MLC Positions Decode

TEL, DICOM, MOSAIQ, and More

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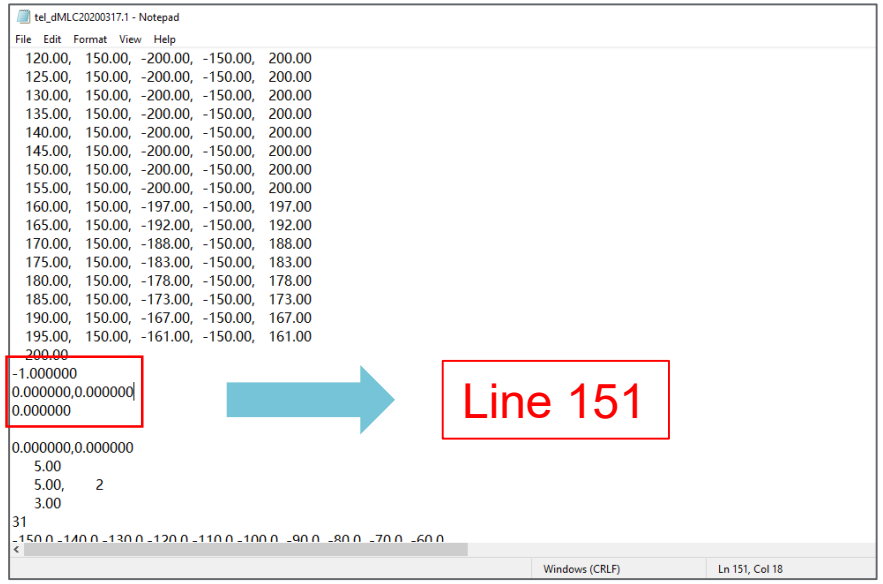
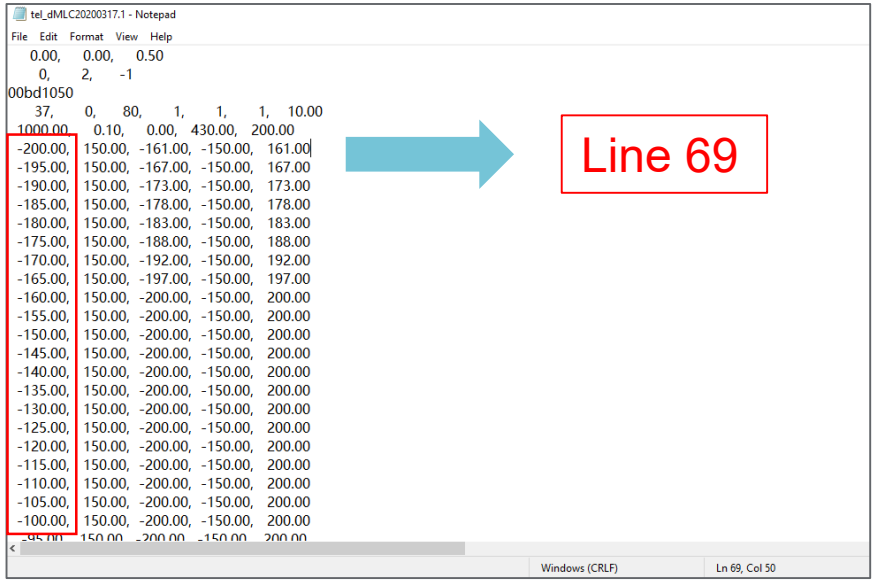
TEL File Decode

1. MLC Bound

- The segment and beam information is written in an incremental order in the tel file.
  - Beam1: Segment #1, #2, #3, …; Beam2: Segment #1, #2, #3, …; Beam3: Segment #1, #2, #3, …
  - All position information is in mm.
- To find the MLC bound information of each beam, locate the following indicator:
  - Line(i), where line(i-1) = “-1.000000”, line(i) = “0.000000,0.000000”, line(i+1) = “0.000000”.
  - The MLC bound info of this beam begins at line(i-2-number of leaf pairs): the first number of each line is the MLC bound location.





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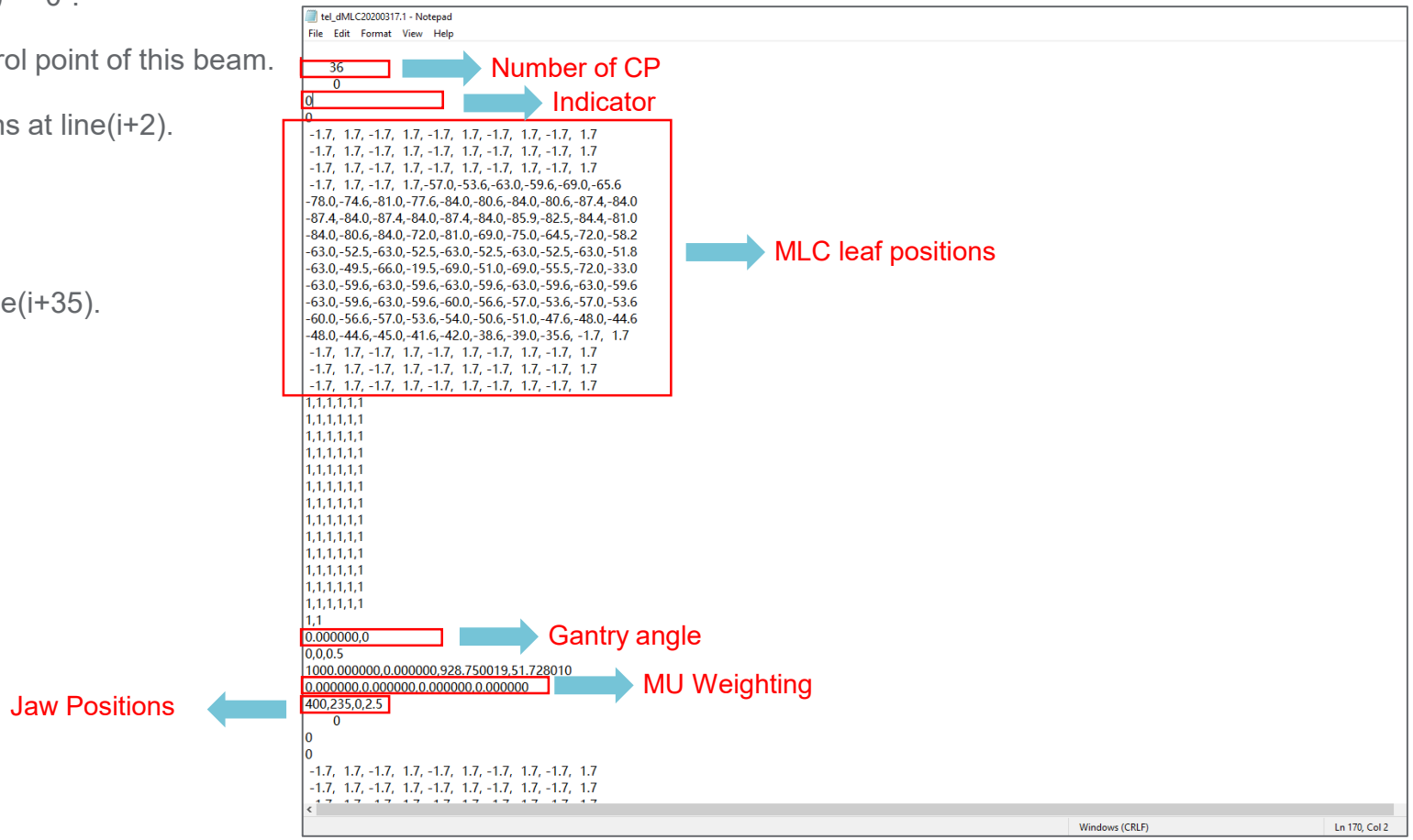
TEL File Decode

2. MLC leaf positions at each control point

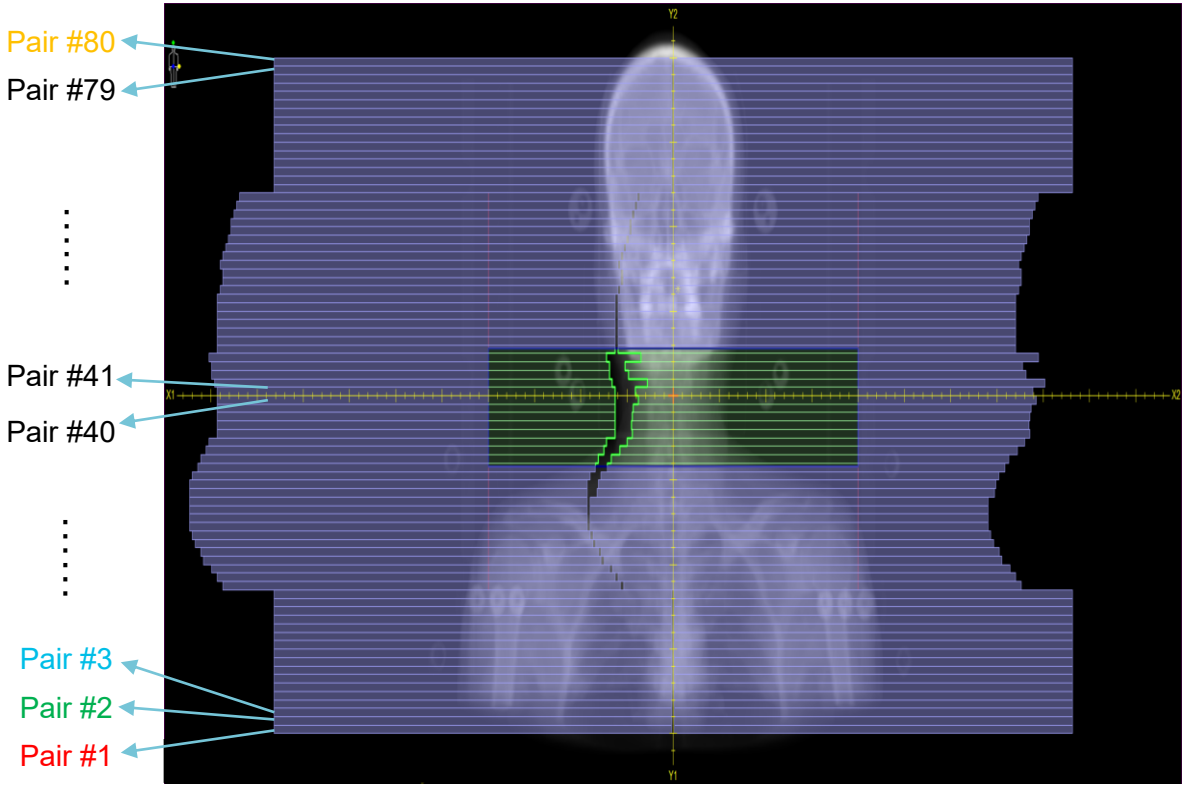
- To find the MLC leaf positions of each control point, locate the following indicator:
  - Line(i), where line(i-1) = “ 0”, line(i) = “0”, line(i+1) = “0”.
  - The number at line (i-2) indicates the number of control point of this beam.
  - The MLC leaf position info of each control point begins at line(i+2).
  - The gantry angle position is recorded at line(i+32).
    - The 2nd number of line(i+32) represents the gantry angle (in degree)
  - The MU of one control point and its weighting is at line(i+35).
    - The 1st number of line(i+35) is the MU delivered at this control point
    - The 4th number of line(i+35) indicates the MU weighting
  - The jaw position information is recorded at line(i+36).
    - 1st number: the distance between 2 jaws in the x-direction
    - 2nd number: the distance between 2 jaws in the y-direction
    - 3rd number: the center location of x jaws
    - 4th number: the center location of y jaws



TEL File Decode

2. MLC leaf positions at each control point

- Correlate the TEL MLC leaf positions with Monaco display
  - The TEL MLC positions are written in a order representing the **leaf pair number**: 1st and 2nd number is the position of left leaf and right leaf of pair #1 respectively, 3rd and 4th is pair #2, 5th and 6th is pair #3, etc.
  - The positions indicate the **right end of leaves at the left band** or **left end of leaves at the right band**.



tel_dMLC20200317.1 - Notepad

File Edit Format View Help

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Pair #1 Pair #2 Pair #3

-1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7
-1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7
-1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7
-1.7, 1.7, -1.7, 1.7,-57.0,-53.6,-63.0,-59.6,-69.0,-65.6
-78.0,-74.6,-81.0,-77.6,-84.0,-80.6,-84.0,-80.6,-87.4,-84.0
-87.4,-84.0,-87.4,-84.0,-87.4,-84.0,-85.9,-82.5,-84.4,-81.0
-84.0,-80.6,-84.0,-72.0,-81.0,-69.0,-75.0,-64.5,-72.0,-58.2
-63.0,-52.5,-63.0,-52.5,-63.0,-52.5,-63.0,-52.5,-63.0,-51.8
-63.0,-49.5,-66.0,-19.5,-69.0,-51.0,-69.0,-55.5,-72.0,-33.0
-63.0,-59.6,-63.0,-59.6,-63.0,-59.6,-63.0,-59.6,-63.0,-59.6
-63.0,-59.6,-63.0,-59.6,-60.0,-56.6,-57.0,-53.6,-57.0,-53.6
-60.0,-56.6,-57.0,-53.6,-54.0,-50.6,-51.0,-47.6,-48.0,-44.6
-48.0,-44.6,-45.0,-41.6,-42.0,-38.6,-39.0,-35.6, -1.7, 1.7
-1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7
-1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7
-1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7, -1.7, 1.7 Pair #80
1,1,1,1,1,1
1,1,1,1,1,1
1,1,1,1,1,1
1,1,1,1,1,1
1,1,1,1,1,1
1,1,1,1,1,1

Windows (CRLF) Ln 172, Col 1

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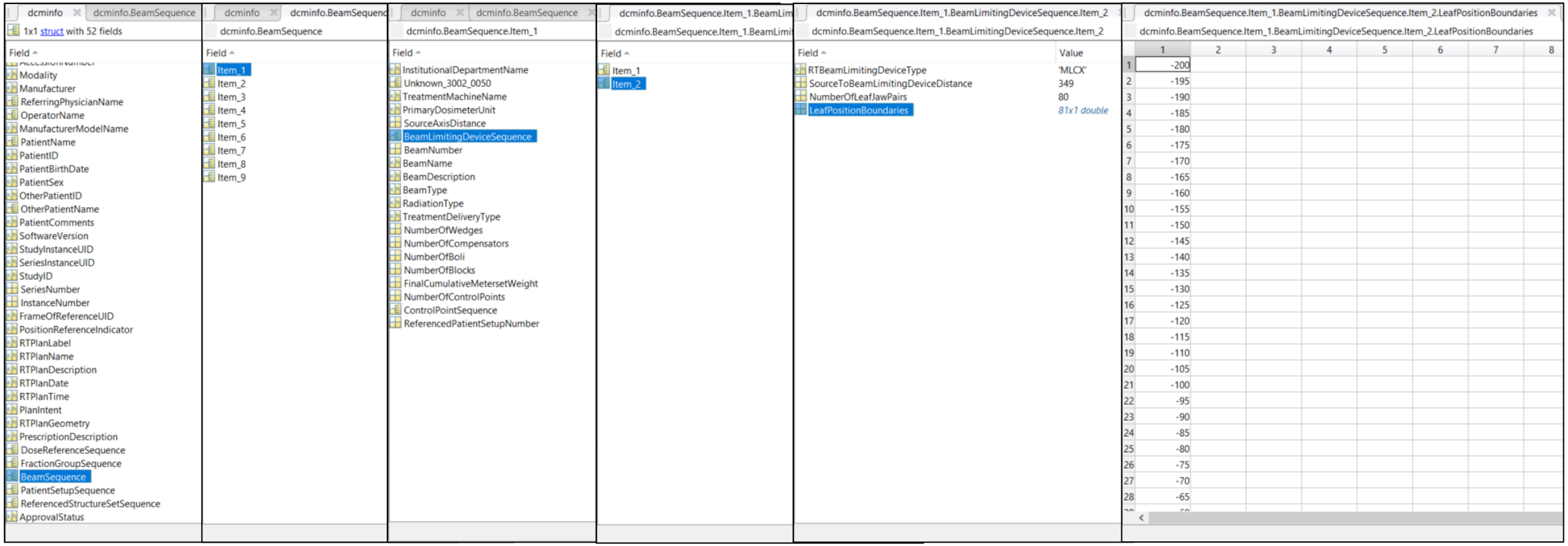
DICOM File Decode

1. MLC Bound

- The DICOM example shown here is read with ‘dicomread()’ function in MATLAB.
- Similar functions can be found in Python (pydicom) or realized via DICOMPYLER app.



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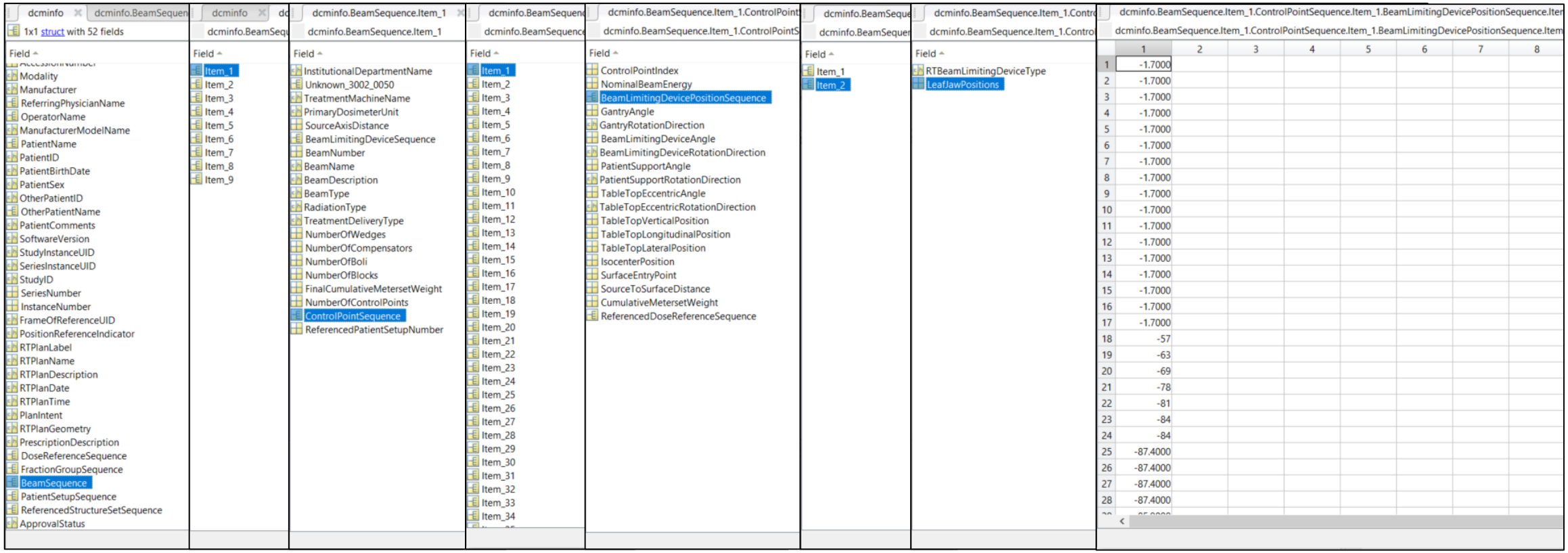
DICOM File Decode

2. MLC leaf positions at each control point

- The MLC leaf positions information is stored at the following path:



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DICOM File Decode

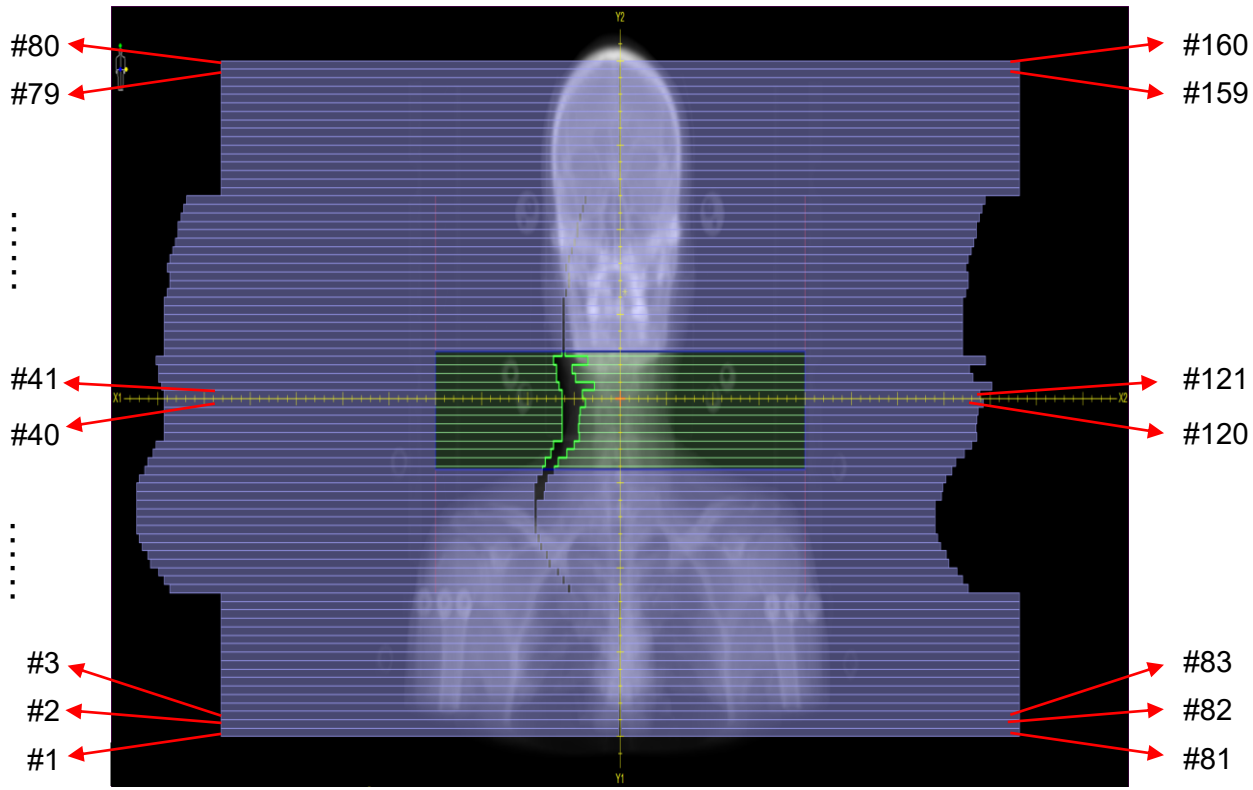
2. MLC leaf positions at each control point

- Correlate the DICOM MLC leaf positions with Monaco display

dcminfo.BeamSequence.Item_1.ControlPointSequence.Item_1.BeamLimitingDevicePositionSequence.Iten

dcminfo.BeamSequence.Item_1.ControlPointSequence.Item_1.BeamLimitingDevicePositionSequence.Item

	1	2	3	4	5	6	7	8
1	-1.7000							
2	-1.7000							
3	-1.7000							
4	-1.7000							
5	-1.7000							
6	-1.7000							
7	-1.7000							
8	-1.7000							
9	-1.7000							
10	-1.7000							
11	-1.7000							
12	-1.7000							
13	-1.7000							
14	-1.7000							
15	-1.7000							
16	-1.7000							
17	-1.7000							
18	-57							
19	-63							
20	-69							
21	-78							
22	-81							
23	-84							
24	-84							
25	-87.4000							
26	-87.4000							
27	-87.4000							
28	-87.4000							



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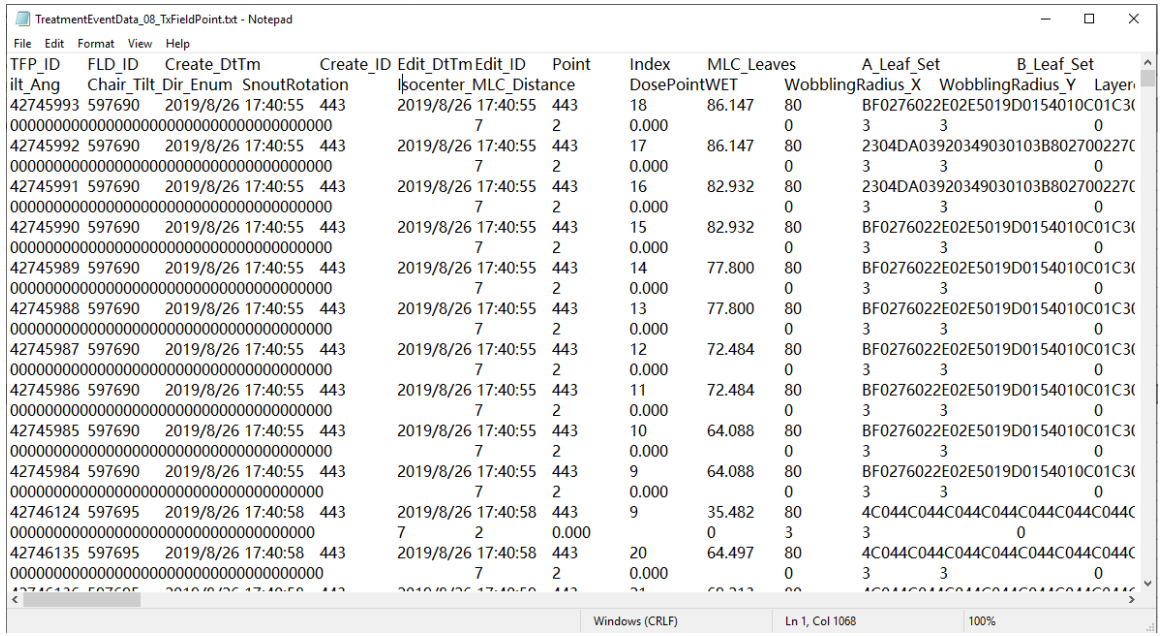
MOSAIQ Log File Decode

1. MOSAIQ Log File Read

- The MOSAIQ machine will store plan data in a unique format:
  - Each line in the text file records the information of one treatment segment and can be read by the following commands。

```
filename = 'TreatmentEventData_08_TxFieldPoint.txt';
opts = detectImportOptions(filename,'NumHeaderLines',0);
T = readtable(filename,opts);
```

  - The **cumulative** MU of each segment is in the “Index” column: $MU_i = Index_i - Index_{i-1}$.
  - The gantry angle is in “Gantry_Ang” column.
  - Jaw positions are in the “Coll_X1”, “Coll_X2”, “Coll_Y1”, “Coll_Y2” columns.
  - Individual leaf positions are in “A_Leaf_Set_Convert” and “B_Leaf_Set_Convert”.



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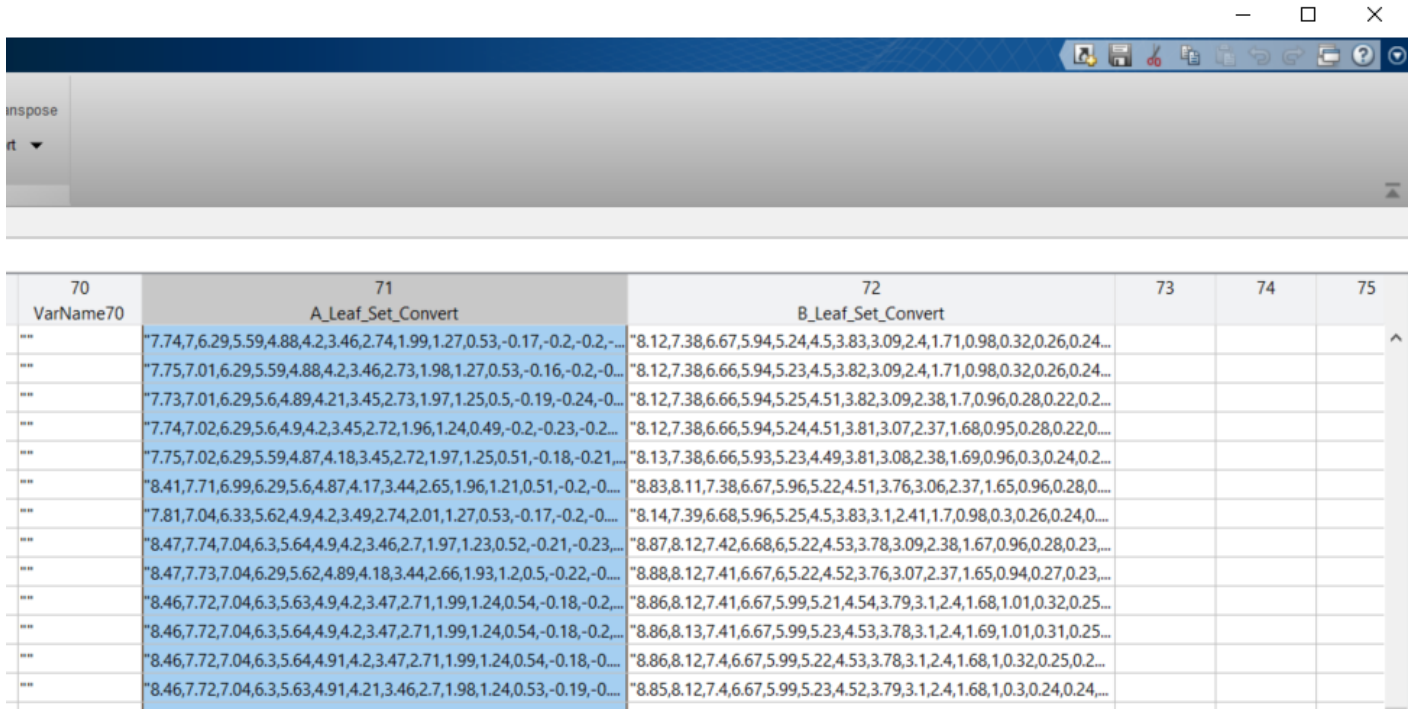
MOSAIQ Log File Decode

2. MLC leaf positions at each control point

- Individual leaf positions are stored in “A_Leaf_Set_Convert” and “B_Leaf_Set_Convert”
  - “A_Leaf” indicates the leaf of the leading band: from leaf #1 to leaf #80.
  - “B_Leaf” is the trailing band of the same segment: from leaf #81 to #160.



70 VarName70	71 A_Leaf_Set_Convert	72 B_Leaf_Set_Convert	73	74	75
""	"7.74,7,6.29,5.59,4.88,4.2,3.46,2.74,1.99,1.27,0.53,-0.17,-0.2,-0.2,-...	"8.12,7.38,6.67,5.94,5.24,4.5,3.83,3.09,2.4,1.71,0.98,0.32,0.26,0.24...			
""	"7.75,7.01,6.29,5.59,4.88,4.2,3.46,2.73,1.98,1.27,0.53,-0.16,-0.2,-0...	"8.12,7.38,6.66,5.94,5.23,4.5,3.82,3.09,2.4,1.71,0.98,0.32,0.26,0.24...			
""	"7.73,7.01,6.29,5.6,4.89,4.21,3.45,2.73,1.97,1.25,0.5,-0.19,-0.24,-0...	"8.12,7.38,6.66,5.94,5.25,4.51,3.82,3.09,2.38,1.7,0.96,0.28,0.22,0.2...			
""	"7.74,7.02,6.29,5.6,4.9,4.2,3.45,2.72,1.96,1.24,0.49,-0.2,-0.23,-0.2...	"8.12,7.38,6.66,5.94,5.24,4.51,3.81,3.07,2.37,1.68,0.95,0.28,0.22,0....			
""	"7.75,7.02,6.29,5.59,4.87,4.18,3.45,2.72,1.97,1.25,0.51,-0.18,-0.21,...	"8.13,7.38,6.66,5.93,5.23,4.49,3.81,3.08,2.38,1.69,0.96,0.3,0.24,0.2...			
""	"8.41,7.71,6.99,6.29,5.6,4.87,4.17,3.44,2.65,1.96,1.21,0.51,-0.2,-0....	"8.83,8.11,7.38,6.67,5.96,5.22,4.51,3.76,3.06,2.37,1.65,0.96,0.28,0....			
""	"7.81,7.04,6.33,5.62,4.9,4.2,3.49,2.74,2.01,1.27,0.53,-0.17,-0.2,-0....	"8.14,7.39,6.68,5.96,5.25,4.5,3.83,3.1,2.41,1.7,0.98,0.3,0.26,0.24,0....			
""	"8.47,7.74,7.04,6.3,5.64,4.9,4.2,3.46,2.7,1.97,1.23,0.52,-0.21,-0.23,...	"8.87,8.12,7.42,6.68,6,5.22,4.53,3.78,3.09,2.38,1.67,0.96,0.28,0.23,...			
""	"8.47,7.73,7.04,6.29,5.62,4.89,4.18,3.44,2.66,1.93,1.2,0.5,-0.22,-0....	"8.88,8.12,7.41,6.67,6,5.22,4.52,3.76,3.07,2.37,1.65,0.94,0.27,0.23,...			
""	"8.46,7.72,7.04,6.3,5.63,4.9,4.2,3.47,2.71,1.99,1.24,0.54,-0.18,-0.2,...	"8.86,8.12,7.41,6.67,5.99,5.21,4.54,3.79,3.1,2.4,1.68,1.01,0.32,0.25...			
""	"8.46,7.72,7.04,6.3,5.64,4.9,4.2,3.47,2.71,1.99,1.24,0.54,-0.18,-0.2,...	"8.86,8.13,7.41,6.67,5.99,5.23,4.53,3.78,3.1,2.4,1.69,1.01,0.31,0.25...			
""	"8.46,7.72,7.04,6.3,5.64,4.91,4.2,3.47,2.71,1.99,1.24,0.54,-0.18,-0....	"8.86,8.12,7.4,6.67,5.99,5.22,4.53,3.78,3.1,2.4,1.68,1,0.32,0.25,0.2...			
""	"8.46,7.72,7.04,6.3,5.63,4.91,4.21,3.46,2.7,1.98,1.24,0.53,-0.19,-0....	"8.85,8.12,7.4,6.67,5.99,5.23,4.52,3.79,3.1,2.4,1.68,1,0.3,0.24,0.24,...			

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