT cm -

MAG cm -

YAW ° -

ROLL ° -

PITCH ° -

Reference
Treatment
Couch 0.0°
Beam Control OFF

04/10/2021 21:04:45

Setup Surface

ROI Tools

- Rectangle
- Oval
- Freehand
- Undo
- Redo
- Reset

ROI Performance

Save

Close

Size ✓

Topography

ROI may be too flat for accurate monitoring.

Size ✓

Topography

ROI may be too flat for accurate monitoring.

Size

Large size of ROI may result in slower monitoring feedback.

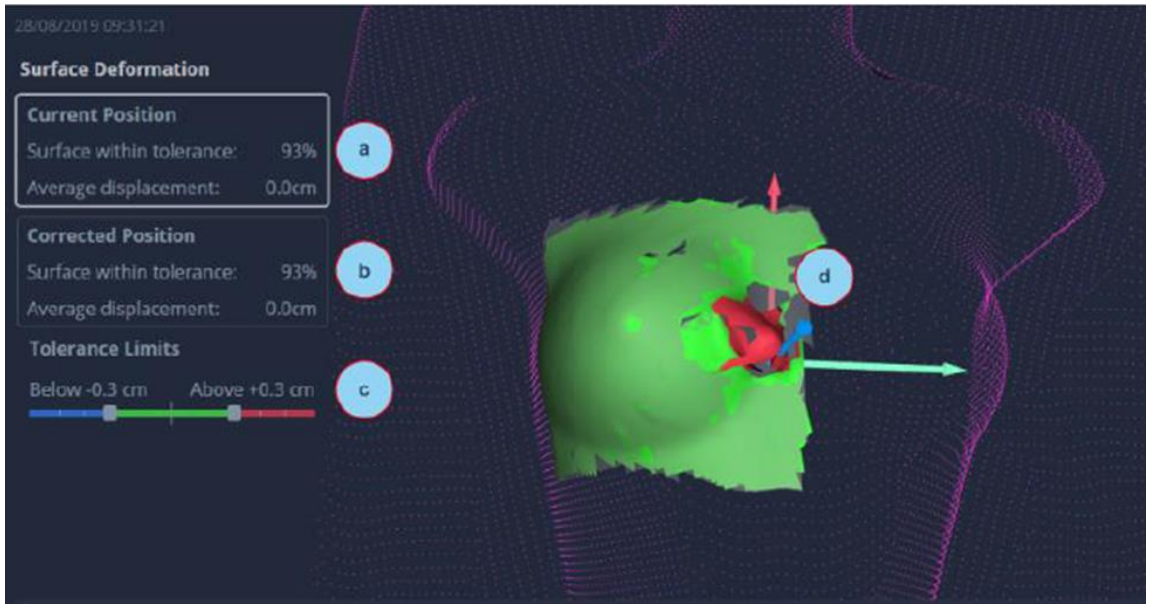
Topography ✓

ROI Performance ✓

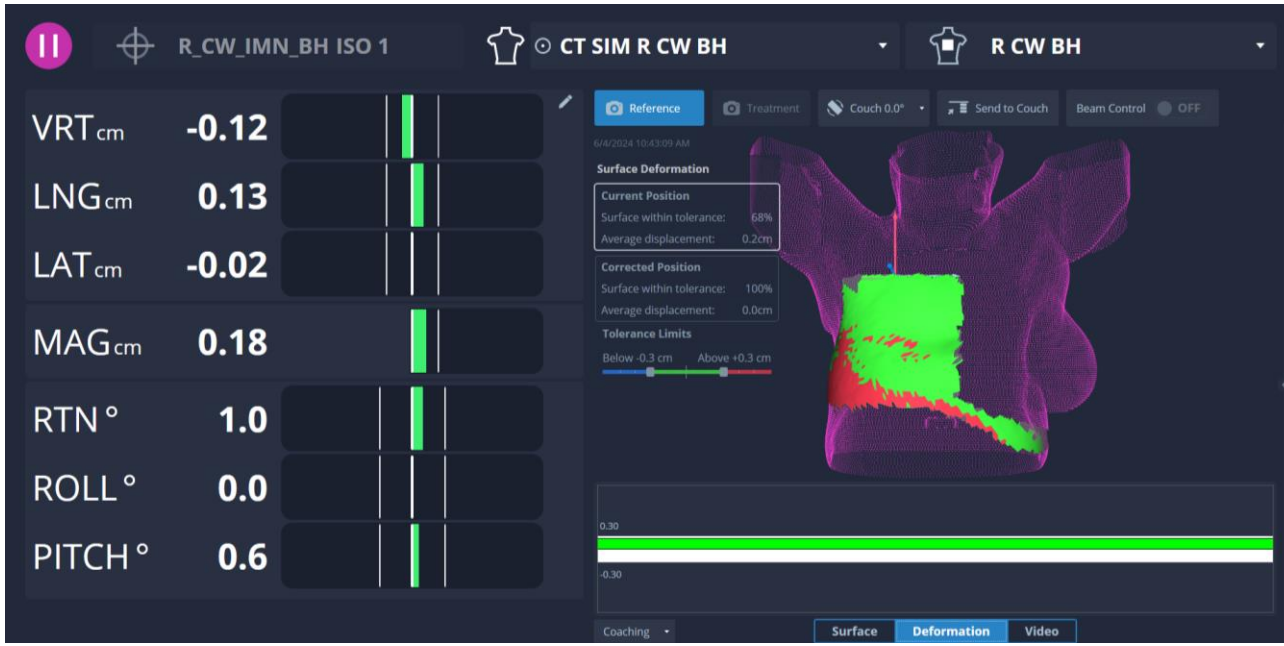
Save

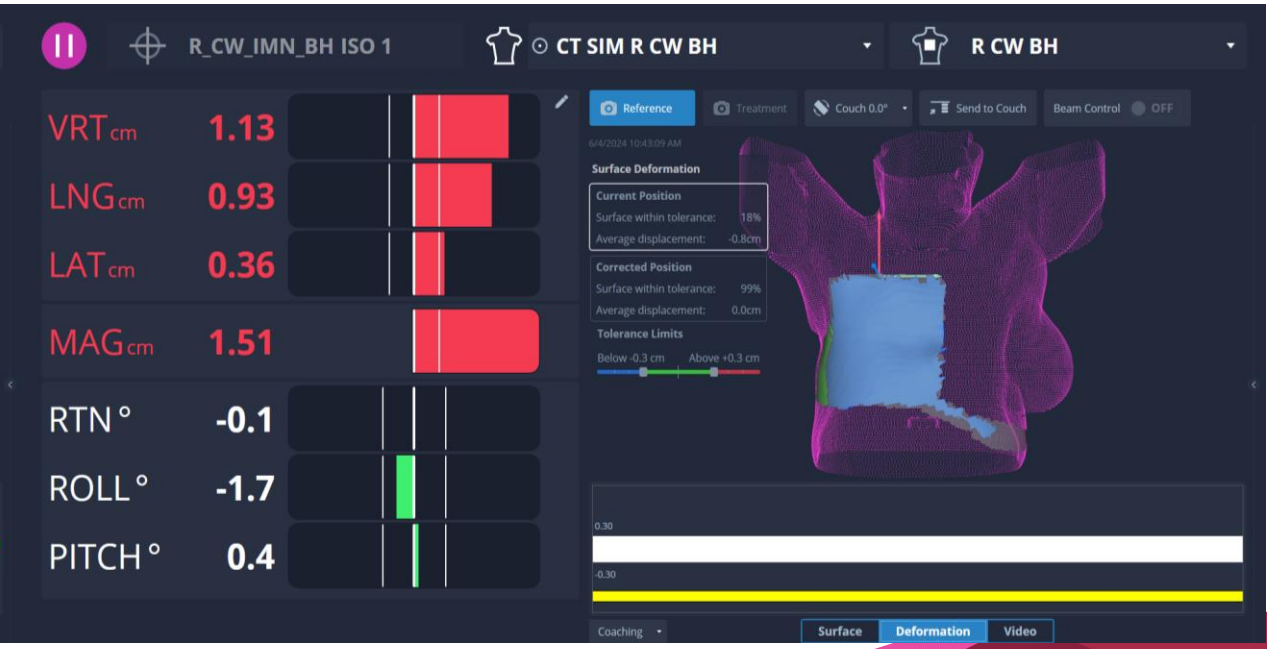
Size ✓

Topography ✓

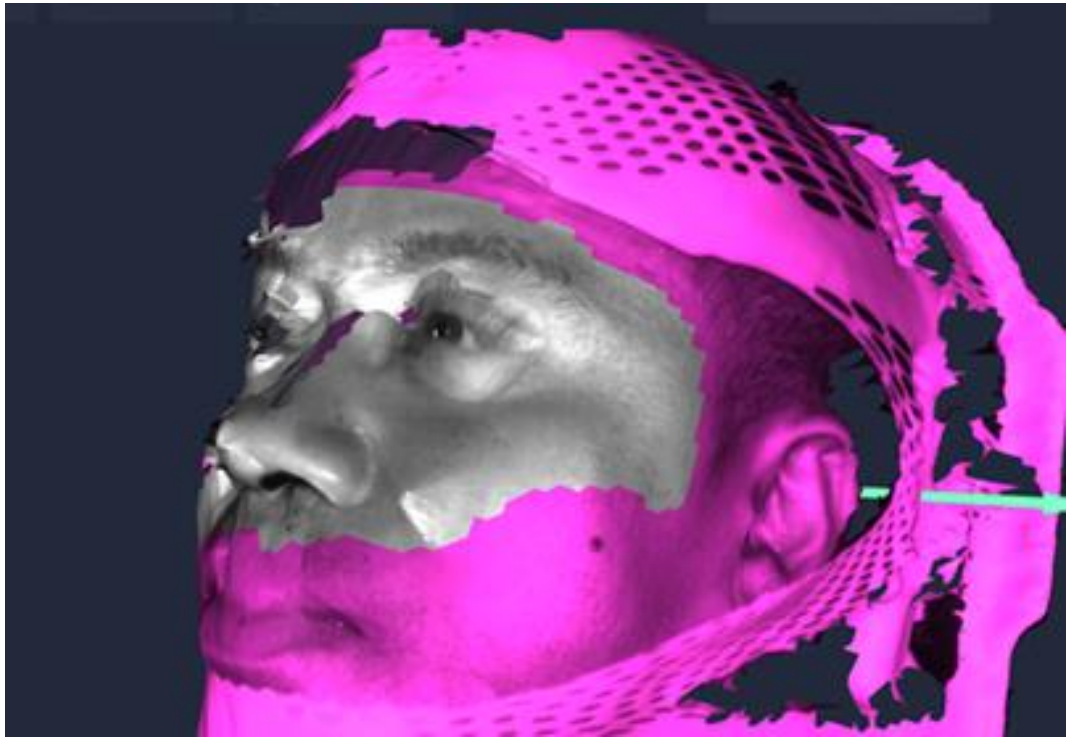

28/08/2019 09:31:21
Surface Deformation
Current Position
Surface within tolerance: 93%
Average displacement: 0.0cm
Corrected Position
Surface within tolerance: 93%
Average displacement: 0.0cm
Tolerance Limits
Below -0.3 cm
Above +0.3 cm
a
b
c
d

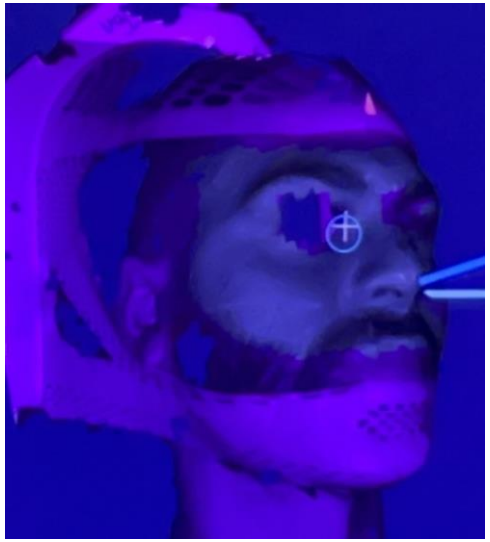

L_Breast_BH ISO 1
CT SIM L breast BH
L breast BH
VRT cm 0.00
LNG cm -0.08
LAT cm -0.06
MAG cm 0.10
RTN ° 0.5
ROLL ° -0.4
PITCH ° 2.7
Reference
Treatment
Couch 0.0°
Send to Couch
Beam Control OFF
Surface Deformation
Current Position
Surface within tolerance: 46%
Average displacement: 0.3cm
Corrected Position
Surface within tolerance: 44%
Average displacement: 0.5cm
Tolerance Limits
Below -0.3 cm
Above +0.3 cm
0.30
-0.30
Coaching
Surface
Deformation
Video


R_CW_IMN_BH ISO 1
CT SIM R CW BH
R CW BH
VRT cm -0.12
LNG cm 0.13
LAT cm -0.02
MAG cm 0.18
RTN ° 1.0
ROLL ° 0.0
PITCH ° 0.6
Reference
Treatment
Couch 0.0°
Send to Couch
Beam Control OFF
Surface Deformation
Current Position
Surface within tolerance: 68%
Average displacement: 0.2cm
Corrected Position
Surface within tolerance: 100%
Average displacement: 0.0cm
Tolerance Limits
Below -0.3 cm
Above +0.3 cm
0.30
-0.30
Coaching
Surface
Deformation
Video


R_CW_IMN_BH ISO 1
CT SIM R CW BH
R CW BH
VRT cm 1.13
LNG cm 0.93
LAT cm 0.36
MAG cm 1.51
RTN ° -0.1
ROLL ° -1.7
PITCH ° 0.4
Reference
Treatment
Couch 0.0°
Send to Couch
Beam Control OFF
Surface Deformation
Current Position
Surface within tolerance: 18%
Average displacement: -0.8cm
Corrected Position
Surface within tolerance: 99%
Average displacement: 0.0cm
Tolerance Limits
Below -0.3 cm
Above +0.3 cm
0.30
-0.30
Coaching
Surface
Deformation
Video

# 3D photo comparison





# Troubleshooting

Camera Occlusion

Jumpy deltas

Error messages

Bolus

Slow response

# Transitioning to Tattoo-less & Mark-less

## Keys To Be Successful

Training

Pilot

Buy in & Support

Implementation Plan

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# Transitioning to Tattoo-less & Mark-less

## Keys To Be Successful

### Training

- VisionRT provided Phase 1, Phase 2, and Phase 3
- “Super Users”
- On site training during “go-live”
- On-going annual training from VisionRT
- Attending SGRT Community Meetings & ASRT RTC presentations on SGRT

# Transitioning to Tattoo-less & Mark-less

## Keys To Be Successful

Pilot

- One body site at a time
- All in

# Transitioning to Tattoo-less & Mark-less

## Keys To Be Successful

Buy in & Support

- Radiation Therapists
- Leadership
- Physics
- Dosimetry
- Physicians

# Suggestions for Implementation Plan

1. **Multi-disciplinary team** - establish protocols and/or Standard Operating Procedures to be followed consistently, before widespread implementation.

2. **SGRT Committee** - Clarify roles, duties, and expectations to further aid in an effective, well-communicated, and supported rollout.

3. **SOPs and Protocols** - SOPs should include every step of the workflow in clearly written, easy-to-follow instructions, from beginning to end.

4. **Reassess and Revise** – SOPs & workflows should be reassessed and revised regularly with increased experience, to establish best practices.

5. **Build Trust with the system** - When learning a new system, it takes time to get comfortable; delays should be expected. However, the more you use the system the more you learn and appreciate the many tools available.

6. **Continuous evaluation**

    a. ROI delineation - Don't get married to those ROIs!

    b. Workflows – establish these based on agreed upon best practices.

    c. Protocol selection – when importing, select the right protocol for what you are treating.

7. **Collaboration with VisionRT Clinical Applications Specialists**

From this


To this

# Summary

## Tattoo & mark free treatments with AlignRT

Can be utilized for both setup and motion management for any treatment site

Submillimeter accuracy in any treatment position

Potential to offer faster and more accurate treatments

Assists with highly complex patient set-ups

With proper training and support any size radiation oncology center can transition successfully.

SGRT is becoming the Standard of Care in Radiation Oncology

Tattoo/mark-free treatments are the next step in the evolution and are the future of our field!

# Thank you!

# Questions?

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REACHING NEW HEIGHTS WITH SGRT

SURFACE GUIDED RADIATION THERAPY
SGRT COMMUNITY

# BREAK