

Historical Review: Certification Corridors

TF-RUCC-K-04-Rev.1

29 Nov. 2011

JARI

Background

- Flex-GTR has three component level and two assembly level certification tests.
- Certification corridors for those tests were developed on the basis of Flex-TEG discussions.
- Before accepting those corridors by IG GTR-PH2, detailed reviews and updates if needed by task force group are required as requested by the IG GTR-PH2 at its constitutional meeting.

Certification Tests		Certification Corridors	Actions
Component level	Tibia	GRSP-2011-13, 14 (ref. ESV 09-0146, TEG-133)	Review and Update if needed.
	Femur	GRSP-2011-13, 14 (ref. ESV 09-0146, TEG-133)	Review and Update if needed.
	Knee	GRSP-2011-13, 14 (ref. ESV 09-0146)	Review and Update if needed.
Assembly level	Pendulum	GRSP-2011-13, 14 (ref. TEG-120)	Review and Update if needed.
	Inverse	GRSP-2011-13, 14 (ref. TEG-119)	Review and Update if needed.

Objectives of this presentation

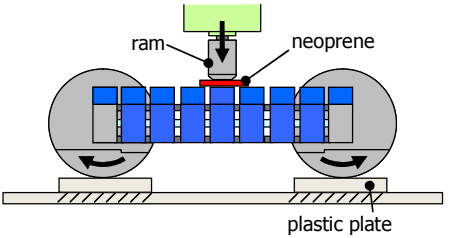
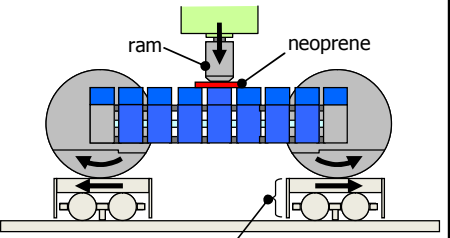
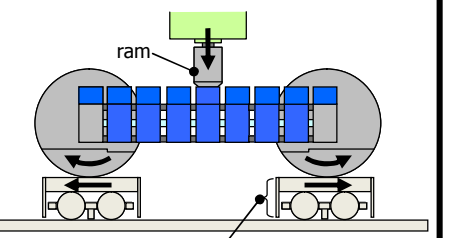
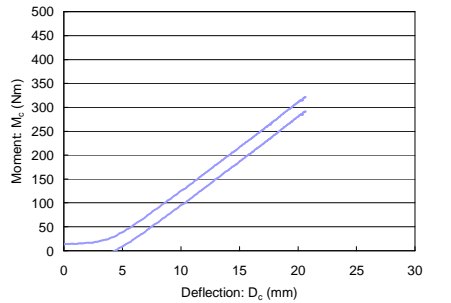
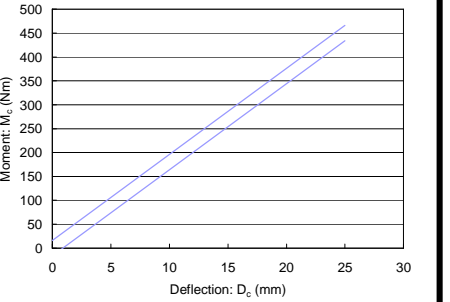
- Conduct historical reviews on Flex-GTR certification test corridors with test methods in order to understand clear overview on this topic.

Historical Review
Component level

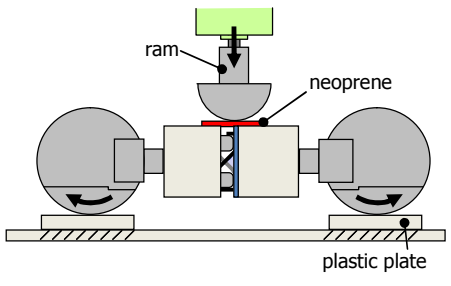
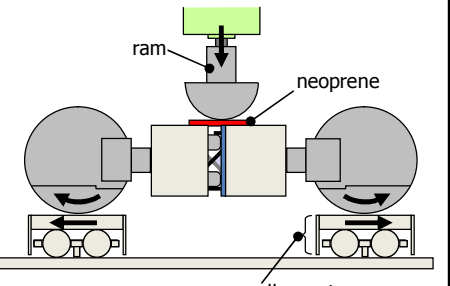
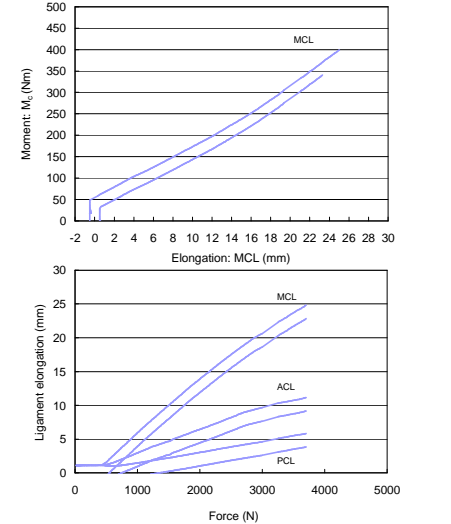
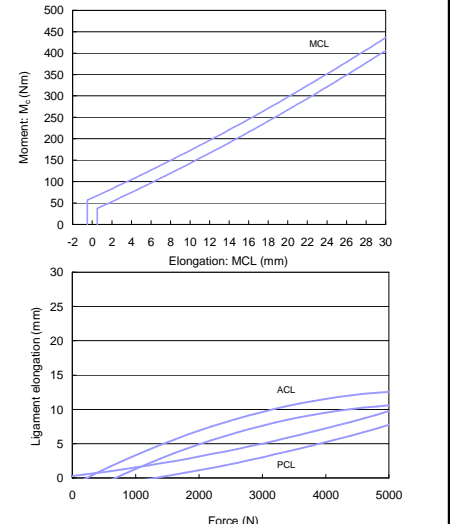
Tibia: Certification Corridor with Test Method

	Flex-GT	Flex-GTR-prototype	Flex-GTR-production
Test Method			
- Loading surface	• Neoprene sheet	• same as left	• Without neoprene sheet
- Support surface	• Plastic plate	• Roller system	• same as left
Corridor		<p>same as left</p>	
- Developed by	• JARI	• same as left	• Humanetics
- Base data	• Flex-GT	• same as left	• Part of Flex-GT
- Test lab	• Test lab: JARI	• same as left	• Test lab: JARI
- Impactor conditions	• Brand New	• same as left	• same as left

Femur: Certification Corridor with Test Method

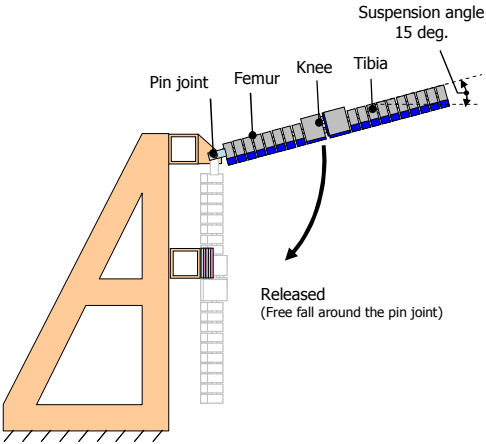
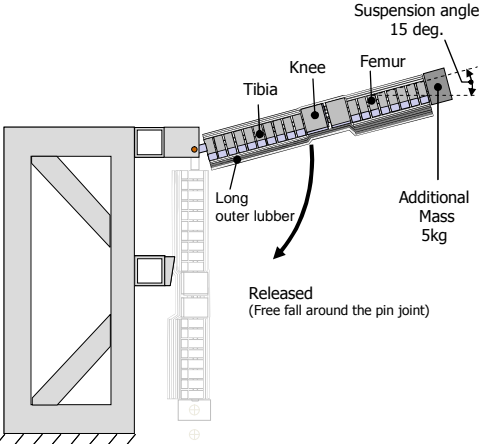
	Flex-GT	Flex-GTR-prototype	Flex-GTR-production
Test Method			
- Loading surface	• Neoprene sheet	• same as left	• Without neoprene sheet
- Support surface	• Plastic plate	• Roller system	• same as left
Corridor		<p>same as left</p>	
- Developed by	• JARI	• same as left	• Humanetics
- Base data	• Flex-GT	• same as left	• Part of Flex-GT
- Test lab	• Test lab: JARI	• same as left	• Test lab: JARI
- Impactor conditions	• Brand New	• same as left	• same as left

Knee: Certification Corridor with Test Method

	Flex-GT	Flex-GTR-prototype	Flex-GTR-production
Test Method			same as left
- Loading surface	• Neoprene sheet	• same as left	• same as left
- Support surface	• Plastic Plate	• Roller system	• same as left
Corridor			same as left
- Developed by	• JARI	• Humanetics	• same as left
- Base data	• Flex-GT	• Flex-GTR-prototype	• same as left
- Test lab	• JARI	• Humanetics	• same as left
- Impactor conditions	• Brand-New	• same as left	• same as left

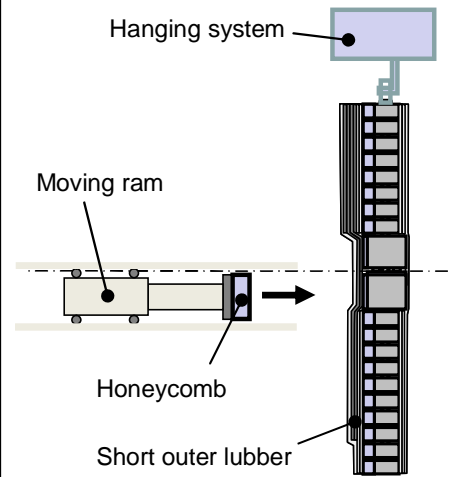
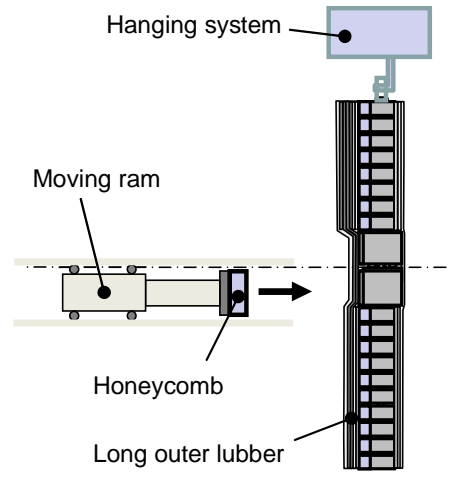
Historical Review
Assembly level

Pendulum: Certification Corridor with Test Method

	Flex-GT	Flex-GTR-prototype	Flex-GTR-production																																																												
Test Method			same as left																																																												
- Flesh	•Without	•With	•same as left																																																												
- Attachment position	•Top of femur	•Bottom of tibia	•same as left																																																												
- Additional mass	•Without	•With	•same as left																																																												
- Outer lubber length	-	•Long	•same as left																																																												
Corridor	<table border="1"> <thead> <tr> <th></th> <th>Upper (Nm)</th> <th>Lower (Nm)</th> <th></th> <th>Upper (mm)</th> <th>Lower (mm)</th> </tr> </thead> <tbody> <tr> <td>Tibia-1</td> <td>163</td> <td>133</td> <td>ACL</td> <td>5.0</td> <td>2.6</td> </tr> <tr> <td>Tibia-2</td> <td>122</td> <td>92</td> <td>PCL</td> <td>4.1</td> <td>1.7</td> </tr> <tr> <td>Tibia-3</td> <td>86</td> <td>56</td> <td>MCL</td> <td>14</td> <td>12</td> </tr> <tr> <td>Tibia-4</td> <td>52</td> <td>22</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Upper (Nm)	Lower (Nm)		Upper (mm)	Lower (mm)	Tibia-1	163	133	ACL	5.0	2.6	Tibia-2	122	92	PCL	4.1	1.7	Tibia-3	86	56	MCL	14	12	Tibia-4	52	22				<table border="1"> <thead> <tr> <th></th> <th>Upper (Nm)</th> <th>Lower (Nm)</th> <th></th> <th>Upper (mm)</th> <th>Lower (mm)</th> </tr> </thead> <tbody> <tr> <td>Tibia-1</td> <td>272</td> <td>235</td> <td>ACL</td> <td>11</td> <td>9.0</td> </tr> <tr> <td>Tibia-2</td> <td>211</td> <td>185</td> <td>PCL</td> <td>5.4</td> <td>4.0</td> </tr> <tr> <td>Tibia-3</td> <td>160</td> <td>135</td> <td>MCL</td> <td>26</td> <td>23</td> </tr> <tr> <td>Tibia-4</td> <td>108</td> <td>94</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Upper (Nm)	Lower (Nm)		Upper (mm)	Lower (mm)	Tibia-1	272	235	ACL	11	9.0	Tibia-2	211	185	PCL	5.4	4.0	Tibia-3	160	135	MCL	26	23	Tibia-4	108	94				same as left
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- Base data	•Flex-GT	•Flex-GTR-prototype with long outer lubber*	•same as left																																																												
- Test lab	•JARI	•JARI (2 impactors), n=12 in total	•same as left																																																												
- Impactor conditions	•Tibia: Brand-New	•same as left	•same as left																																																												
	•Femur: Brand-New	•same as left	•same as left																																																												
	•Knee: Brand-New	•Knee: Used	•same as left																																																												

* Long outer lubber is used for Flex-GTR-production.

Inverse: Certification Corridor with Test Method

	Flex-GT	Flex-GTR-prototype	Flex-GTR-production																														
Test Method	-																																
- Flesh	-	•With	•same as left																														
- Honeycomb	-	•With	•same as left																														
- Outer lubber	-	•Short	•Long																														
Corridor	-	<table border="1" data-bbox="1086 901 1444 1053"> <thead> <tr> <th></th> <th>Upper (Nm)</th> <th>Lower (Nm)</th> <th></th> <th>Upper (mm)</th> <th>Lower (mm)</th> </tr> </thead> <tbody> <tr> <td>Tibia-1</td> <td>277</td> <td>237</td> <td>ACL</td> <td>11</td> <td>9</td> </tr> <tr> <td>Tibia-2</td> <td>269</td> <td>223</td> <td>PCL</td> <td>6</td> <td>5</td> </tr> <tr> <td>Tibia-3</td> <td>204</td> <td>176</td> <td>MCL</td> <td>23</td> <td>18</td> </tr> <tr> <td>Tibia-4</td> <td>120</td> <td>98</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Upper (Nm)	Lower (Nm)		Upper (mm)	Lower (mm)	Tibia-1	277	237	ACL	11	9	Tibia-2	269	223	PCL	6	5	Tibia-3	204	176	MCL	23	18	Tibia-4	120	98				same as left
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Tibia-4	120	98																															
- Developed by	-	•BAST	•same as left																														
- Base data	-	•Flex-GTR-prototype with short outer lubber*	•same as left																														
- Test lab	-	•BAST (3 impactors) and JARI (1 impactor), n= 31 in total	•same as left																														
- Impactor conditions	-	•Tibia: Used	•same as left																														
	-	•Femur: Used	•same as left																														
	-	•Knee: Used	•same as left																														

* Short outer lubber was used for initial version of Flex-GTR-prototype

Future Action Plan

→ Report ●→ Activity → Submit

	2011		2012		
	Nov.	Dec.	Jan.	Feb.	Mar.
IG GTR9-PH2 Meeting		1 st			2 nd
TF RUCC Web Meeting	Kick off		1 st	2 nd	3 rd
Detailed Review					
Review of component test methods and corridors in details and update if needed	●→ Humanetics/JARI				
Preparation and Obtain Test Data					
Preparation of several Flex-GTR-productions which can meet component level certification tests corridors properly and all sensors are re-calibrated.		●→ Humanetics			
Obtain pendulum & inverse test data for update if needed			●→ Humanetics		
Update Proposal					○

Discuss again at 1st TF RUCC Web Meeting