ALTAIR
ONLY FORWARD

Altair Safety Report Manager
2022.3

GNCAP Occupant

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March 17, 2023

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Altair support portals are available 24x7 and our global support engineers are available during normal Altair business hours in your region.

When contacting Altair support, specify the product and version number you are using along with a detailed description of the problem. It is beneficial for the support engineer to know what type of workstation, operating system, RAM, and graphics board you have, so include that in your communication.

Location	Telephone	E-mail
Australia	+61 3 9866 5557	anzsupport@altair.com
Brazil	+55 113 884 0414	br_support@altair.com
Canada	+1 416 447 6463	support@altairengineering.ca
China	+86 400 619 6186	support@altair.com.cn
France	+33 141 33 0992	francesupport@altair.com
Germany	+49 703 162 0822	hwsupport@altair.de
Greece	+30 231 047 3311	eesupport@altair.com
India	+91 806 629 4500 +1 800 425 0234 (toll free)	support@india.altair.com
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Italy	+39 800 905 595	support@altairengineering.it
Japan	+81 3 6225 5830	jp-support@altair.com
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Mexico	+52 55 5658 6808	mx-support@altair.com
New Zealand	+64 9 413 7981	anzsupport@altair.com
South Africa	+27 21 831 1500	support@altair.co.za
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ALTAIR

Table of Contents

Altair Safety Report Manager Intro

The Altair Safety Report Manager (aka ASRM) is a fully customizable automatic report generation utility for crash & safety regulations. It allows users to create a First Sight Report PPT for the selected impact type & regulation. The PPT report which consists of plots & animations that are generated based on various inputs entered by the user.

A standard report is delivered for each mode with the following info and contents.

- Model information

- Run quality statistics

- Occupant requirements

- Structure requirements

- Structure overview

- User defined plots

In addition, HyperView template & session files are created at the end of report generation which contains all plots/animations for closer analysis. It has the capability to overlay plots from different iterations. It is also possible to overlay plots with test data in HyperView.

The ASRM utility can also be run on HPC after job completion.

ASRM GUI Overview

Below is a snapshot of the ASRM GUI. To understand the ASRM workflow better, the GUI is divided into various sections as highlighted & numbered in the below picture. The main functionality of all the sections is briefly described below.
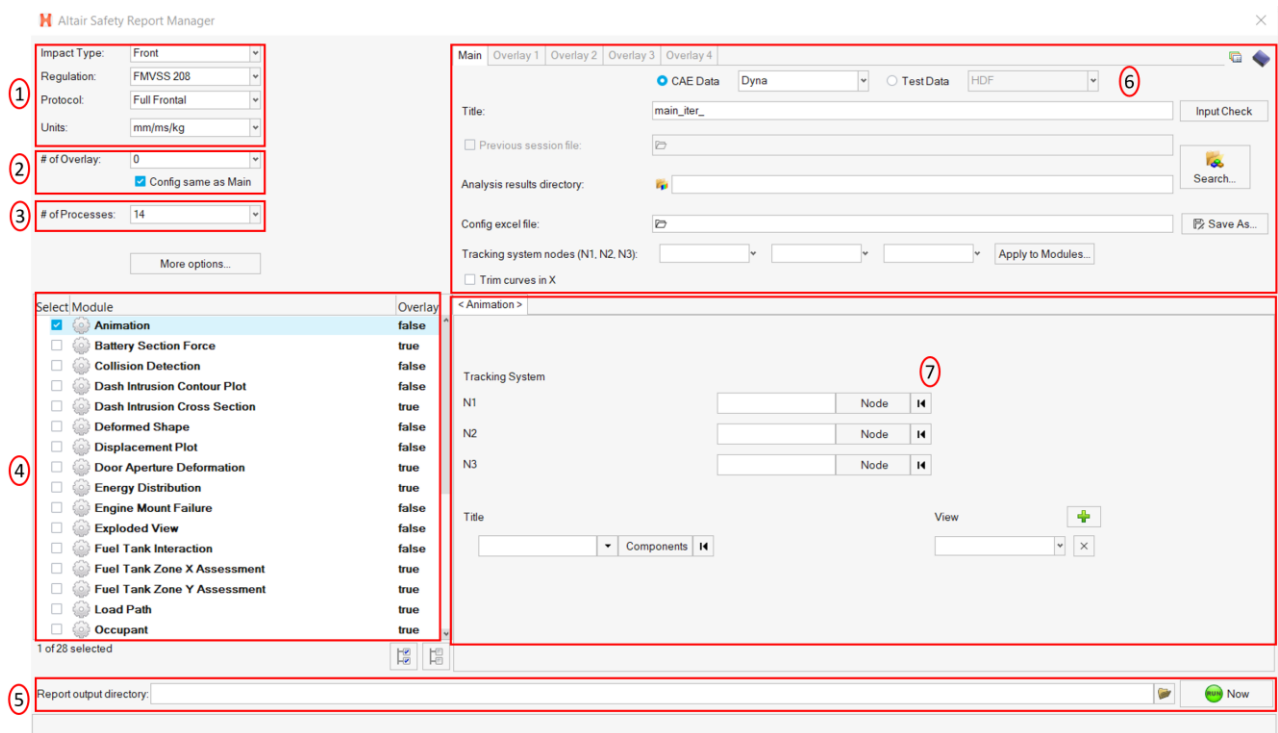
Impact Type & Units selection Section

In this section, user will be able to select the Impact Type, Regulation, and the Protocol for which he / she wants to generate the PPT report along with the source units used for running the simulation. Based on this selection the modules list (section #4) gets updated.

Overlay selection section

In this section user will be able to select the overlay option. Following scenarios are supported.

- When you want to generate report for a single run then you would set overlay option to 0. Therefore, overlay tabs (in section #6) is disabled.

- When you want to run in overlay mode, then you must pick appropriate number of overlay runs. The overlay tabs get enabled based on the number selected. User can select up to 4 iterations for overlay.

Please note that only those modules which run in HyperGraph (that create curves / graphs) are supported for overlay mode. There is a specific overlay status column next to modules list that indicates the overlay support for each module.

No. of Processes selection & save session file section

This section allows user to enter the no. of processes to be used when executing the utility. ASRM has the capability to run the report generation in parallel based on the no. of processes selected.

It also saves TPL files and session files at the end of the report generation. Users can also choose to export curves (curves created from the respective plotting modules) into **Excel** format. Click on the **More options…** button to select these options.

Modules list

This section allows users to select the modules to be run for report generation. User must make sure to select the module that he / she wants to include in the report generation.

Output directory selection

In this section user will select the output directory path. This is where all the output files such as the session files, images, animations, PPT & log files from the ASRM run will be created.

Main section

Input directory & configuration section

In this section, user should select the following.

- Type of data being used for generating the report. It could be CAE simulation data or physical test data.
- Title for the report which will be used for creating results directory as well as prefix for curve names & summary tables
- Results directory path where the solver input file, results files such as animation & time history files or test data are located.
- Config file path (if it exists already)

- Define global tracking system using 3 nodes (requests from Time history file). This is an optional input. Once the global tracking system is defined, it can be easily applied to other modules where tracking system is an input. Click on **Apply to Modules…** button, a selection dialog pops up, select the modules to apply the 3 nodes, and click **Apply&Close** button.
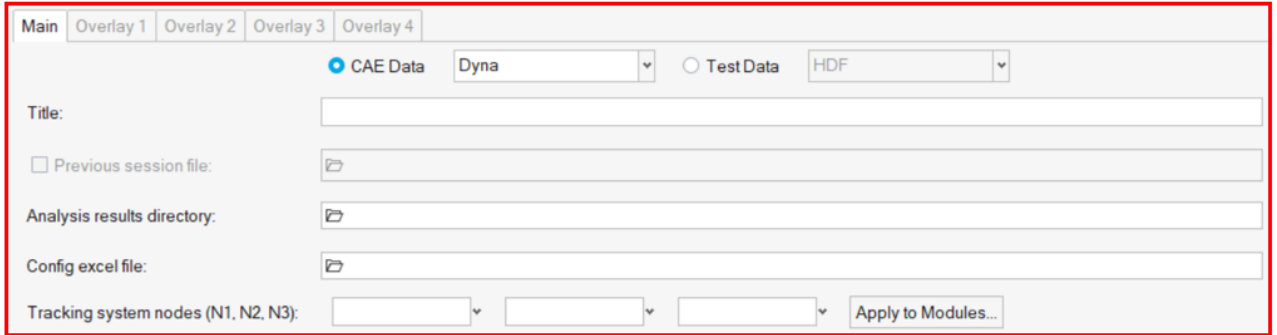

Input Validation check

Input Check button would run a quick validation check to verify if the inputs defined for various modules selected is valid. The verification is done on the results files available in the input directory specified. Any invalid inputs and missing input found from validation check will be highlighted in RED in the ASRM GUI as shown below.
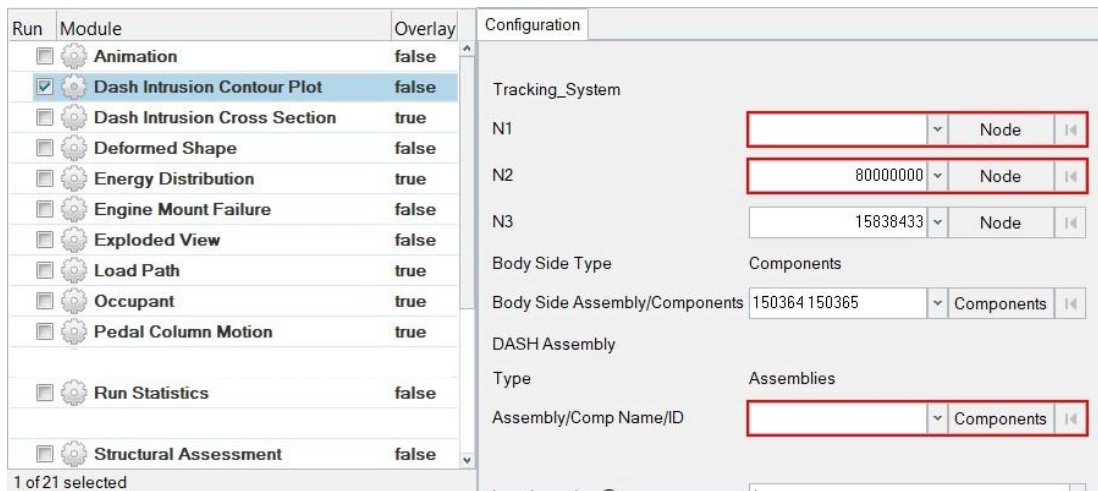

Search function

Search button will let users to select and import the 2D time history file (CAE (T01 / binout) or physical test data (HDF / ISO MME)) as well as main solver input file into the current session. This is required for defining the inputs for all the modules. An additional dialog called **files to load** will be displayed to select the files as shown below.
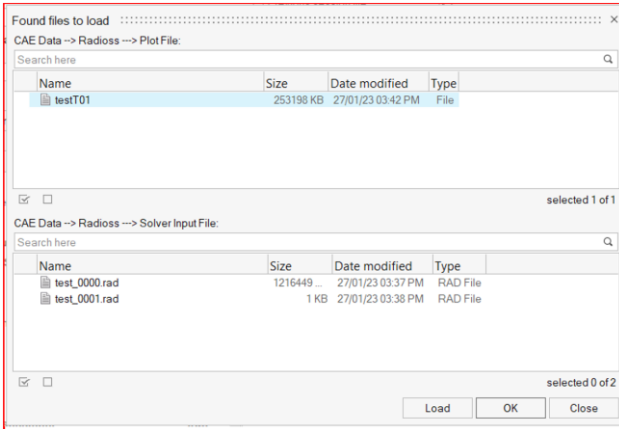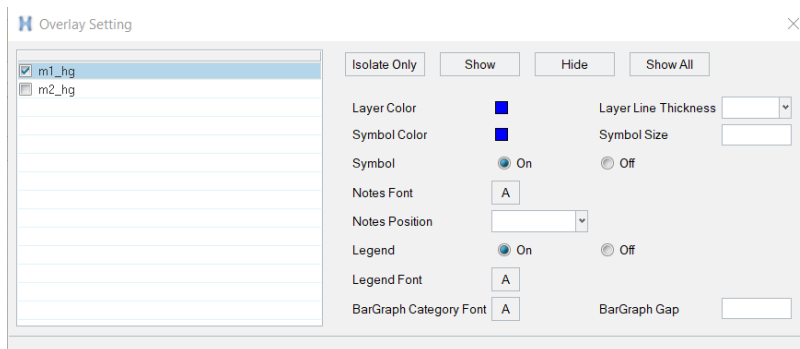
Change curve attributes & publish session

This section is mainly used for the overlay scenario.

The change curve attributes option brings up an overlay setting dialog as shown below. This will allow to change various curve & note related attributes for the overlay session per layer basis.

After changing the curve & note related attributes using the overlay setting dialog, user can click on Publish session icon which would publish a report for the overlay session.

Configuration section

This is the section wherein the inputs required for all the modules will be entered & displayed. For defining the inputs, firstly make sure to load both the 3D (solver input file) file as well as Time History file using the Load button. Then start defining the inputs for the modules.

FE entities such as nodes, components or assemblies can be selected from graphics screen from the loaded solver input file.

Inputs from the Time History files (subcases, requests & components) can be selected from the drop-down context dialog as shown below.

GNCAP Occupant Module

Introduction

The Global New Car Assessment Program (Global NCAP) is designed to provide a fair, meaningful, and objective assessment of the impact performance of cars and provide a mechanism to inform consumers. This protocol is based upon those used by the European New Car Assessment Program for adult occupant protection and child occupant protection ratings.

Method of Assessment

The starting point for the assessment of adult occupant protection is the dummy response data recorded in the frontal impact. Initially, each relevant body area is given a score based on the measured dummy parameters. The assessment also considers the structural performance of the car by taking account of such aspects as steering wheel displacement, pedal movement, foot well distortion and displacement of the A pillar.

For Adult occupant protection, the overall rating is based on the driver data, unless part of the passenger fared less well. It is stated that the judgement relates primarily to the driver. The adjusted rating for the different body regions is presented in a visual format of colored segments within a human body outline for the driver and passenger.

Points Calculation

A sliding scale system of points scoring has been adopted for the biomechanical assessments. This involves two limits for each parameter, a more demanding limit (higher performance), beyond which a maximum score is obtained and also a less demanding limit (lower performance), below which no points are scored. For the adult rating, the maximum score for each body region is four points. Where a value falls between the two limits, the score is calculated by linear interpolation.

For all tests that are part of the adult occupant protection assessment, capping limits are maintained for criteria related to critical body regions: head, neck and chest. Exceeding a capping limit generally indicates unacceptable high risk at injury. In all cases, this leads to loss of all points related to the tests. Capping limits can be equal to or higher than the lower performance limit, depending on the test.

Scoring & Visualization

The protection provided for adults for each body region are presented visually, using colored segments within body outlines. The color used is based on the points awarded for that body region (rounded to three decimal places), as follows:

- Green - 4.000 points

- Yellow - 2.670 - 3.999 points

- Orange - 1.330 - 2.669 points

- Brown - 0.001 - 1.329 points

- Red - 0.000 points

For frontal impact, the body regions are grouped together, with the score for the grouped body region being that of the worst performing region or limb. Results are shown separately for driver and passenger. The grouped regions are:

- Head and Neck,

- Chest,

- Knee, Femur, Pelvis (i.e., left and right femur and knee slider)

- Leg and Foot (i.e., left and right lower leg and foot and ankle)

The contribution of the frontal impact test to the Adult Occupant Protection Score is calculated by summing the body scores for the relevant body regions, taking the lower of the driver and passenger scores. The total achievable score is 17.00 points, and the overall scores are then used to generate star ratings as follows.

Frontal Impact:

- 14.00 – 16.00 points + 1-point SBR + 4ch ABS + ECE95* 5 stars

- 11.00 – 13.99 points 4 stars

- 8.00 – 10.99 points 3 stars

- 5.00 – 7.99 points 2 stars

- 2.00 – 4.99 points 1 star

- 0.00 – 1.99 points 0 stars

GNCAP Occupant

The GNCAP Occupant module generates following summary report based on user selected info.

1) Occupant protection summary

2) Adult & child occupant protection detailed summary table that includes various injury criteria, high & low performance limits, actual result obtained and the corresponding point value

3) Occupant performance plots
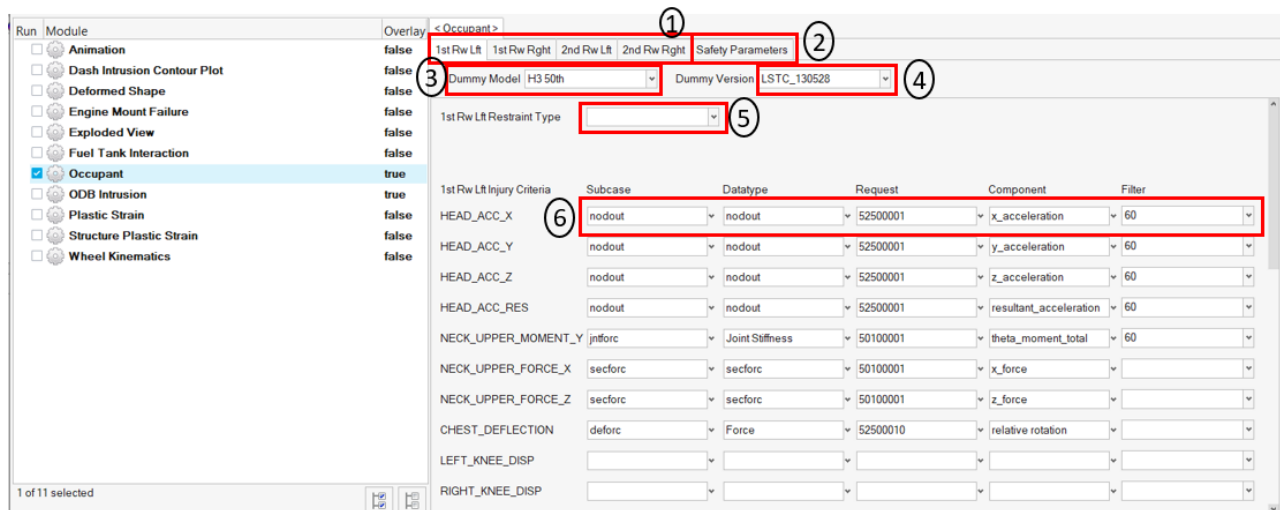
Inputs:

1) **Tabs** allowing users to define 1st row left & 1sr row right **adult** dummy info as well as 2nd row left & 2nd row right **child** dummy info independently

2) **Safety Parameters** tab allows to select various parameters to be included in rating calculation

3) **Dummy model** selection option. Currently following dummy types are supported for different occupant positions as per the regulation.

- For the 1st row left & 1st row right positions, Hybrid 3 50th dummy type is supported.

- For the 2nd row left position, Q1.5 dummy type is supported.

- Similarly, for the 2nd row right position, Q3 dummy type is supported

4) **Dummy version** selection. Users can either select a particular version number from the drop down or set it to config option. When selecting a version number, all the subcase, datatype, request & component types along with filters are predefined for the user based on defaults config file. When user selects the config option then it is user's responsibility to define all the inputs. This is especially needed when using a newer dummy version.

5) **Restraint type** selection. For each of the occupant, user is allowed to select the restraint type Belted or Unbelted.

6) **Driver / Passenger Injury Criteria selection**. This option is enabled only when the dummy version is set to config. User should first make sure to load the Time History file (binout) by clicking the Load

button. After loading the file, user can start defining the appropriate subcase, datatype, request & component types for each of the injury criteria.
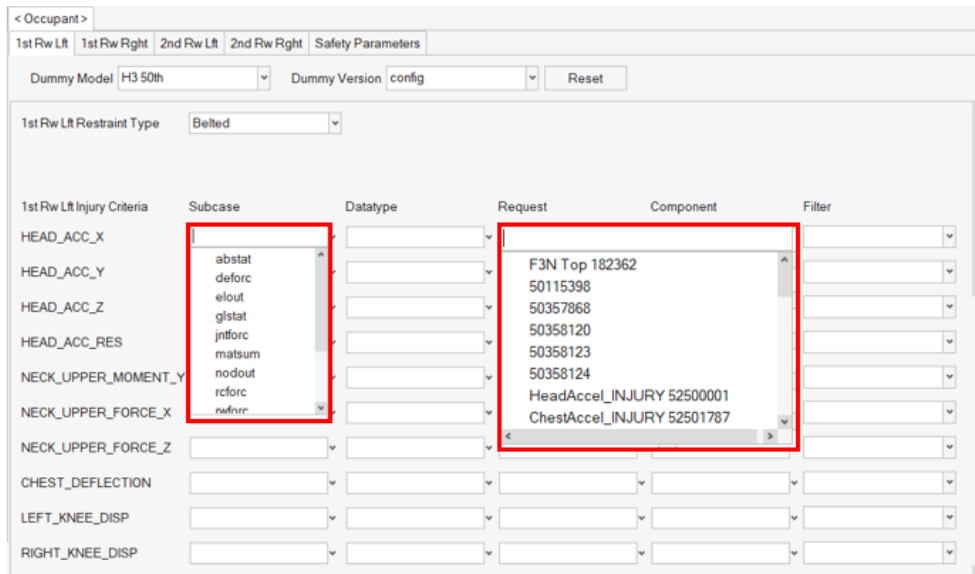
GNCAP Occupant Report details

A detailed report is generated for each of the occupant with the following info. A number of plots are created for each of the occupant injury criteria.

Adult Occupant Protection Summary
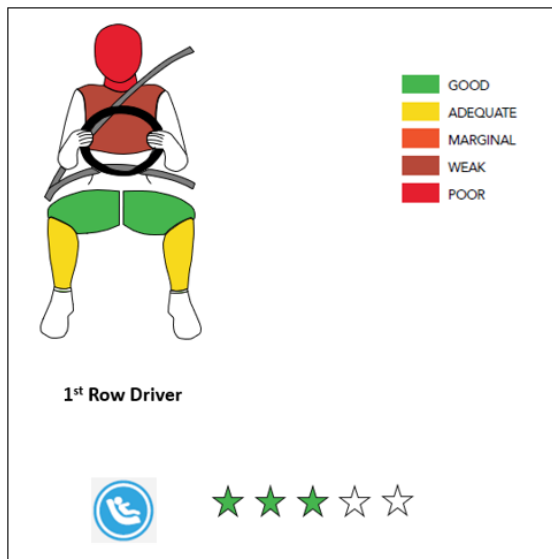
ADULT FRONTAL IMPACT OCCUPANT PROTECTION ASSESSMENT	H3 50th - LSTC_130528 - t1
Head-Neck	0
Chest	0.736
Femur-Knee	4
Tibia-Foot	3.806
Seat Belt Reminders(SBR)	1
Max (17)	9.542

AOP Total Points	9.542 Points
AOP Star Rating	3 Stars

Adult Occupant Protection Detailed Summary

	Title	Higher Performance Limit	Lower Performance Limit	Driver - H3 50th - LSTC_130528 - t1	Points
Head	HIC 15	500	700	490.238	4
	Resultant Acc. 3 msec (G)	72	88	68.175	4
Neck	Shear (N)	(0,25,35,45,1000) (1900.0,1200.0,1200.0,1100.0,1100.0)	(0,25,35,45,1000) (3100.0,1500.0,1500.0,1100.0,1100.0)	340.003	4
	Tension (N)	(0,35,60,1000) (2700.0,2300.0,1100.0,1100.0)	(0,35,60,1000) (3300.0,2900.0,1100.0,1100.0)	260.659	4
	Extension (N.m)	42	57	34.960	4
Chest	Deflection (mm)	22	42	38.322	0.736
	Viscous Criterion (mm/s)	500	1000	223.512	4
Knee	Left Knee Disp (mm)	6	15	err	err
	Right Knee Disp (mm)	6	15	err	err
Femur	Femur Axial Force - Left (N)	3800	7560	1129.302	4
	Femur Axial Force - Right (N)	3800	7560	1514.367	4
Lower Leg	Tibia Axial Force - Left (N)	2000	8000	2291.104	3.806
	Tibia Axial Force - Right (N)	2000	8000	2182.596	3.878
	Left Tibia Index	0.4	1.3	0.435	3.844
	Right Tibia Index	0.4	1.3	0.385	4
Foot-Ankle	Pedal dislacement (mm)	100	200	err	err

1st Rw Lft Head

1st Rw Lft Tibia Left

Tibia Left FX

Max 829.044
Min -308.198

Tibia Left FZ

Max 338.877
Min -2956.477

Tibia Left MX

Max 104.026
Min -73.609

Tibia Left MY_C

Tibia Index Left 0.435448

Max 83616.482
Min -18980.233