

MotionSim^{XY/4D}TM

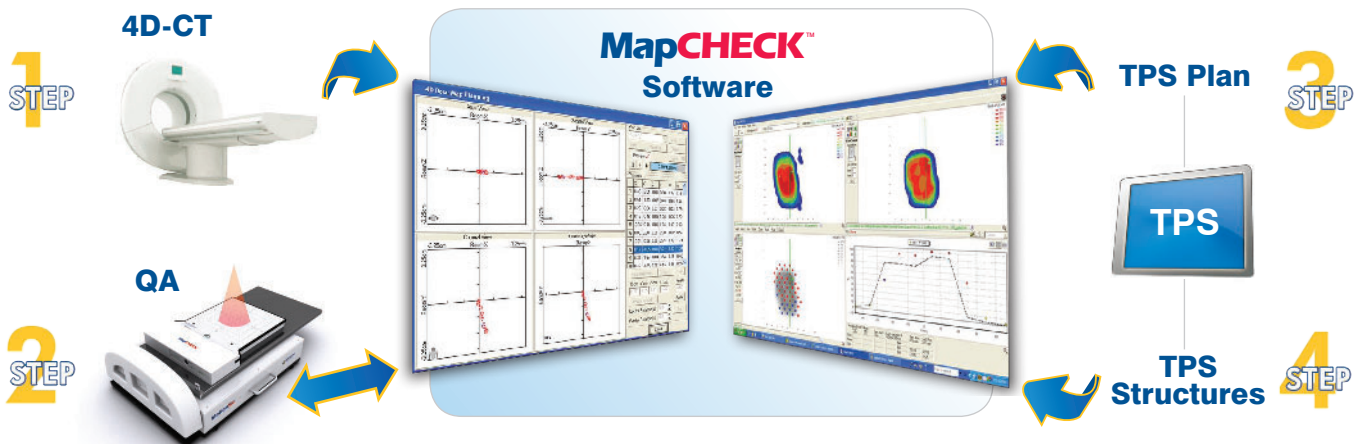
Target Motion, Gating & Imaging QA

The only treatment simulator that reproduces actual target motion obtained from a 4D CT or other methods

The MotionSim Advantage

- Only commercial 3D motion simulator
- Reproduces *actual* target and surrogate motion
 - BEV specific respiratory trace using 4D CT or other methods
- Use with MapCHECKTM and MapCHECK 2TM
- Assess interplay effects in MLC based IMRT QA
 - Analyze intra-fractional target motion effects on dose distribution
- Verify gating and 4D CT systems
- Compare gated versus non-gated delivery
 - Gating surrogates: Markers, and pressure belts
- Optimize duty cycles - Minimize delivery variations
- Increase MapCHECK detector density
- Position MapCHECK or MapCHECK 2 for MLC QA

MotionSim Workflow



Features and Specifications

Use Case 1: Commission a gating system

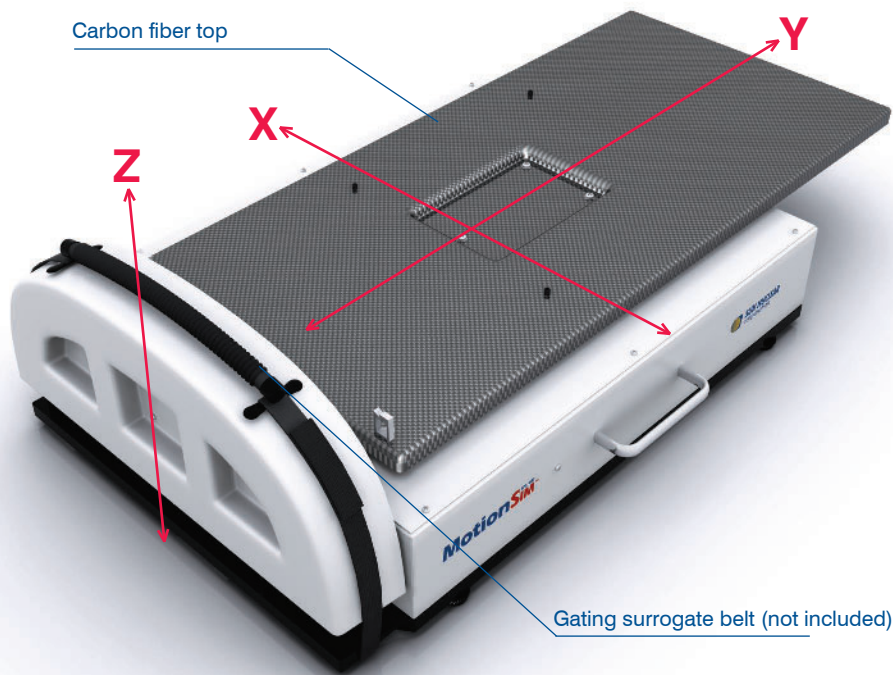
A non-gated delivery is input to an in-motion MapCHECK driven by a pre-selected motion kernel. A duty cycle is defined for the gated beam. Then the same dose is delivered to an in-motion MapCHECK. The non-gated delivery should yield a blurry motion with a poor comparison to the TPS, whereas the gated results should be significantly more desirable if the system is functioning correctly.

Use Case 2: Dose QA for moving targets (with gating)

Prescription dose to the target (PTV) can be compromised due to the effect of internal target motion. The PTV travels along a motion path which defines the internal target volume (ITV). MotionSim simulates the ITV, so that true dose to the PTV can be assessed. PTV dose may appear to pass with stationary QA, however adding MotionSim provides true ITV motion, and confidence.

Use Case 3: Access interplay effects in MLC-based IMRT
Determining the interplay effect in MLC-based IMRT is significant for a given patient plan and target motion. Not taking the interplay effect into consideration during treatment can lead to significant non-uniform fraction-to-fraction dose delivery to the target, further putting the integrity of delivery at risk. Assess the interplay effect by comparing gated and non-gated fraction-to-fraction results against the TPS to determine delivery discrepancies.

Use Case 4: Commission Varian's new TrueBeam™
Test TrueBeam's ability to detect and follow spontaneous patient movement to access TrueBeam's accuracy in tracking motion in relation to stereotactic treatment.



For use with:
MapCHECK™



MapCHECK 2™



Table

Platform:	Carbon fiber
Maximum travel:	X-Axis: 4in (10.2cm); Y-Axis: 4in (10.2cm)
Motors:	2 phase bipolar steppers
Max velocity:	2in / second (5.08 cm/second)
Resolution:	0.13μm
Repeatability:	0.13μm bidirectional
Communication:	RS-232, 19,200kbps
Dimensions:	22.7 x 19.12 x 9.0in (57.7 x 48.5 x 22.9cm)
Weight:	33.4lb (15kg)
Power:	100-240V, single-phase, 47-63Hz, 4A

Gating Surrogate

Type:	Independent linear positioner
Max travel:	2in (5.08 cm)
Motor:	2 phase bipolar stepper
Max velocity:	0.5in / second (1.27cm /second)
Resolution:	0.02μm
Repeatability:	5.0μm bidirectional
Surrogate:	<ul style="list-style-type: none"> • Varian RPM marker block • Siemens and Elekta belts

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