PocketLFC – The minimal LogFileCalculator V1.0 by H.Krauss (KFJ)

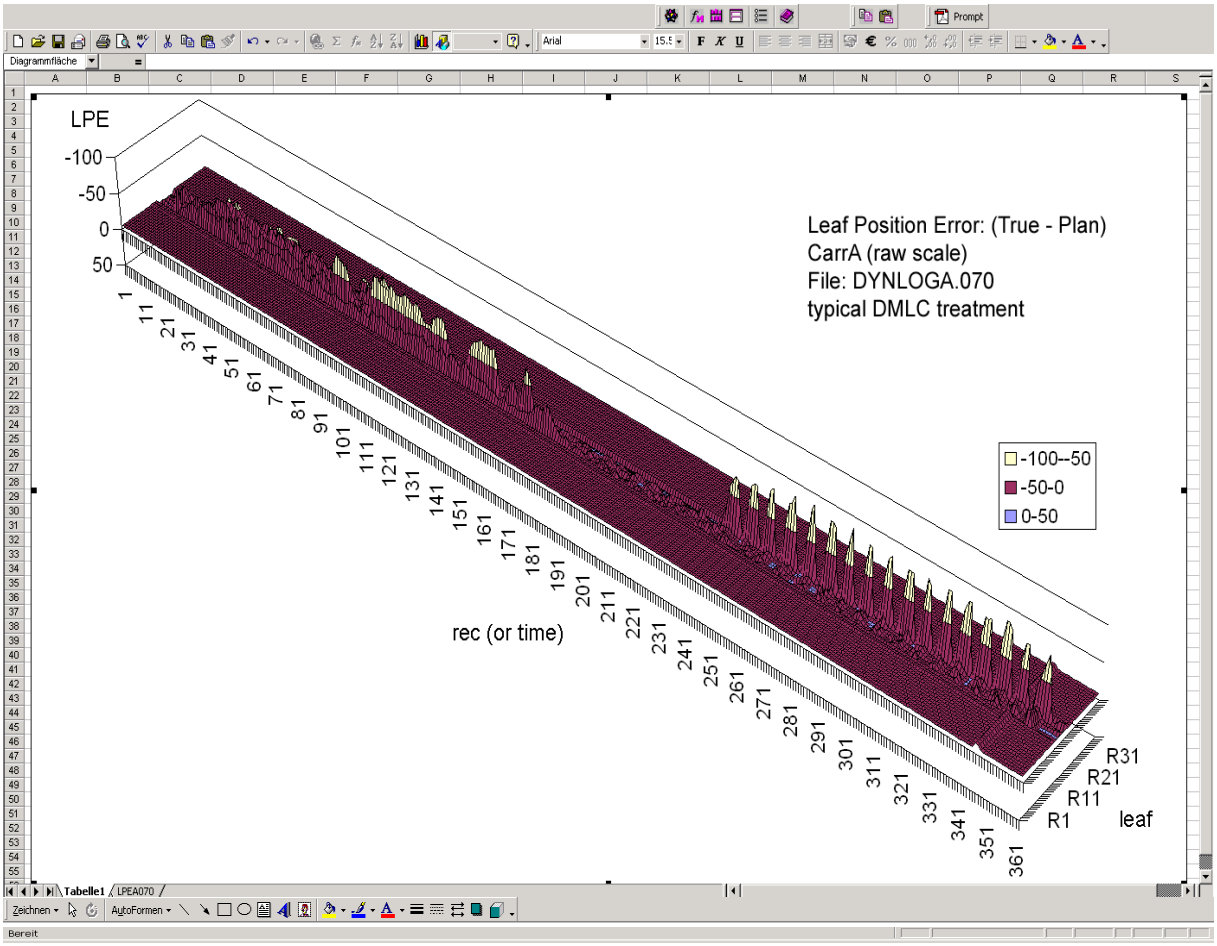
Purpose: to get leaf position errors (defined as TrueLeafPosition – PlannedLeafPosition) for each leaf as quickly as possible when analyzing the DYNALOG files of DMLC treatments.

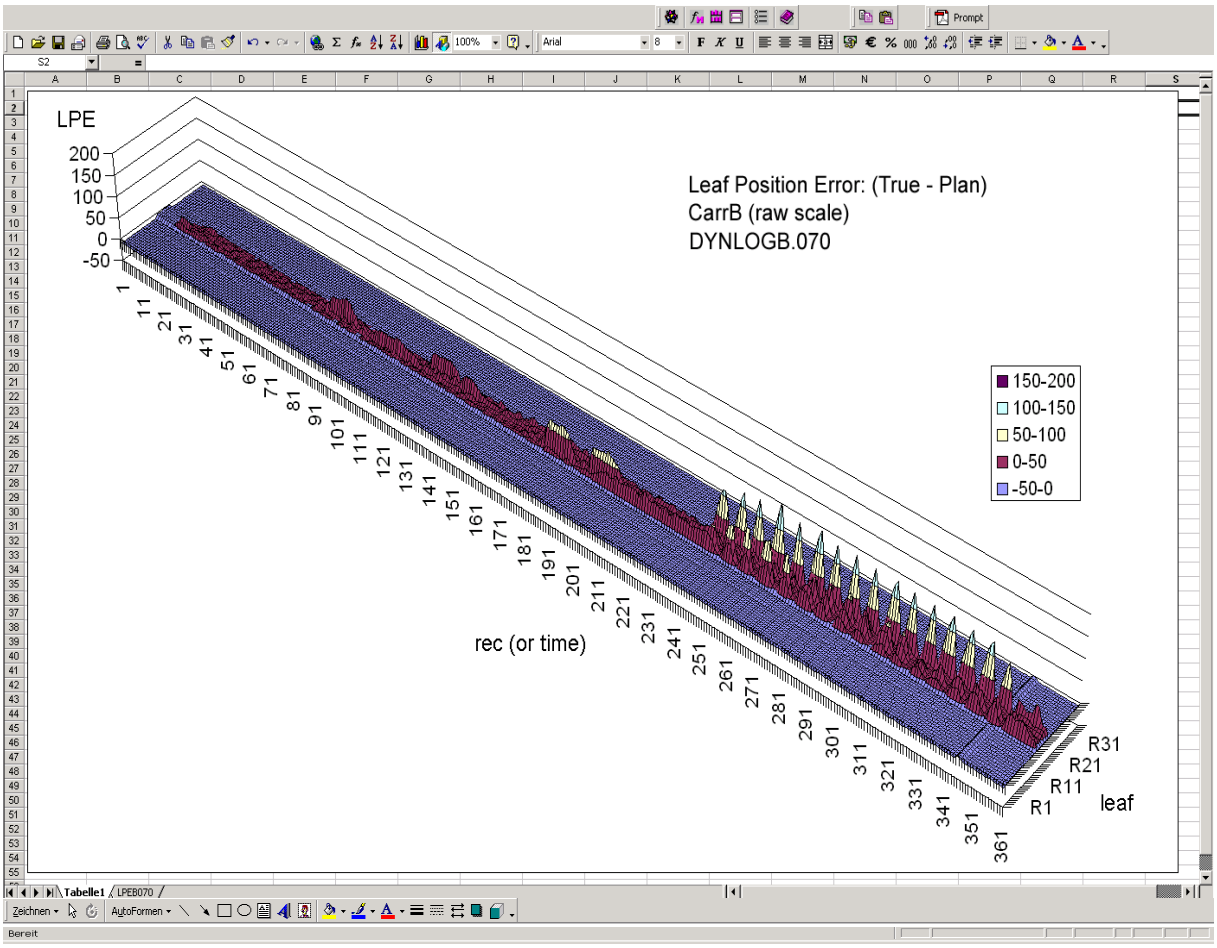
Principle: the logfiles are stored on the MLC Controller and transferred to the PC via floppy. They are put in the same directory as the file PocketLFC.exe. The logfiles must not be modified. The exe is started and asks for the file extension of the logfiles (e.g., 123 for DYNLOGA.123 and DYNLOGB.123). Then the program creates two textfiles: LPEA123.csv and LPEB123.csv, which contain the leaf position errors. By double-clicking each csv file, Excel usually starts and imports the data. In Excel, data is then further explored and visualized by line plots or surface plots (see example). The analysis itself is described in a separate document (tutorial.doc). In the current document you are reading, only a quick overview is given.

LPExyyy.csv file description: as with the dynalog files, each line of the file contains a new record (position sample every 50ms) and the columns stand for the leaves. Therefore, the file contains 40 columns and as many rows as there are records in the dynalog files on an 80-leaf MLC. The row number divided by 20 gives the treatment time in seconds. The values are leaf position errors in raw scale: 100 means 1mm at MLC level. If distances are required at Isocenter distance, they must be scaled with a rather odd factor that can be found in the MLC calibration files. In order to get mm at isocenter, the raw values must be divided by 50.86108. Usually it is more convenient to work in raw scale.

Leaf windup: depending on the test, carriages A and B may be treated and checked separately or together. If opposing leaves are close to each other, a windup effect takes place: leaves may seem to overlap (which is certainly not possible). If leaves are pressed against each other, the mechanical parts of the MLC tolerate some windup. This may be checked by calculating the sum of the leaf positions of leaf A and leaf B. If the sum is negative, there is windup. Both leaf positions are counted positive from the centreline outwards, and if the positions should be A=0 and B=0 according to the leaf plan, the reading is usually A=-7 and B=-7, so they seem to overlap by roughly 0.14mm. This must be taken into account when test patterns are treated that contain closed leaf pairs.

Example: these are the LPE plots for a typical DMLC treatment, first for carriage A, then for B, generated in the way described in the beginning. Only some leaf pairs are moving (18 – 24). This is a typical clinical treatment, where leaves move from left to right (when looking at the Shaper). But I only mention this here for completeness. When looking at the LPE plots, it cannot be said in which direction the leaves were moving. The files contain 360 records, treatment time therefore is 18 seconds.
Note that the vertical scale (the LPE) of CarrA is reversed. Since the LPE values of the moving leaves (in the central part) are mostly negative for CarrA (that means that they are always behind their planned values), the peaks would be hidden by the surface. So this has only display reasons.
The B leaves are also behind their planned values, but this leads to positive leaf position errors, since leaves move from left to right, but the positive counting direction is right to left for CarrB.
Note also the small bump on both plots near the end of the treatment, which affects all leaves. The reason for this is not yet fully understood.


LPE
-100
-50
0
50
Leaf Position Error: (True - Plan)
CarrA (raw scale)
File: DYNLOGA.070
typical DMLC treatment
-100--50
-50-0
0-50
rec (or time)
R31
R21
R11
R1
leaf


LPE
200
150
100
50
0
-50
Leaf Position Error: (True - Plan)
CarrB (raw scale)
DYNLOGB.070
150-200
100-150
50-100
0-50
-50-0
rec (or time)
R31
R21
R11
R1
leaf