

Forces FAQ

FAQs

Question: I'm doing **inverse dynamic analyses** but in some trials my participant has **two feet on one force platform** at the same time, and in others **one of their feet is simultaneously in contact with two different force platforms**. What should I do?

Answer

If two feet are on the same force platform at the same time, Visual3D has no way of parsing the FORCE data into two separate parts, one for each foot. This means that inverse dynamic calculations are invalid and shouldn't be carried out. Conversely, one foot contacting two platforms isn't a problem. Visual3D automatically 'assigns' segments to forces based on the distance of the COFP from the segments in the model. Put simply, the nearest segment to the COFP is assigned to the force. There is a threshold value that the separation distance must be within (0.2m), and we don't advise altering this without good reason. This assignment means that inverse dynamics are still calculated when a foot 'straddles' two platforms. Also, most people aren't aware that Automatic_Gait_Events are based on force assignments, so bad or absent assignments can create issues with these. We advise that force assignment should always be checked carefully. See [Force Assignments](#)

Question: When I look at **"Data Values"** in a FORCE signal, within the Signals and Events tree, what are the **X SUB, Y SUB and Z SUB** values?

Answer

Many people collect analog data at a higher rate than their motion capture data, which is the point rate. This is fine, as long as the higher rate is an integer multiple of the point rate. When force data are applied to a model, the resulting Link_Model_Based data are at point rate. This is because forces applied to segments cannot be calculated where the segment location is unknown (between point frames), i.e. there are no target data to generate segment locations for the 'extra' analog frames. However, the FORCE data retain the analog data rate. These 'extra' sample points are displayed as SUB frames within the point rate. Other Link_Model_Based data, which are based on segments, are also sampled at the point rate, since segmental data can only ever be calculated at point rate.

Question: How do **force assignments** work?

Answer

For all segments, except 'kinematic only' segments, Visual3D automatically calculates the distance between each segmental centre of mass and the centre(s) of pressure. In order to assign forces to segments, Visual3D automatically compares the locations of segments' centre of mass with the location of the centre of pressure. During a contact with a force platform the segment that has its centre of mass closest to the centre of pressure for the longest time is assumed to be the segment

that is in contact with the force platform. Put simply, the nearest segment to the centre of pressure is assigned to the force. There is a threshold value that the separation distance must be within, which usually excludes most segments within a model. This threshold value can be altered from its default setting, which is 0.2m, however we have found this default value to work best in most circumstances, therefore we don't advise altering this without good reason. Force assignment means that link model based items can be generated for left and right forces, centre of pressure position and free moments without the user imputing which foot contacted which force platform and even when a foot 'straddles' two platforms. Automatic_Gait_Events are based on force assignments, so bad or absent assignments can create issues with these. We strongly advise that force assignment should always be checked carefully (especially when using instrumented treadmills) and, if incorrect, altered manually. See [Force Assignments](#)

Question: What does **CalTester** do?

Answer (click to expand)

The COFP signal is created by transferring the centre of pressure calculated inside the force platform's coordinate system into the global, laboratory coordinate system. This transfer is based on the location of the force platform's corners and the offset between the top of the force sensors and the top of the platform's surface. The correct position of the COFP is key to accurate inverse dynamic calculations. Put simply, CalTester allows you to compare the position of the COFP, which has been transformed from the force platform's coordinate system into the global, laboratory coordinate system with how that position is represented using motion capture data. We can do this because we know where the end of the calibrated CalTester rod is in space, and can compare this to the calculated position of the COFP. The two can then be 'calibrated' to bring them closer together by altering the force platform location parameters. In order to ensure best results it is important to follow a few simple steps. Always Begin the data capture with the CalTester rod not in contact with the force platform, but make sure the base plate is in situ. This allows Visual3D to calculate a baseline zero for all the force platform channels. Once the rod is in contact with the base plate, the CalTester should be the only thing that comes in contact with the force platform. Ensure the rod is loaded longitudinally with a load of at least 200 N and that, during the data collection, the angle of the rod is no more than about 20 degrees. This will maximise accuracy of COFP calculation from the kinetic data and prevent the CalTester rod's tip sliding away from the bottom of the dimple in the base plate and being elevated. See [CalTester](#)

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