

Contents

1	Introduction	3
2	Literature Overview	5
2.1	Introduction	5
2.2	Clinical Literature	5
2.3	Technical Literature	6
2.3.1	Multileaf Collimator	7
2.3.2	Design of Individual Leaves	7
2.3.3	Leaf Position Detection and Data Transfer	8
2.3.4	Control System and Control Loops	10
3	Hypothesis & Goals	13
4	Materials & Methods	15
4.1	Hardware	15
4.1.1	C167CR microcontroller	18
4.1.2	Safety microcontroller	19
4.1.3	Control Computer	19
4.1.4	Softing PCI-CAN interface	20
4.2	Software	20
4.2.1	Development Environment	20
4.2.2	Microcontroller Firmware	21
4.2.3	Control Software	23
4.2.3.1	libCOSMICrtcan	23
4.2.3.2	COSMICrt	23
4.2.4	Control Loops	26
4.2.5	Real-time operating system - Safety	28
4.3	Test Setup	29
4.3.1	4D Phantom	30
4.3.2	Artificial Tracking Signal	31
4.3.3	Radiation Measurement	31
4.3.4	MLC Setup	31
4.4	Data Analysis	33
4.4.1	Timing Analysis	33

4.4.2	Dose Measurements	34
5	Results	37
5.1	Timing Analysis	37
5.2	Dose Measurements	41
6	Discussion	45
6.1	Methods	45
6.2	Results	47
7	Conclusions	49

Collimator-Based Tracking with an Add-On Multileaf
Collimator

Modification of a commercial collimator system for
realtime applications

Böhler, A.

2016, XIV, 53 p. 18 illus., 14 illus. in color., Softcover

ISBN: 978-3-658-10657-7