Mini-checkpoint Presentation
A New Generation of Quality Assurance
For Radiation Oncology

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April 29, 2014
1. Project Overview

Design and release a commercial software for Raven QA which includes: Image Acquisition; Image Processing; Motor Control; User Workflow Guidance.

- Semi-transparent phosphorus screen
- Neutron/x-ray shielding
- Optical path
- CCD camera

Second Prototype
1. Project Overview: What do we do in QA?

Light field with ODI
Room Lateral Laser
6 MV x-ray at dmax
12 MeV electron at dmax
2. Deliverables Status

- **Minimum Deliverables:**
  - Image Acquisition
    - Camera Correction
      - Alignment Map Done
      - Distortion Map (New) Done
      - Uniformity Map (New) In Progress
    - Image Processing Done
    - Motor Controlling
      - Step Motor Control Done
      - Inclinometer Control Waiting for the device
  - Motor Controlling

- **Expected Deliverables:**
  - 3D Rendering Done
  - Workflow Guidance Done
  - Report Generation Done

- **Maximum Deliverables:**
  - Internet Local database Done
  - Software Documentation Draft Done
  - Auto-alignment Map (New) Done
3. Distortion Map & Uniformity Map

Points Position Shift: Distortion Map

Points Greyscale Shift: Uniformity Map

Distortion map and Uniformity map is fixed. They can be generated manually.
Alignment map changes when the QA box rotates very frequently, so it must be regenerated every time before our QA.
4. Auto-alignment Map

Before Alignment

After Alignment

Manual Alignment Map
4. Auto-alignment Map

Algorithm:
QA Box Rotation
Capture Images
Pre-filter
Hough Algorithm
Point Cloud Regist

Time Cost:
Monthly: 3 min (Rough Check)
Yearly: ~15 min (Fine Check)
5. Image Processing

**MLC Collimator Rotation Test**

**Energy Comparison Test**

**Flatness and Symmetry Test**

- Facility
- Machine
- Month
- **Mechanicals/Optical**
  - Collimator Rotation
  - Gantry Rotation
  - Table Rotation
  - Table Longitudinal Movement
  - Table Lateral Movement
  - Table Vertical Movement
  - Light Field
  - Laser Coincidence
- **Radiation**
  - Light Field Radiation Coincidence
  - Collimator Rotation
  - Gantry Rotation
- **Output**
  - Photons
  - Electrons
- **Energy Check**
  - Photons
  - Electrons
- **Flatness and Symmetry**
  - Photons
  - Electrons

Machine Setup

Energy: 6MV

Existing Templates: 6MV

Create Machine

Delete Machine

Raven QA

Display Parameters:
- Light Field Radiation Coincidence
- Collimator Rotation
- Gantry Rotation
- Table Rotation

Flatness and Symmetry Photons
Flatness and Symmetry Electrons

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Flatness and Symmetry Photons
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8. Summary

• Falls behind schedule, over estimates shipping speed.

• Cross-check with other QA products is needed.

• Documents and software manual are needed.

• A demo for QA Box and Software will be shown on AAPM 2014 in July.
Thanks for your attention!

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