



Flex PLI: Detailed Review of Drawing Package and Itemized Check against Master Leg Impactor SN03

**7th Meeting of Informal Group GTR9 Phase 2
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- Background
- Performed Work
- Results
 - Review of Drawing Package
 - Check against Master Leg SN03
 - Comments / Relevance
 - Certifications before/after drawing review
- Summary
- Annex
 - Detailed drawing review table
 - Certification curves

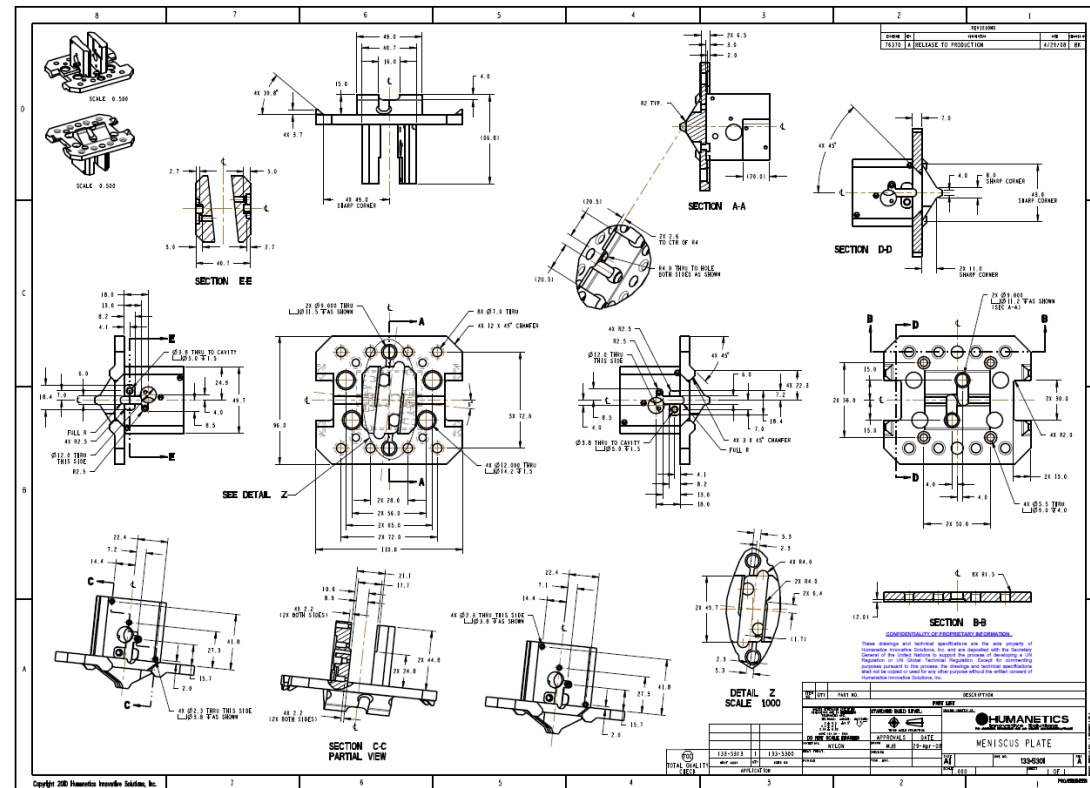
Tasks of IG GTR9-PH2:

- Review of complete drawing package provided by manufacturer
 - Drawing set complete?
 - Information on drawings complete?
 - Any unclear information?
- Consistency check against hardware impactor
 - Dimensions
 - Materials
 - Assemblies
 - Differences



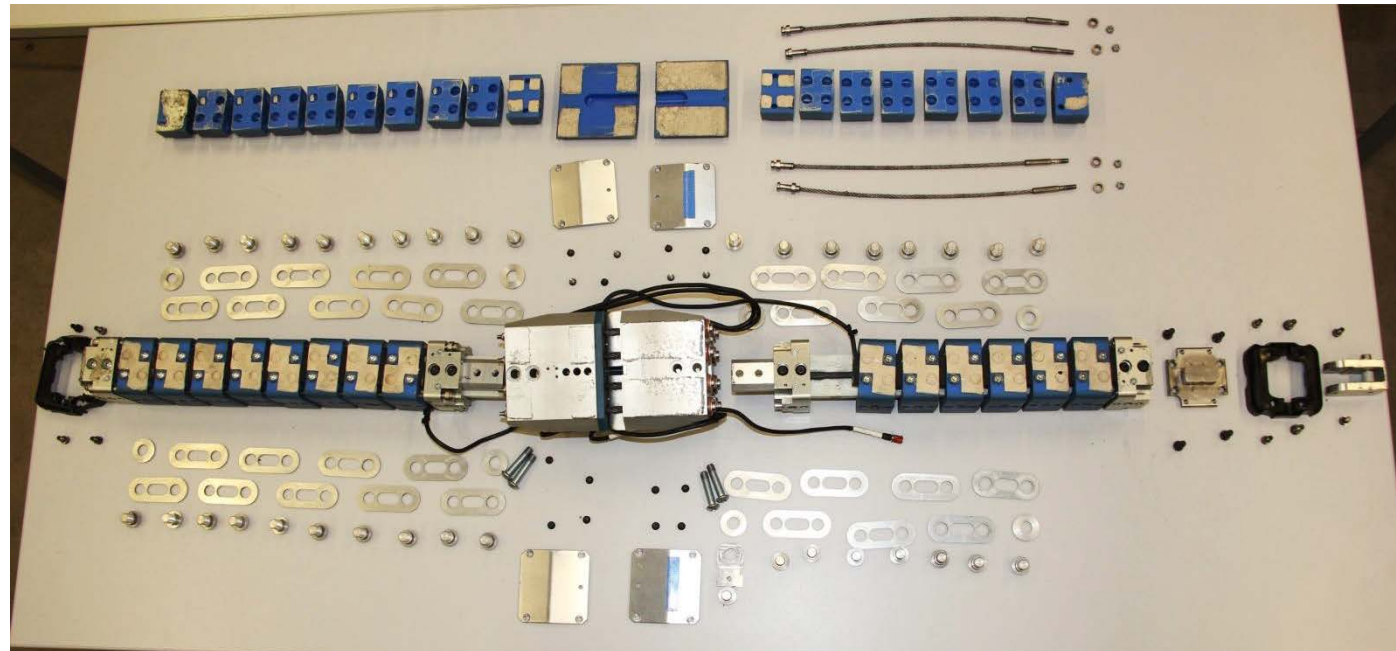
- Drawings preparation
 - Printing of all drawings in A4
 - Sort and list drawings
 - Plotting of large drawings in A1

Drawing (example):



- Impactor preparation (SN03):
 - Inverse certification test
 - Pendulum certification test
 - Complete impactor disassembly

Partly
disassembled
impactor:





- Drawing review and consistency check:
Examination work done with each drawing
 1. Compare drawing number and drawing description with drawing object
 2. Record drawing revision level
 3. Check whether all dimensions of the drawing object are provided
 4. Check all dimensions against the corresponding part of Flex PLI Master Leg SN03
 5. Check the materials against the material of the corresponding part of SN03
 6. Check whether any information on drawing is unclear
 7. Record any further comment



- Subsequent work with impactor SN03:
 - Complete impactor re-assembly incl. all adjustments
 - Inverse certification test
 - Pendulum certification test
- Documentation
 - Table including detailed information about each drawing
 - Time curves and results table of certification tests

Detailed table (see annex) including information about each drawing, with following columns:

- Drawing no.
- Drawing description
- Drawing no. and description correct?
- Revision level
- All dimensions provided?
- All dimensions checked against SN03?
- Materials checked against SN03?
- Any unclear information?
- Comments
- Relevance

Summary of table details:

- Drawing no. / Description / Drawing no. and description correct? / Revision level
 - 112 drawings were reviewed
 - Each drawing no. and drawing description is correct and matches the corresponding item
 - The references provided in tables of several overview or assembly drawings were also correct.
 - The revision level of all (!) drawings is “A”



Summary of table details:

– All dimensions provided?

- In nine drawings one or more dimensions were missing.
- Some of the missing information can be obtained from other drawings with similar parts
- The missing dimensions in two drawings seem to be not necessary (purpose of holes in side of bone is unclear)
- The missing bending radius in three drawings (shims) seems to be less important
- Dimensions are often provided redundantly, i.e. measured from centerline to holes plus distance from hole to hole
- The depth of drill holes is unclear due to missing specification of "depth": Tip of the drill or useable depth of the hole.
- (Some drawings were quite complex and had far more than 100 dimensions, e.g. "meniscus plate 133-5301")



Summary of table details:

- All dimensions checked against SN03?
 - Dimensions that may be checked against the hardware impactor were found on 77 drawings
 - Six small items (four types of shims, acrylic foam tape 133-5109 and spring cap 133-5310) were not included in SN03 and therefore could not be checked.
 - One item (insert M1.6 (M3 O.D.) 133-5312) could not be checked because it could not be disassembled.
 - Drawing of one item (string guide 133-5303) was supplied later and could not be checked against hardware because the impactor was already re-assembled. Similar item was ok.
 - All dimensions on 69 drawings were checked against the corresponding parts of Master Leg SN03.
 - The position of the strain gauges on the femur and tibia bone drawings could not be checked on SN03 because of the covering of the strain gauges.

Summary of table details:

- All dimensions checked against SN03?
 - Some dimensions on the knee cover plates (outer plates covering the DAS) could not be checked exactly because of the wearing due to the usage of the parts
 - Several dimensions referring to the depth or diameter of holes do not match with the parts in SN03. All these differences seem to be uncritical.
 - Some holes in the knee block drawings (tibia and femur) are missing in the parts of SN03. Probably depending on DAS.
 - The position of four holes in the knee block tibia 133-5330 differ 1 mm between drawing and the part in SN03
 - In the “inner segment 133-5513” the chamfer “9.4x90 both sides” is only on one side on all segments.
 - The “bone clamps” “133-5506” and “133-5508” have chamfers that differ to the part in SN03.
 - The “bone clamp 133-5508” has additional hole and cutouts not mentioned in drawing

Summary of table details:

– Materials checked against SN03?

- Materials that could be checked against the hardware impactor were found on 66 drawings
- Material specifications are not always precise, e.g. no alloy or hardness is provided (e.g.: “Material: Aluminium”).
- In one drawing (cable assembly 133-5530) the material is not specified. Material in SN03 is stainless steel.
- In one drawing (washer 133-5521) the material differs between drawing (S.S.) and SN03 (aluminium)



Summary of table details:

- Any unclear information?
 - All 112 drawings were checked whether there is any information missing or unclear.
 - The cable and wiring specifications could not be checked.
 - The purpose of the holes in the side of the tibia and femur bones is unclear; dimensions of the holes are not provided
 - The “tape 133-5109” is unknown and not used in SN03; its intended use is unclear
 - The term “TYP” is sometimes unclear because it is not mentioned how often this position is used.
 - The correct material of the cable ass’y 133-5530 is not specified (see above)
 - The drawing of the “Knee Block, Tibia, 133-5330” includes holes for different versions (“A” and “B”). There is no explanation to this. Most probably this refers to different DAS. Proposal: Provide alternative drawings for all applicable DAS.
 - The intended use of “washer 133-8142” is unclear

Summary of table details:

– Comments /Relevance

- There are nineteen comments marked with “high” relevance, but some comments refer to same or similar issues.
- Most of the comments refer to the findings mentioned on the previous pages, others are mentioned below:
- On one drawing (shoulder bolt 133-5106) the quantity specified (18) is not correct, must be 16.
- “Spring cap 133-5310” is not used in SN03, “spring cap 133-5318” is used instead. If “spring cap 133-5310” is not necessary, the drawing can be eliminated.
- The inner radius (R5.0) of the “end cover 133-5516” matches the corresponding radius of “segment bottom, tibia 133-5511” but does not match the corresponding radius of “top plate 133-5102”.



Results table of inverse certification tests

(time curves see annex)

	ACL [mm]	PCL [mm]	MCL [mm]	Tibia 1 [Nm]	Tibia 2 [Nm]	Tibia 3 [Nm]	Tibia 4 [Nm]
Corridor upper limit	10	6	21	272	252	192	108
Corridor lower limit	8	4	17	230	210	166	93
Test 1 (before)	10,0	4,4	18,2	235,2	224,4	174,3	94,4
Within corridor?	yes	yes	yes	yes	yes	yes	yes
Test 2 (after)	9,9	4,7	18,1	240,6	215,1	176,2	102,6
Within corridor?	yes	yes	yes	yes	yes	yes	yes



Results table of pendulum certification tests

(time curves see annex)

	ACL [mm]	PCL [mm]	MCL [mm]	Tibia 1 [Nm]	Tibia 2 [Nm]	Tibia 3 [Nm]	Tibia 4 [Nm]
Corridor upper limit	10,5	5	24	272	219	166	111
Corridor lower limit	8	3,5	20,5	235	187	139	90
Test 1 (before)	9,5	4,6	22,9	245,6	195,2	149,8	100,1
Within corridor?	yes	yes	yes	yes	yes	yes	yes
Test 2 (after)	8,9	5,2	23,7	248,6	199,0	151,0	100,8
Within corridor?	yes	yes	yes	yes	yes	yes	yes

- The drawing package provided by the manufacturer of the Flex PLI was reviewed and checked in all details against the Flex PLI Master Legform SN03.
- Some differences were found, most of them seem to be uncritical.
- Some information details (e.g. dimensions, material) are missing, most of them of less importance.
- Some information remains unclear.
- Altogether the drawing package appears to be correct and almost complete.
- Before the disassembly of the master leg as well as after the re-assembly both certification tests - inverse and pendulum - were carried out. In all cases the impactor complied with the certification corridors.
- During the disassembly and assembly work it became obvious that some impactor parts show signs of wear and tear due to the usage and testing. Therefore, a regular maintenance, e.g. annually or after a certain number of tests, is highly recommended.

Annex

- Detailed drawing review table
- Certification curves

Flex PLI Drawing Review and Hardware Check
July 3rd, 2013

Item	Drawing no.	Description	Revision level	Drawing no. and description correct?	All dimensions provided?	Dimensions checked against SN03?	Materials checked against SN03?	Any unclear information?	Comment	Relevance
a	ALL	GENERAL REMARKS							Material specifications not precise, e.g. alloy or hardness not provided.	high
b	ALL	GENERAL REMARKS							Dimensions are often provided redundantly, e.g. measured from centreline plus distance from hole to hole.	low
c	ALL	GENERAL REMARKS							The depth of drill holes is often unclear due to missing specifications of the "depth": Tip of the drill or useable depth of the hole.	high
1	133-5000	FLEX PLI GTR INSTRUMENTED LEG TESTED & CERTIFIED	A	yes	yes	yes	--	no		
2	133-5001	SHIM, (T0-5) OPTIONAL	A	yes	no	yes	yes	no	Radius shown in Detail "A" not defined Could be considered as the minimal bending radius possible for material strength (approx. zero for max 0.6 mm sheet metal)	high
3	133-5002	SHIM, BONE CLAMP (T0-05) OPTIONAL	A	yes	yes	yes	yes	no		
4	133-5003	SHIM, BONE CLAMP (T0-5) OPTIONAL	A	yes	yes	yes	yes	no		
5	133-5004	SHIM, BONE CLAMP (T0-6) OPTIONAL	A	yes	yes	yes	yes	no		
6	133-5005	SHIM, (T0-6) OPTIONAL	A	yes	no	yes	yes	no	Radius shown in Detail "A" not defined Could be considered as the minimal bending radius possible for material strength (approx. zero for max 0.6 mm sheet metal)	high
7	133-5010	BUFFER, FEMUR	A	yes	yes	yes	yes	no		
8	133-5011	BUFFER, LEG	A	yes	yes	yes	yes	no		
9	133-5012	SHIM, 05 (OPTIONAL)	A	yes	yes	yes	yes	no		
10	133-5013	COVER, INNER, FEMUR	A	yes	yes	yes	yes	no		
11	133-5014	COVER, OUTER, FEMUR	A	yes	yes	yes	yes	no		
12	133-5015	COVER, INNER, TIBIA	A	yes	yes	yes	yes	no		
13	133-5016	COVER, OUTER, TIBIA	A	yes	yes	yes	yes	no		
14	133-5017	COVER, FLEX PLI GTR	A	yes	yes	yes	yes	no		
15	133-5018	TAPE, FRONT COVER	A	yes	yes	yes	yes	no		
16	133-5019	HOOK & LOOP BUNDLE TIE, 500mm LONG	A	yes	yes	yes	yes	no		
17	133-5020	BUFFER SHEET ASSEMBLY, LEG	A	yes	yes	yes	yes	no		
18	133-5025	TAPE, IMPACT SEGMENT	A	yes	yes	yes	yes	no		
19	133-5026	TAPE, END COVER, 12 X 16	A	yes	yes	yes	yes	no		
20	133-5027	TAPE, END COVER, 10 X 12	A	yes	yes	yes	yes	no		
21	133-5028	TAPE, END COVER, 12 X 24	A	yes	yes	yes	yes	no		
22	133-5029	SHIM, .1 THICK (OPTIONAL)	A	yes	yes	no	no	no	Part not included in SN03, therefore not measured	low
23	133-5030	SHIM, .2 THICK (OPTIONAL)	A	yes	yes	no	no	no	Part not included in SN03, therefore not measured	low
24	133-5031	SHIM, .40 THICK (OPTIONAL)	A	yes	yes	no	no	no	Part not included in SN03, therefore not measured	low
25	133-5034	CATCH ROPE BRACKET	A	yes	yes	--	--	no		
26	133-5100, 1of2	FEMUR ASSEMBLY, FLEX PLI TESTED & CERTIFIED	A	yes	--	--	--	no		
27	133-5100, 2of2	FEMUR ASSEMBLY, FLEX PLI TESTED & CERTIFIED	A	yes	--	--	--	no		
28	133-5101	FEMUR BONE	A	yes	no	yes	yes	yes	There are holes in the side of the bone that are also present in the drawing but no dimensions are provided. Purpose of the holes is unclear.	low
29	133-5102	PLATE, TOP	A	yes	yes	yes	yes	no	Radius "R3.0 Typ" (drawing area B-2) does not match corresponding radius (R5.0) on "End Cover" (133-5516).	high
30	133-5103	LAUNCH GUIDE	A	yes	yes	yes	yes	no		
31	133-5104	WASHER, 12 ID X 26 OD X 3	A	yes	yes	yes	yes	no		
32	133-5106	SHOULDER BOLT	A	yes	yes	yes	yes	no	Incorrect quantity: mentioned 18, must be 16 (see 133-5100)	low
33	133-5107	ROLLER	A	yes	yes	yes	yes	no		

Flex PLI Drawing Review and Hardware Check
July 3rd, 2013

Item	Drawing no.	Description	Revision level	Drawing no. and description correct?	All dimensions provided?	Dimensions checked against SN03?	Materials checked against SN03?	Any unclear information?	Comment	Relevance
34	133-5108	SEGMENT TOP, FEMUR	A	yes	yes	yes	yes	no	Drill holes "2 x 3.050, depth 5.0" (drawing area C-3) are 6.0 deep in SN03 (perhaps mixed up with 133-5511)	low
35	133-5109	TAPE, ACRYLIC FOAM, 54mm LONG	A	yes	yes	no	no	yes	Unknown part, not included in SN03, unclear use	low
36	133-5110	CABLE ASSEMBLY, FEMUR	A	yes	yes	yes	yes	no		
37	133-5112	WIRE SETTING TOOL	A	yes	yes	--	--	no		
38	133-5113	SETTING TOOL, KNEE ATTACHMENT	A	yes	yes	--	--	no		
39	133-5165, 1of2	PCB BONE ASSEMBLY, 3 CHANNEL FEMUR, TESTED & CERTIFIED	A	yes	yes	yes	--	no		
40	133-5165, 2of2	PCB BONE ASSEMBLY, 3 CHANNEL FEMUR, TESTED & CERTIFIED	A	yes	yes	no	--	no	Dimensions could not be checked against SN03 due to the covering of the strain gauges. Tables "Performance specifications" and "connector pinouts" could not be checked.	low
41	133-5300	KNEE ASSEMBLY, FLEX PLI TESTED & CERTIFIED	A	yes	--	--	--	no	Part no. 8 (133-5310) not used in SN03, no. 9 (133-5318) used instead (chamfer in 133-5310 not necessary)	high
42	133-5301	MENISCUS PLATE	A	yes	no	yes	yes	no	Dimensions for chamfer (4 x 5 x 45°) missing in drawing (drawing area C-7)	high
43	133-5302	ATTACHMENT PLATE, STRING POT	A	yes	yes	yes	yes	yes	"6 TYP" is unclear, better: " 4x .6". "1.2 TYP" is unclear, better: " 4x 1.2"	low
44	133-5303	STRING GUIDE KNEE	A	yes	yes	no	no	no	Drawing was supplied later, missing during review, could not be checked against SN03 because legform was already re-assembled	low
45	133-5304	COVER, UPPER KNEE, FLEX PLI	A	yes	yes	yes	yes	no		
46	133-5305	COVER, LOWER KNEE, FLEX PLI	A	yes	yes	yes	yes	no		
47	133-5306	COVER, KNEE	A	yes	yes	yes	yes	no		
48	133-5307	STRING GUIDE, AP	A	yes	yes	yes	yes	no	"R .8" (drawing area D-3) is .5 x 45° in SN03 Chamfer 30° (drawing area C-2) is 27° in SN03	high
49	133-5308	WIRE RETAINER, KNEE	A	yes	yes	yes	yes	no		
50	133-5309	STRING GUIDE, AP LIGAMENT	A	yes	yes	yes	yes	no		
51	133-5310	SPRING CAP	A	yes	yes	no	no	no	Part not included in SN03, 133-5318 used instead (difference: chamfer 1.0 x 45° not in part 133-5318; chamfer not necessary)	high
52	133-5311	CABLE WASHER	A	yes	yes	yes	yes	no		
53	133-5312	INSERT, M1.6 (M3 O.D.)	A	yes	yes	no	no	no	Part could not be checked because it cannot be disassembled (but fits the hole, i.e. assumed to be ok)	low
54	133-5313	MENISCUS ASSEMBLY	A	yes	--	--	--	no		
55	133-5314	COVER, KNEE, TIBIA LEFT SIDE	A	yes	yes	yes	yes	no	Radius 24.0 could not be checked exactly on SN03 because of used part. Assumed to be ok.	low
56	133-5315	COVER, KNEE, FEMUR RIGHT SIDE	A	yes	yes	yes	yes	no	Some dimensions could not be checked exactly on SN03 because of used part. Assumed to be ok.	low
57	133-5318	SPRING CAP KNEE BLOCK TIBIA	A	yes	yes	yes	yes	no	Used in SN03 also instead of 133-5310	low
58	133-5320	KNEE BLOCK, FEMUR	A	yes	yes	yes	yes	no	Drill holes ("2x 5.0, depth 3.0") missing in SN03 (drawing area D-5).	high
59	133-5330	KNEE BLOCK, TIBIA, FLEX PLI	A	yes	yes	yes	yes	yes	Alternative drawings for different DAS (DTS, M=Bus, Kistler, ...) not included SN03 only has holes for version "B" (drawing area B/C-1/2), holes for version "A" missing No explanation for version "A" and "B" Holes "3 x M3x.5, depth 6.0" missing in SN03 (drawing area B/C-5) 4 Holes 7.0 ("3 x 7.0 thru all "+ "1 x 7.0 this side", drawing area B/C-7/8) are located at 77, 67, 57 and 47 mm in SN03 instead of 76, 66, 56 and 46 mm in drawing Drill holes "2 x 5.0 thru" are 2 x 6.0 in SN03 (drawing area A-5)	high
60	133-5350	CABLE ASSEMBLY, KNEE ML	A	yes	yes	yes	yes	no		
61	133-5360	CABLE ASSEMBLY, KNEE AP	A	yes	yes	yes	yes	no		

Flex PLI Drawing Review and Hardware Check
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Item	Drawing no.	Description	Revision level	Drawing no. and description correct?	All dimensions provided?	Dimensions checked against SN03?	Materials checked against SN03?	Any unclear information?	Comment	Relevance
62	133-5500 1of2	TIBIA ASSEMBLY, FLEX PLI TESTED & CERTIFIED	A	yes	--	--	--	no		
63	133-5500 2of2	TIBIA ASSEMBLY, FLEX PLI TESTED & CERTIFIED	A	yes	--	--	--	no		
64	133-5502	BONE CLAMP THICK, FEMUR/TIBIA	A	yes	no	yes	yes	no	R35.0 not defined (no centerpoint/starting point given) should be 17 mm (see 133-5503) (drawing area C-2)	high
65	133-5503	BONE CLAMP THIN, FEMUR/TIBIA	A	yes	yes	yes	yes	no		
66	133-5504	SHIM, BONE CLAMP (.4 THICK) OPTIONAL	A	yes	yes	no	no	no	Part not included, therefore not measured	low
67	133-5505	SPACER, BONE CONTACT, THICK	A	yes	yes	yes	yes	no		
68	133-5506	BONE CLAMP THICK, KNEE	A	yes	yes	yes	yes	no	"2 x 5 x 45° chamfer" is 2 x 5.5 x 46° in SN03	low
69	133-5507	SPACER, BONE CONTACT, THIN	A	yes	yes	yes	yes	no		
70	133-5508	BONE CLAMP THIN, KNEE	A	yes	yes	yes	yes	no	Part in SN03 has two machined cut-outs and two holes that are not included in drawing (see photographs) "2 x 5 x 45° Chamfer" is 2 x 5.5 x 46° in SN03 "2 x 2 x 45° Chamfer" is 2 x .5 x 45° in SN03 Detail A: "4 x 1.5" (drawing area D-2) is 4 x 2 mm in SN03 Detail A: "chamfer 2 x 12 mm" is 3 x 9.5 in SN03	high
71	133-5509	SHIM (.4 THICK) OPTIONAL	A	yes	no	yes	yes	no	Radius shown in Detail "A" not defined Could be considered as the minimal bending radius possible for material strength (approx. zero for max 0.6 mm sheet metal)	low
72	133-5510	RUBBER BUFFER, FEMUR/TIBIA END	A	yes	yes	yes	yes	no		
73	133-5511	SEGMENT BOTTOM, TIBIA	A	yes	yes	yes	yes	no	Radius "R5 TYP" (drawing area B-7) is 4.5 in SN03 Drill holes "2 x 3.050, depth 6.0" (drawing area D-5) are 5.0 deep in SN03 (perhaps mixed up with 133-5108)	high
74	133-5512	RUBBER BUFFER	A	yes	yes	yes	yes	no		
75	133-5513	INNER SEGMENT	A	yes	yes	yes	yes	no	"4 x 7.4 Thru/9.4 x 90° (both sides)" (drawing area D-3) is only on one side in SN03 (all segments) Dimension 41.0 (drawing area D-2) is 41.5 in SN03	low
76	133-5514	INNER SEGMENT, KNEE	A	yes	yes	yes	yes	no	Depth of drill holes "2 x 3.050, depth 6.0" is around 8.0 in SN03 (drawing area B-3)	low
77	133-5515	LINK	A	yes	yes	yes	yes	no		
78	133-5516	END COVER	A	yes	yes	yes	yes	no	Radius "R5.0 Typ." does not match radius on Top Plate 133-5102 (R 3.0) but matches "Segment Bottom, Tibia" (133-5511)	high
79	133-5517	IMPACT SEGMENT	A	yes	yes	yes	yes	no		
80	133-5518	COVER, END IMPACT	A	yes	no	yes	yes	no	Center for Radius "R30.0" (drawing area C-3) not defined Total width dimension not included (must be 30 mm acc. to 133-5517)	high
81	133-5519	COVER, END IMPACT, (KNEE END)	A	yes	no	yes	yes	no	Center for Radius "R30.0" (drawing area C-3) not defined Total width dimension not included (must be 30 mm acc. to 133-5517)	high
82	133-5520	TIBIA BONE	A	yes	no	yes	yes	yes	There are holes in the side of the bone that are also present in the drawing but no dimensions are provided. Purpose of the holes is unclear.	low
83	133-5521	WASHER, CABLE	A	yes	yes	yes	yes	no	Washers of different thickness (3.0 & 4.0) included in SN03 Radius .2 (drawing area D-3) missing on part in SN03 Material according to drawing: S.S.; in SN03: aluminium	high
84	133-5522	WIRE EXIT BASE	A	yes	yes	yes	yes	no		
85	133-5523	WIRE EXIT CLAMP	A	yes	yes	yes	yes	no		
86	133-5525	INSERT, MOLDED, END COVER	A	yes	yes	yes	yes	no		
87	133-5530	CABLE ASSEMBLY, TIBIA	A	yes	yes	yes	no	yes	Material not specified; SN03: S.S.	high
88	133-5534	INNER SEGMENT ASSEMBLY	A	yes	--	--	--	no		

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Item	Drawing no.	Description	Revision level	Drawing no. and description correct?	All dimensions provided?	Dimensions checked against SN03?	Materials checked against SN03?	Any unclear information?	Comment	Relevance
89	133-5535	INNER SEGMENT ASSEMBLY CLOSERS TO KNEE	A	yes	--	--	--	no		
90	133-5565 1of2	PCB BONE ASSEMBLY, 4 CHANNEL TIBIA, TESTED & CERTIFIED	A	yes	--	--	--	no		
91	133-5565 2of2	PCB BONE ASSEMBLY, 4 CHANNEL TIBIA, TESTED & CERTIFIED	A	yes	--	--	--	no	Dimensions could not be checked against SN03 due to the covering of the strain gauges. Tables "Performance specifications" and "connector pinouts" could not be checked.	low
92	133-8031	TEFLON SHEET	A	yes	yes			no		
93	133-8102	LEG LOADING SPIGOT, FLEX PLI	A	yes	yes			no		
94	133-8105	KNEE LOADING PROFILE, FLEX PLI	A	yes	yes			no		
95	133-8120 1of2	BONE AND KNEE ASSEMBLY CALIBRATION FIXTURES	A	yes	yes			no		
96	133-8120 2of2	BONE AND KNEE ASSEMBLY CALIBRATION FIXTURES	A	yes	yes			no		
97	133-8121	KNEE CALIBRATION INSERT, FEMUR SIDE	A	yes	yes			no		
98	133-8122	KNEE CALIBRATION INSERT, TIBIA SIDE	A	yes	yes			no		
99	133-8124	SIDE PLATE, LEGS	A	yes	yes			no		
100	133-8125	PIVOT BASE	A	yes	yes			no		
101	133-8126	KNEE PIVOT SIDE PLATE	A	yes	yes			no		
102	133-8127	SPACER	A	yes	yes			no		
103	133-8128	SHOULDER BOLT, (11.90mm)	A	yes	yes			no		
104	133-8129	INSERT LEG PIVOT	A	yes	yes			no		
105	133-8134	PIVOT SPACER	A	yes	yes			no		
106	133-8142	WASHER, 13 O.D. X 5.2 I.D. X 5	A	yes	yes			yes	Intended use unclear	low
107	133-8150	BASE ASSEMBLY	A	yes	--			no		
108	133-8151	BASE PLATE	A	yes	yes			no		
109	61-201-05-00-00	ACCEL ASSEMBLY, 64C-2000 TO 7 PIN MALE W/LATCH AND IK ID	A	yes	--	--	--	--	(Cable and wiring specifications could not be checked.)	
110	61-301-05-00-00	ACCEL ASSEMBLY, ASE-A TO 7 PIN MALE W/LATCH AND IK ID	A	yes	--	--	--	--	(Cable and wiring specifications could not be checked.)	
111	61-503-05-00-00	CABLE ASSEMBLY, RIGHT STRING POT TO 7 PIN MALE W/LATCH	A	yes	--	--	--	--	(Cable and wiring specifications could not be checked.)	
112	61-507-05-00-00	CABLE ASSEMBLY, LEFT STRING POT TO 7 PIN MALE W/LATCH	A	yes	--	--	--	--	(Cable and wiring specifications could not be checked.)	

Pedestrian Impact Test **bast**

Impactor : SN03
Test No. : Calib-SN03-1212-I
Date : 07.12.2012
Customer :

Temperature

Stabilised temperature : 20.3 °C

Impact Velocity : 11.06 m/s

Maximum Bending Moment

Component	Maximum Bending Moment [Nm]	Time [ms]
CFC 180		
Femur A3	68.8 Nm	28.3 ms
Femur A2	129.9 Nm	27.4 ms
Femur A1	174.5 Nm	27.2 ms
Tibia A1	235.2 Nm	15.2 ms
Tibia A2	224.4 Nm	14.7 ms
Tibia A3	174.3 Nm	14.1 ms
Tibia A4	94.9 Nm	13.5 ms

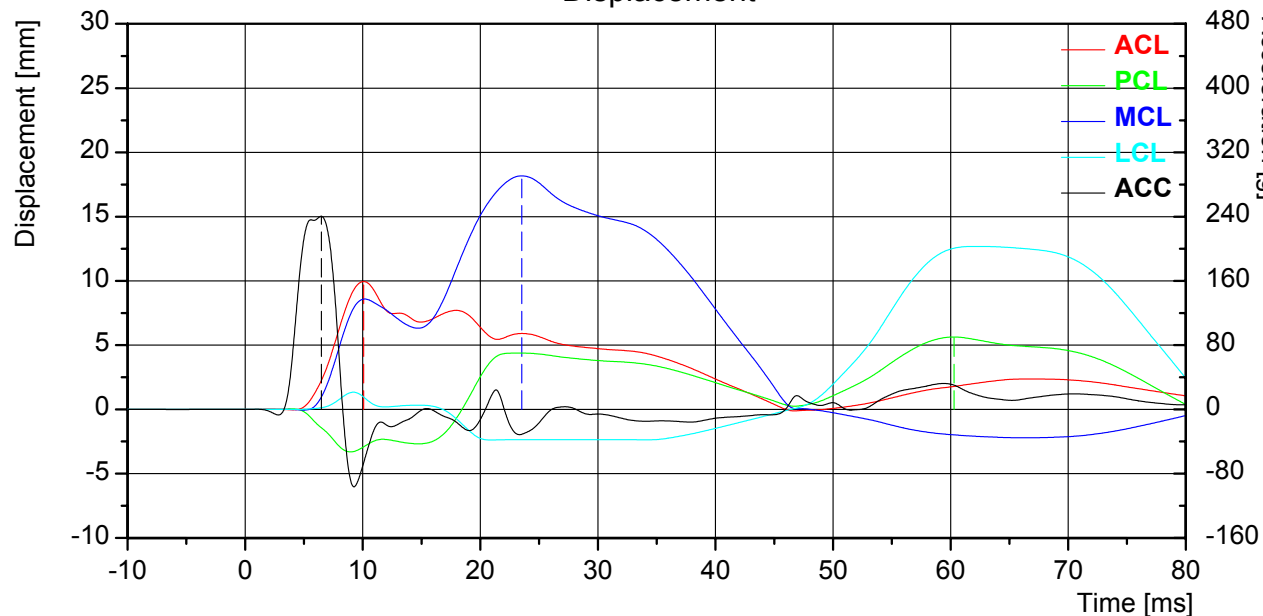
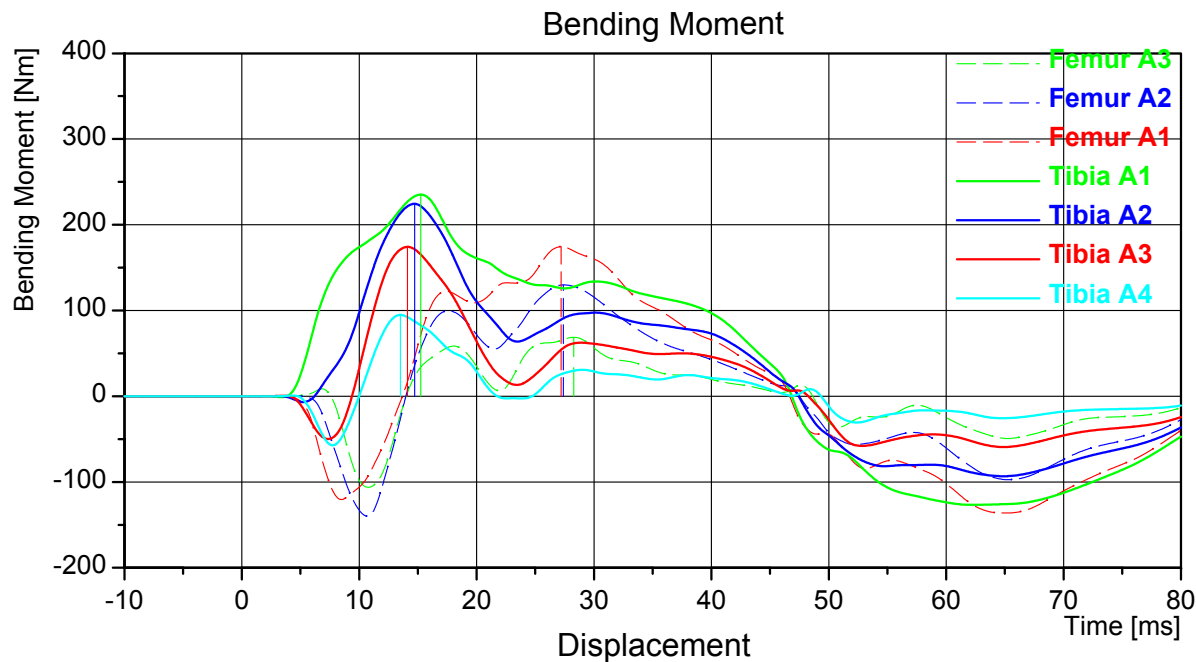
Maximum Displacement

Component	Maximum Displacement [mm]	Time [ms]
CFC 180		
ACL	10.0 mm	10.1 ms
PCL	4.4 mm	23.3 ms
MCL	18.2 mm	23.5 ms
LCL	13.8 mm	353.2 ms

Maximum Acceleration

Component	Maximum Acceleration [g]	Time [ms]
CFC 180		
ACC	240.4 g	6.5 ms

SN03 : Calib-SN03-1212-I



Pedestrian Impact Test **bast**

Impactor : Flex GTR SN03
Test No. : Calib-SN03-0713-I
Date : 01.07.2013
Customer : BAST

Temperature

Stabilised temperature : 21.5 °C

Impact Velocity : 10.95 m/s

Maximum Bending Moment

Component	Maximum Bending Moment [Nm]	Time [ms]
CFC 180		
Femur A3	68.3 Nm	24.2 ms
Femur A2	131.2 Nm	23.5 ms
Femur A1	178.8 Nm	22.9 ms
Tibia A1	240.6 Nm	12.4 ms
Tibia A2	215.1 Nm	11.5 ms
Tibia A3	176.2 Nm	10.5 ms
Tibia A4	102.6 Nm	10.1 ms

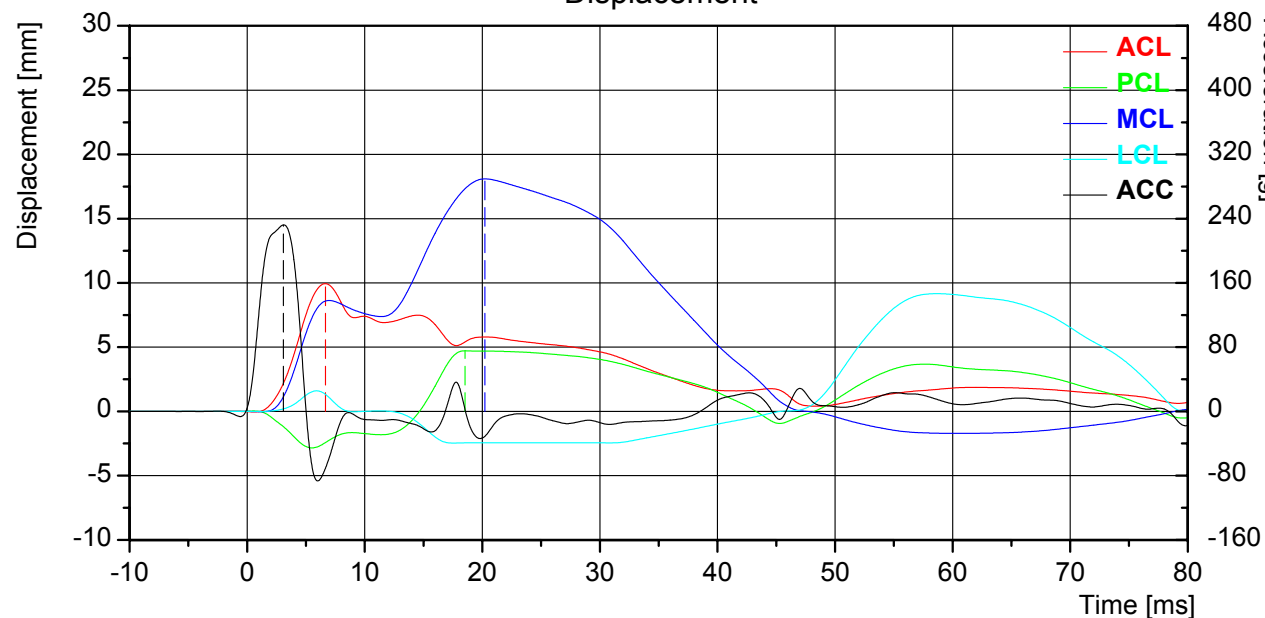
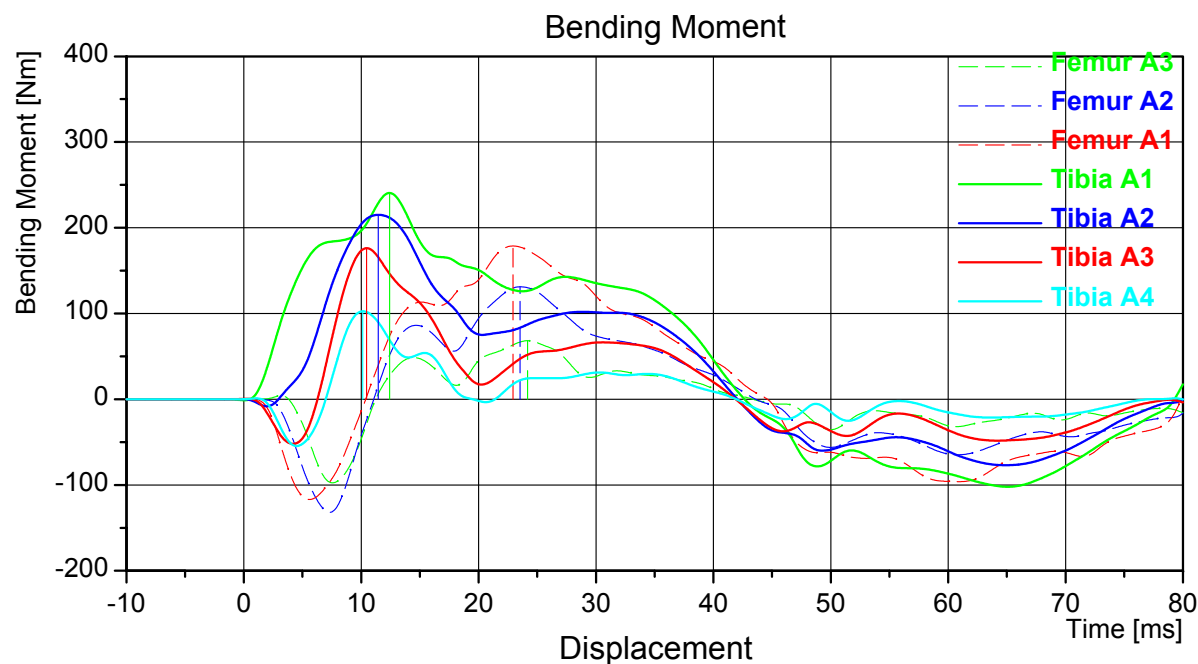
Maximum Displacement

Component	Maximum Displacement [mm]	Time [ms]
CFC 180		
ACL	9.9 mm	6.7 ms
PCL	4.7 mm	18.5 ms
MCL	18.1 mm	20.2 ms
LCL	9.1 mm	58.3 ms

Maximum Acceleration

Component	Maximum Acceleration [g]	Time [ms]
CFC 180		
ACC	232.3 g	3.1 ms

Flex GTR SN03 : Calib-SN03-0713-I



Pedestrian Impact Test **bast**

Impactor : SN03
Test No. : Calib-SN03-1212-P
Date : 07.12.2012
Customer :

Temperature

Stabilised temperature : 20.1 °C

Impact Velocity : m/s

Maximum Bending Moment

Component	Maximum Bending Moment [Nm]	Time [ms]
CFC 180		
Femur A3	81.0 Nm	79.1 ms
Femur A2	133.1 Nm	81.6 ms
Femur A1	183.6 Nm	84.5 ms
Tibia A1	245.6 Nm	95.1 ms
Tibia A2	195.2 Nm	90.4 ms
Tibia A3	149.8 Nm	89.6 ms
Tibia A4	100.1 Nm	89.6 ms

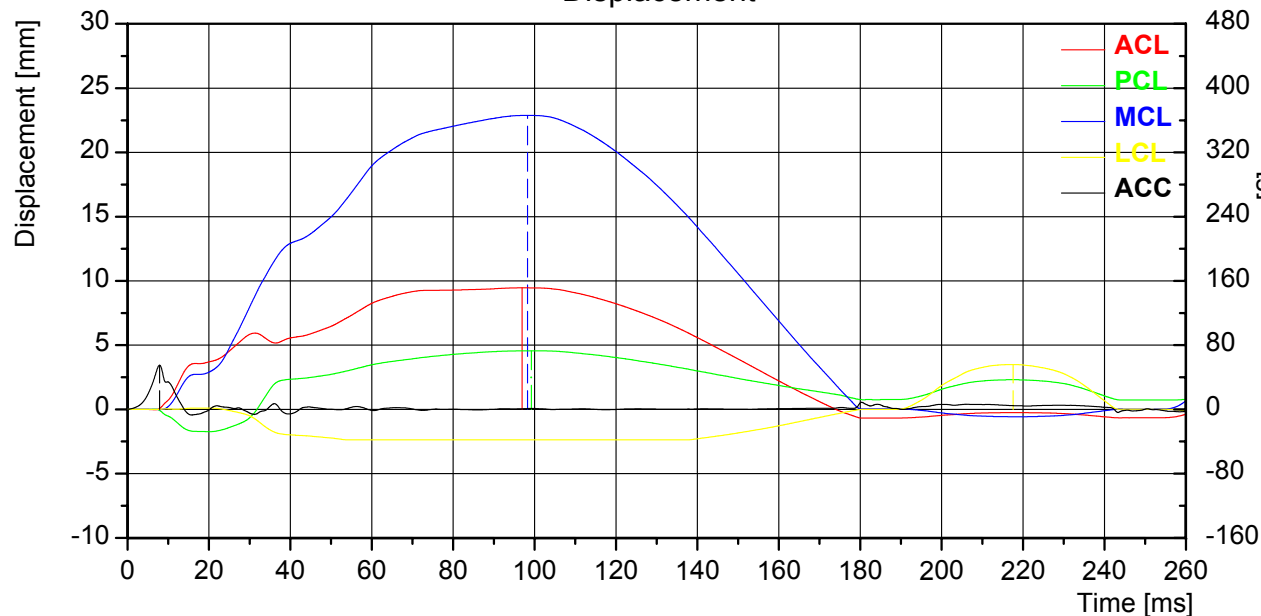
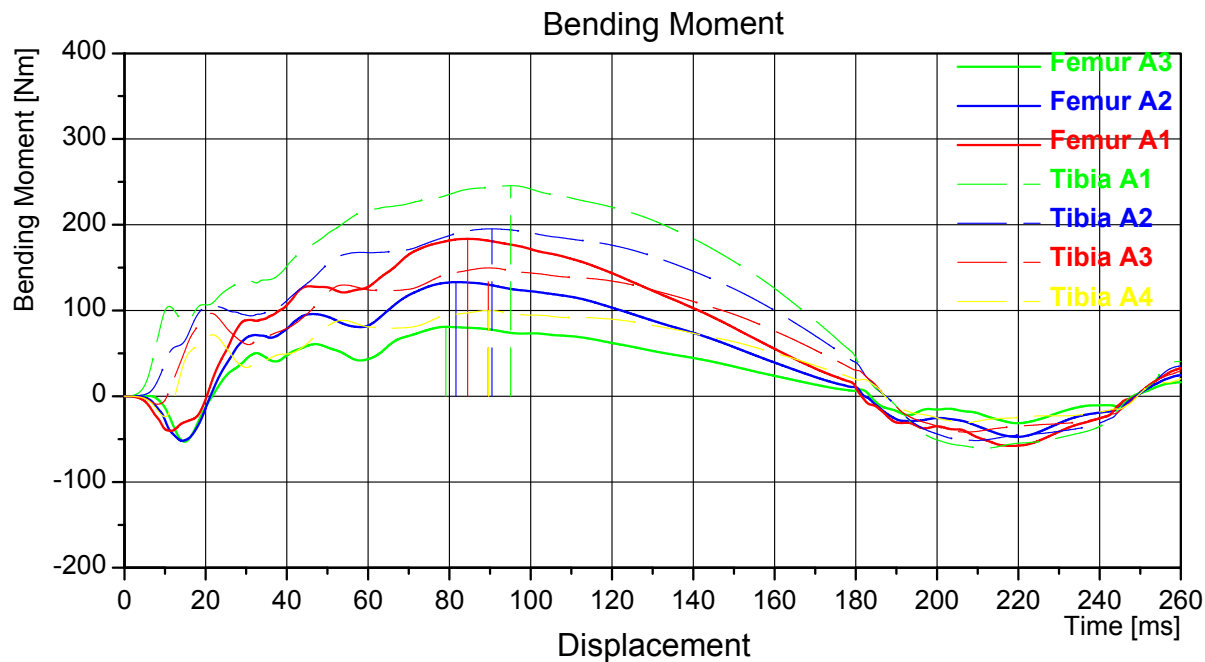
Maximum Displacement

Component	Maximum Displacement [mm]	Time [ms]
CFC 180		
ACL	9.5 mm	97.0 ms
PCL	4.6 mm	99.2 ms
MCL	22.9 mm	98.3 ms
LCL	3.5 mm	217.6 ms

Maximum Acceleration

Component	Maximum Acceleration [g]	Time [ms]
CFC 180		
ACC	55.1 g	7.9 ms

SN03 : Calib-SN03-1212-P



Pedestrian Impact Test **bast**

Impactor : Flex GTR SN03
Test No. : Calib-SN03-0713-P
Date : 01.07.2013
Customer : BAST

Temperature

Stabilised temperature : 21.4 °C

Impact Velocity : m/s

Maximum Bending Moment

Component	Maximum Bending Moment [Nm]	Time [ms]
CFC 180		
Femur A3	81.7 Nm	89.6 ms
Femur A2	135.2 Nm	92.2 ms
Femur A1	186.6 Nm	93.8 ms
Tibia A1	248.6 Nm	104.2 ms
Tibia A2	199.0 Nm	100.8 ms
Tibia A3	151.0 Nm	99.3 ms
Tibia A4	100.8 Nm	99.0 ms

Maximum Displacement

Component	Maximum Displacement [mm]	Time [ms]
CFC 180		
ACL	8.9 mm	81.2 ms
PCL	5.2 mm	109.8 ms
MCL	23.7 mm	107.0 ms
LCL	4.1 mm	230.8 ms

Maximum Acceleration

Component	Maximum Acceleration [g]	Time [ms]
CFC 180		
ACC	54.9 g	16.0 ms

Flex GTR SN03 : Calib-SN03-0713-P

