

Driveline

Through the [OpenBiomechanics Project](#), [Driveline Baseball](#) has made elite-level motion capture data publicly available. The data can be downloaded from [Driveline's GitHub repository](#).

Having access to large datasets is a great asset, but processing these large datasets can take time (and patience). Inspect3D is designed to streamline this process. The steps in this tutorial describe how to create CMZ files from the pitching and batting data sets, then inspect and group the data in Inspect3D.

Download

Download the files directory from the [repository](#) (Code → Download ZIP).

Data Structure Outline in openbiomechanics-main folder:

- baseball_hitting
 - code
 - v3d
 - CMO.v3s
 - model
 - hitting_v1_model_hybrid.mdh
- data
 - metadata.csv
 - c3d
- baseball_pitching
 - code
 - v3d
 - CMO.v3s
 - model
 - v6_model_hybrid_lm.mdh
 - data
 - metadata.csv
 - c3d

Download the [HAS-Motion Specific Files](#):

1. Filter Script
2. Event Script

1. Note: The event script updates the force platform parameters. Visual3D automatically combines the forces when one foot is in contact with two plates but requires the surfaces to be parallel (or close to). This script adjusts the corners which are coincident to allow the forces to be combined. This script is specific to this data set.

Additional files are provided as examples, but not necessary for processing (files to automatically build group definitions, a subset of group definitions, and sample workspaces).

Outline

1. Build CMZs
 1. This step is done once, or any time you collect more data
2. Build Group definition
3. Inspect data

Build CMZ Files

Pitching

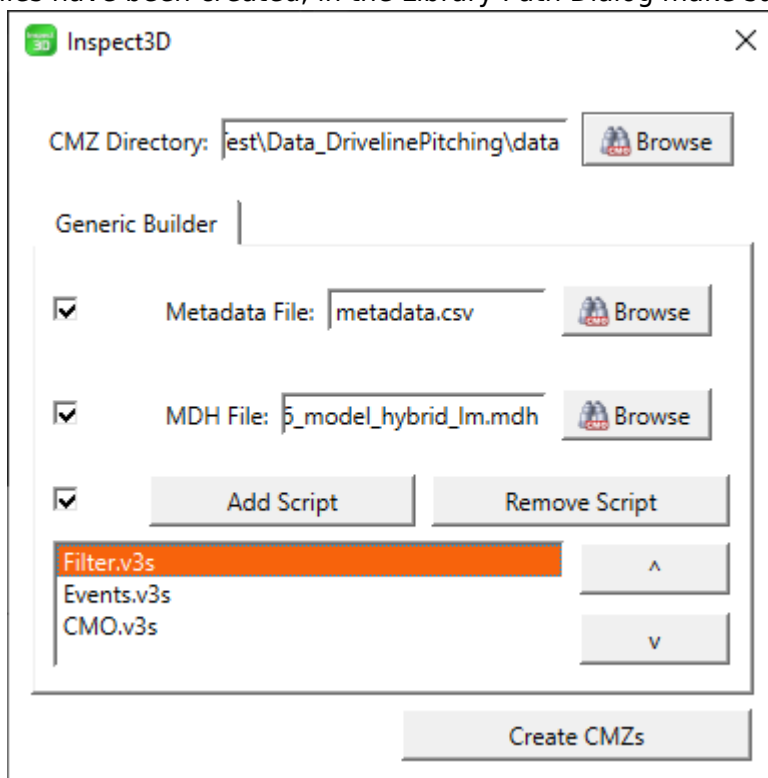
Build CMZ Files for Pitching Data: * Click [Load Library](#) Toolbar option

* In Library Path Dialog, click **Build CMZs**

* In the Build CMZ Dialog:

- Set the path to: C:\...\openbiomechanics-main\baseball_pitching\data\c3d
- [Metadata File](#): * C:\...\openbiomechanics-main\baseball_pitching\data\metadata.csv
- * MDH File: * C:\...\openbiomechanics-main\baseball_pitching\code\v3d\model\v6_model_hybrid_1m.mdh
- Add the following scripts and ensure they are in the correct order:
 - C:\...\CMotion Files\Filter.v3s
 - C:\...\CMotion Files\Events.v3s
 - C:\...\openbiomechanics-main\baseball_pitching\code\v3d\CMO.v3s

* Click **Create CMZs** * [Metadata](#): * Check "Subject Specific" next to playing_level * Load Library:
Once the CMZ files have been created, in the Library Path Dialog make sure the path is set correctly



and click **Load**.

Inspect3D

?

×

Height Units:

m

Weight Units:

kg

	Header	Description	Subject Specific
1	user	Metric	☒
2	session	Metric	☒
3	session_pitch	Text	☒
4	session_mass_kg	Weight	☒
5	session_height_m	Height	☒
6	age_yrs	Metric	☒
7	playing_level	Text	☒
8	pitch_speed_mph	Metric	☐
9	filename_new	Identifier_Dynamic	☐
10	modelname_new	Identifier_Static	☒

Cancel

Create

Hitting

Driveline Hitting Biomechanics

Build CMZ files for Hitting data:

Click Load Library Toolbar option

In Library Path Dialog click Build CMZs

Click In the Build CMZ Dialog:

Set the path to:

Metadata File:

MDH File:

Add the following scripts and ensure they are in the correct order:

Click Create CMZs

CMZ Directory:

pt\Inspect3D\Driveline_Regression_Test\Data\DrivelineHitting\data

Browse

Generic Builder

Metadata File:

metadata.csv

Browse

MDH File:

hitting_v1_model_hybrid.mdh

Browse

Add Script Remove Script

Files to Add

Event v3s

CMO v3s

Create CMZs

Inspect3D

?

×

Height Units:

in

Weight Units:

Lb

	Header	Description	Subject Specific
1	session_swing	Identifier_Dynamic	☒
2	session_mass_lbs	Weight	☒
3	session_height_in	Height	☒
4	athlete_age	Metric	☒
5	highest_playing_level	Text	☒
6	hitter_side	Text	☒
7	bat_weight_oz	Metric	☒
8	bat_length_in	Metric	☒
9	bat_speed_mph_max_x	Metric	☐
10	blast_bat_speed_mph_x	Metric	☐
11	exit_velo_mph_x	Text	☐
12	user	Identifier_Static	☒
13	session	Metric	☒

Cancel

Create

Metadata:

Height Units: in

Weight Units: Lb

session_swing: Identifier_Dynamic

user: Identifier_Static

Check "Subject Specific" next to playing_level, side, bat weight/length

Load Library:

Once the CMZ files have been created, in the Library Path Dialog make sure the path is set correctly and click Load.

Group Data

* Click **Group Definitions** Toolbar option

* Select **Group Definitions**

* In the **Group Definitions** dialog, click **Auto-Populate Groups**

* Choose the Signal Type and Folder

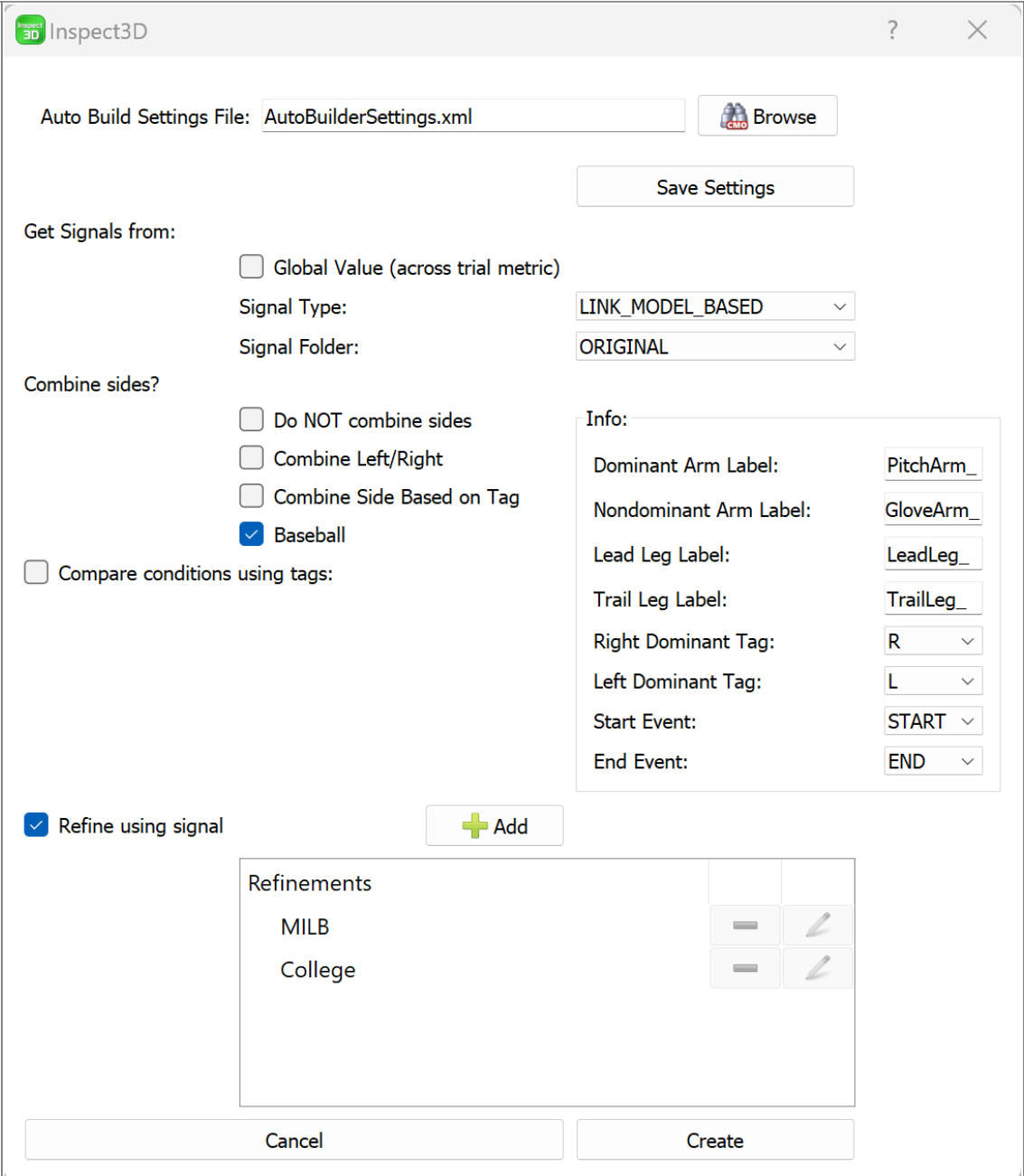
* Combine Sides?

* Select **Baseball** and options will appear on right

* For Hitting change default arm labels to LeadArm_/TrailArm_

* Refine using signal:

* Add refinements (ex. group based on playing level)



The image shows the 'Inspect3D' 'Auto Builder Settings' dialog box. At the top, there's a field for 'Auto Build Settings File' set to 'AutoBuilderSettings.xml' with a 'Browse' button. Below this is a 'Save Settings' button. The 'Get Signals from:' section has a checkbox for 'Global Value (across trial metric)' which is unchecked. Below it, 'Signal Type' is set to 'LINK_MODEL_BASED' and 'Signal Folder' is set to 'ORIGINAL'. The 'Combine sides?' section has three checkboxes: 'Do NOT combine sides' (unchecked), 'Combine Left/Right' (unchecked), and 'Combine Side Based on Tag' (unchecked). A 'Baseball' checkbox is checked. Below this is a checkbox for 'Compare conditions using tags:' which is unchecked. On the right, an 'Info:' section contains several labels and dropdown menus: 'Dominant Arm Label' (PitchArm_), 'Nondominant Arm Label' (GloveArm_), 'Lead Leg Label' (LeadLeg_), 'Trail Leg Label' (TrailLeg_), 'Right Dominant Tag' (R), 'Left Dominant Tag' (L), 'Start Event' (START), and 'End Event' (END). At the bottom left, there's a checked checkbox for 'Refine using signal' and an 'Add' button. Below these is a 'Refinements' list containing 'MILB' and 'College', each with a minus and a plus icon. At the very bottom are 'Cancel' and 'Create' buttons.

- Alternative: Click **Browse** to load these settings from an XML file to compare two playing levels (MILB vs. College).
 - C:\...\CMotion Files\AutoBuilderSettings_Pitch.xml
 - C:\...\CMotion Files\AutoBuilderSettings_Hit.xml
- Click **Create**
- In **Group Definition** dialog, delete groups you are not interested in calculating.
- Click **Calculate All Groups**
- Inspect your data!

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