EDC　Technical　Newsletter

HVE & *HVE-2D* - Ongoing Developments

HVE & *HVE-2D* Version 5.20

Version 5.20 was released on February 1, 2007 and has been shipped as an update to all users with current Update/Technical Support policies. Users who have not received their updates should contact EDC Customer Service for assistance with tracking and obtaining your copy.

Update for *SIMON* Users Now Available

An interim update to the *SIMON* vehicle dynamics simulation model is now available for *HVE* 5.20 users. This update is available to download from the *Downloads* page of the *Support* section of the EDC website. Use the links found on the home page to navigate to the page or type the address directly in your browser - www.edccorp.com/support/downloads.html. Users will need to contact EDC Technical Support for an updated license file to run *SIMON* 3.12.

This update corrects a single issue where the tire model was using an incorrect value for friction, cornering stiffness or camber stiffness if the current vertical tire load exceeded the rated load or the current forward tire velocity was negative. If the tire load does exceed the rated load and/or the tire data set includes more than one speed and the tire is moving backwards, there will be a difference in vehicle behavior compared to *SIMON* Version 3.10. The difference will increase with an increasing difference between the second and third cornering stiffness values, as well as the magnitude of the tire forward velocity. In the *SIMON* Validation runs that involve only handling maneuvers, the difference in Version 3.10 and 3.12 results for rest position at the end of the event varies from zero to a few feet and five degrees.

Upcoming *DyMESH* Enhancements

Numerous changes are now being implemented and tested which will provide *DyMESH* users with more efficient and robust collision modeling. For example, an Advanced Mesh Options dialog will now allow the user to specify the region of the vehicle for applying more focused tessellation of the mesh areas involved in collisions. More details and release dates will be announced in the next newsletter.

Computer Recommendations

Here is a summary of the latest recommendations based upon user reports:

- Processors - DuoCore processor systems are providing excellent performance when using *HVE*.

- Graphics Cards - Graphics cards using NVIDIA chipsets still provide the most consistent performance for *HVE* users (GeForce is the best!). If we had to rank them for consistent performance, we would say NVIDIA, Integrated Intel and ATI in that order. Users with ATI cards still report having to reduce their hardware acceleration to avoid unexpected crashes.

- Windows Vista - We've received anecdotal reports of problems with Vista and various hardware and software, but our own evaluation using *HVE* on Vista is still underway. If you are running *HVE* or *HVE-2D* on a Windows Vista computer, please contact EDC Technical Support and tell us about your experience and the configuration of your computer. (Windows XP is still a great choice!)

2008 *HVE* Forum - San Diego, CA

The dates for the 2008 *HVE* Forum have been set for February 18 to 22, 2008. All events and activities will be held at the Holiday Inn On The Bay located in downtown San Diego, California. Planning has already begun for the new workshop content for 2008. More information about the 2008 *HVE* Forum including workshop schedules, descriptions and registration forms will be posted on the EDC website by mid-June.

DiscoverHVE.com

Collision Engineering Associates has launched a new website where subscribers can learn more about using *HVE* by viewing basic, intermediate and advanced video tutorials. Members can also participate in on-line discussion groups covering various topics such as tire side-wall impacts, video output, importing vehicles and scenes, using humans in *HVE*, and known issues or work-arounds. Visit www.DiscoverHVE.com or contact Collision Engineering Associates at 480-655-0399 for special introductory offers.

Technical Session

Our Technical Session this time deals with the subject of restitution, what it is and how it is calculated.

In classic particle physics (the study of the motion of bodies whose mass occupies a single point in space; the size and shape of the body do not affect the solution), the coefficient of restitution of two colliding bodies is defined as the ratio of the rebound velocity to the approach velocity, or

$$e = \frac{-(V_{r,1} - V_{r,2})}{(V_{a,1} - V_{a,2})} \qquad \text{(eq. 1)}$$

where $V_{r,1}$ and $V_{r,2}$ are the rebound velocities of bodies 1 and 2, respectively, and $V_{a,1}$ and $V_{a,2}$ are the respective approach velocities. Thus, $V_{r,1} - V_{r,2}$ is the relative separation velocity and $V_{a,1} - V_{a,2}$ is the relative impact (also called *closing*) velocity.

Note that we use the term *relative* (impact or separation) velocity. This is important. Because velocity is a vector; it always has a direction associated with it (as opposed to *speed*, which is a scalar and has no specified direction). Thus, the relative impact and separation velocities we use in eq. 1 must lie in a specific

direction. The direction we choose is defined by a line drawn from center of mass of particle 1 to the center of mass of particle 2.

But enough about particle physics. We're here to talk about the mechanics of colliding vehicles. The big difference is that vehicles are not particles; they have size and shape. This means they can rotate. Fortunately, as we'll see, this does not greatly affect the solution.

Figure 1 shows two vehicles at impact. A dotted line has been drawn through the vehicle centers of gravity. The line forms an angle, Φ_{imp}, with respect to the earth-fixed coordinate system. Now note the impact velocity vectors, $V_{imp,1}$ and $V_{imp,2}$. We need to determine the components of these velocities along the dotted line. To do this we calculate the earth-fixed directions, ν_1 and ν_2, of $V_{imp,1}$ and $V_{imp,2}$, respectively. These are

$$\nu_{imp,1} = \Psi_{imp,1} + \beta_{imp,1} \qquad \text{(eq. 2)}$$

$$\nu_{imp,2} = \Psi_{imp,2} + \beta_{imp,2}$$

where $\Psi_{imp,1}$ and $\Psi_{imp,2}$ are the impact heading angles of vehicles 1 and 2, respectively, and $\beta_{imp,1}$ and $\beta_{imp,2}$ are the respective impact sideslip angles (although our example shows zero sideslip angles at impact, this need not be the case).
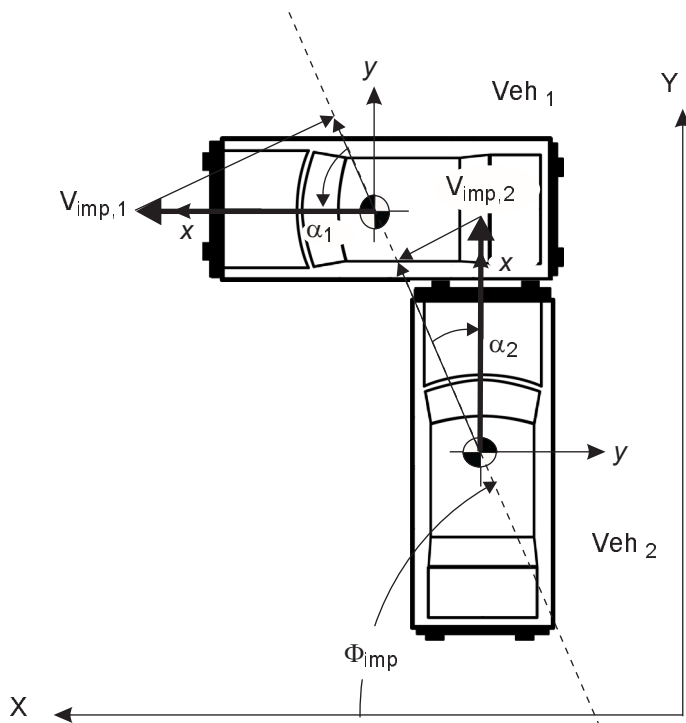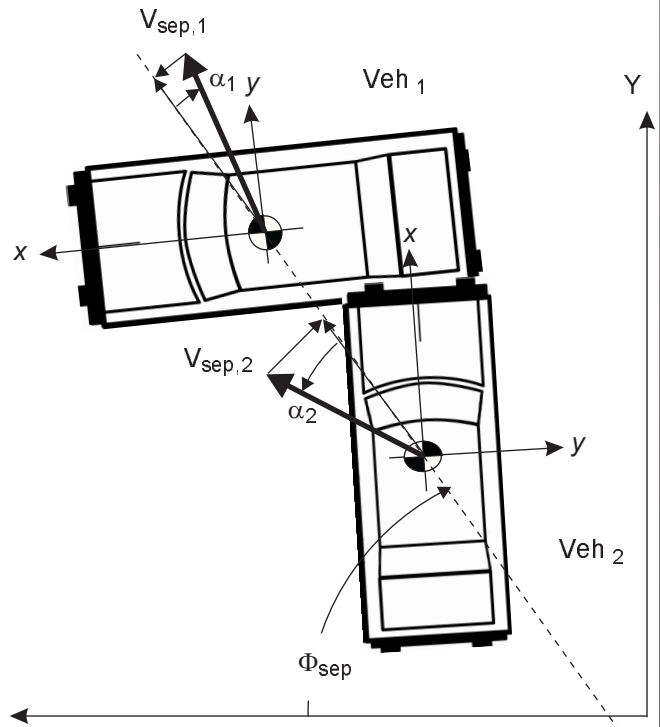

Figure 1 - At impact

Figure 2 - At separation

The angle from the dotted line to the impact velocity vector is

$$\alpha_{imp} = \nu_{imp} - \Phi_{imp} \qquad \text{(eq. 3)}$$

Thus, the component of the impact velocity vector lying along the dotted line is

$$V_a = V_{imp} \cos(\alpha_{imp}) \qquad \text{(eq. 4)}$$

Substituting, we can calculate the relative approach (closing) velocity as

$$V_{a,1} - V_{a,2} = V_{imp,1} \cos(\alpha_{imp,1}) - V_{imp,2} \cos(\alpha_{imp,2})$$
$$= V_{imp,1} \cos((\Psi_{imp,1} + \beta_{imp,1}) - \Phi_{imp}) -$$
$$V_{imp,2} \cos((\Psi_{imp,2} + \beta_{imp,2}) - \Phi_{imp}) \qquad \text{(eq. 5)}$$

Figure 2 is quite similar to Figure 1, except that it shows the two vehicles at separation. Again, a dotted line has been drawn through the vehicle centers of gravity. The line forms an angle, Φ_{sep}, with respect to the earth-fixed coordinate system. Now note the separation velocity vectors, $V_{sep,1}$ and $V_{sep,2}$. We need to determine the components of these velocities along the dotted line. We proceed in exactly the same manner as for impact velocities. Thus,

$$\nu_{sep,1} = \Psi_{sep,1} + \beta_{sep,1}$$
$$\nu_{sep,2} = \Psi_{sep,2} + \beta_{sep,2}$$

where $\Psi_{sep,1}$ and $\Psi_{sep,2}$ are the separation heading angles of vehicles 1 and 2, respectively, and $\beta_{sep,1}$ and $\beta_{sep,2}$ are the respective sideslip angles at separation.

The angle from the dotted line to the separation velocity vector is

$$\alpha_{sep} = \nu_{sep} - \Phi_{sep} \qquad \text{(eq. 6)}$$

Thus, the component of the separation velocity vector lying along the dotted line is

$$V_r = V_{sep} \cos(\alpha_{sep}) \qquad \text{(eq. 7)}$$

Substituting, we can calculate the relative separation (rebound) velocity as

$$V_{r,1} - V_{r,2} = V_{sep,1} \cos(\alpha_{sep,1}) - V_{sep,2} \cos(\alpha_{sep,2})$$
$$= V_{sep,1} \cos((\Psi_{sep,1} + \beta_{sep,1}) - \Phi_{sep}) -$$
$$V_{sep,2} \cos((\Psi_{sep,2} + \beta_{sep,2}) - \Phi_{sep}) \qquad \text{(eq. 8)}$$

We can now calculate the coefficient of restitution using eq. 1,

$$e = \frac{-(V_{r,1} - V_{r,2})}{(V_{a,1} - V_{a,2})}$$

Implementation

There are many different ways to implement the coefficient of restitution into calculations for impact and/or separation velocity. Eq. 1 can be rearranged as

$$V_{r,2} - V_{r,1} = e(V_{a,1} - V_{a,2}) \qquad \text{(eq. 9)}$$

which provides the relative velocities after impact based on relative velocities before impact. Similarly, we can calculate

$$V_{a,1} - V_{a,2} = \frac{V_{r,2} - V_{r,1}}{e} \qquad \text{(eq. 10)}$$

which provides relative velocities before impact based on relative velocities after impact.

But neither of these approaches is used in *EDCRASH*, *EDSMAC*, *EDSMAC4* or *SIMON*.

EDCRASH

EDCRASH calculates the separation velocity for each vehicle from scene data. Thus, $V_{sep,1}$ and $V_{sep,2}$ are both known. *EDCRASH* then calculates the impact velocity, using either the conservation of linear momentum or the damage-based procedure, for each vehicle. Thus, $V_{imp,1}$ and $V_{imp,2}$ are both known. The *EDCRASH* calculations for impact and separation velocity are <u>not</u> dependent upon a user-entered value of restitution.

After the calculations for impact and separation velocity are complete, *EDCRASH* uses eqs. 5, 8 and 1 to calculate the resulting coefficient of restitution. The value is then tested to confirm that it lies within a reasonable range (see Reasonable Range, below). If the value lies outside of this range, *EDCRASH* produces a diagnostic message alerting the user.

Collision Simulations

EDSMAC, *EDSMAC4* and *SIMON/DyMESH* (i.e., collision simulation models) calculate velocities at small, user-defined time intervals (integration timesteps) based directly on forces acting on and between the vehicles. Thus, we are prevented from using an approach based on the coefficient of restitution because the separation velocities that are required (see eq. 1) are not known until the <u>end</u> of the collision.

Collision simulations typically approach the issue of restitution by using a modeling technique that produces a restitution effect as the vehicles separate. *EDSMAC* and *EDSMAC4* employ three user-entered polynomial coefficients (not traditional restitution coefficients!) that increase the inter-vehicle collision force as the vehicles separate. *SIMON* employs a user-entered relaxation length to do the same thing. In each case, the approach is the same: After the displacement has been calculated for a rho vector (*EDSMAC/EDSMAC4*) or vertex (*SIMON*), the rho vector or vertex is allowed to grow back some of it's original displacement. The result is that there will be interference between the vehicles as they separate, causing them to push away from each other. This force increases the relative rebound velocity, $V_{r,1}$-$V_{r,2}$. Looking at eq. 1, as $V_{r,1}$-$V_{r,2}$ increases, the coefficient of restitution increases. Thus, the polynomial coefficients and relaxation length indirectly influence restitution.

It is difficult to predict how much restitution will be produced by the user-entered polynomial coefficients used by *EDSMAC/EDSMAC4*. The default values (C_0=0.04606, C_1=1.7547x10^{-3}, C_2=1.6711x10^{-5}) are intended to produce restitution in the neighborhood of 0.30. However, the effect varies according to the vehicles and collision type. The original CALSPAN SMAC technical reference[*] has an in-depth derivation of the restitution model. This reference includes recommended values for a plastic impact (C_1=5.0x10^{-5}, C_1=0.1000, C_2=50.0) and elastic impact (C_0=1.000, C_1=2.0x10^{-5}, C_2=1.0x10^{-10}). *EDSMAC* actually bypasses the restitution model entirely when C_0=C_1=C_2=0.0. Still, a simple *EDSMAC* axial collision simulation typically has restitution of about 0.10, and EDC does not normally recommend editing the coefficients. Bottom line: If the user chooses to edit the coefficients, trial and error is usually required to achieve the desired restitution effect.

As this Newsletter goes to press, the *DyMESH* collision simulation model is nearing the end of a significant revision. The restitution model has been changed, and EDC does not yet have sufficient experience with the new model to provide meaningful insight. However, it is expected that the default values for relaxation length will produce restitution in the neighborhood of 0.10 - 0.20. Same as for *EDSMAC/EDSMAC4*, trial and error will be required to achieve the desired restitution effect.

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* Mathematical Reconstruction of Highway Accidents - Scene Measurement and Data Processing System," Jones, I., Lynch, J., McHenry, R., DOT HS-801 405, February, 1975 (EDC Lib. Ref. 1052)

Reasonable Range

According to classic impulse-momentum theory, a coefficient of restitution equal to zero is termed a *plastic* impact. Eq. 1 shows us that when e = 0, the numerator (i.e., $V_{r,1}$-$V_{r,2}$) must be zero. Thus, when e = 0, the two colliding vehicles essentially stick together after impact. At the opposite extreme, a coefficient of restitution equal to 1 is termed an *elastic* impact. Eq. 1 shows us that when e = 1, the numerator and denominator must be equal. Thus, the approach velocity and rebound velocity are equal in an elastic impact. In this case, two colliding vehicles bounce off of each other at a velocity equal to their closing speed.

Neither of these conditions occurs in real-world collisions. In general, the coefficient of restitution for two colliding vehicles typically lies between 0.05 and 0.30. In some cases (e.g., a bullet vehicle striking the side of a stationary target vehicle), e may approach zero (in this case, the target vehicle is essentially impaled on the front of the bullet vehicle. And for low-speed, bumper-to-bumper collisions involving energy-absorbing bumpers, e has been measured at nearly 0.5. But these situations are the exceptions.

In theory, the coefficient of restitution can never be negative. To illustrate why this is the case, consider a rear-end, axial collision in which $V_{r,1}$ > $V_{r,2}$, (i.e., $V_{r,1}$ - $V_{r,2}$ > 0), where vehicle 1 is the bullet vehicle and vehicle 2 is the target vehicle. Because this is an axial collision, V_r is the same as V_{sep}. If $V_{sep,1}$ and $V_{sep,2}$ are in the same direction (rear-end, axial collision) and $V_{sep,1}$ is greater than $V_{sep,2}$, then vehicle 1 must literally drive *through* vehicle 2. This, of course, is not possible (unless vehicle 2 disintegrates). In real-world collisions, the coefficient of restitution calculated as shown in eq. 1 may sometimes be slightly negative if the collision is oblique and there is significant rotation.

Note that the denominator in eq. 1 can never be zero or negative. (If the relative velocity were zero or negative, the vehicles would not be approaching each other and a collision would never occur!) This important fact tells us something important about the diagnostic produced by *EDCRASH*: When *EDCRASH* calculates a negative coefficient of restitution, the problem always lies in the numerator. Because the relative rebound (separation) velocities are calculated purely from scene data, the problem always lies with the vehicle positions (i.e., path length), tire-ground friction or wheel lock-ups. Thus, the user should focus on these areas when working to resolve the negative restitution error.

Preparing CAD Models for the DXF Translator

While using your CAD program to construct DXF format drawings or models for use in HVE, you should take a few moments and plan out what you intend to do with your final model. Also, how should you assign layers and colors of objects? Careful use of the tools and capabilities of your CAD program will help you save time by limiting your use of the 3D Editor in *HVE*.

HVE allows users to import three formats of models: Open Inventor (.iv), VRML (.wrl) and DXF. The Open Inventor and VRML formats are directly supported and do not require conversion. DXF models are processed through a translator to convert them to Open Inventor format (Inventor V2.1 ascii format to be exact).

The DXF translator provided with *HVE* behaves as follows:

· Supports direct conversion of DXF files in formats for ACAD 12, 13, 14, 2000 and 2002. Newer versions of AutoCAD allow the saving of a Release 12 DXF format as a legacy format, so all versions of AutoCAD may be used to produce models. In many cases, the Release 12 format also provides the most consistent translation, so it would be the recommended format to use.

· LAYERS that are turned off when the DXF file is created will not be converted.

· When converting, the color of an object is the only descriptor that may result in a "grouped" object in the *HVE* environment model. In other words, objects are created by COLOR and not by LAYER from the original DXF. Here's the breakdown:

  · ENTITIES that have the same description (e.g. 3dface) and are the exact same color will be converted to a "grouped" OBJECT that is easily selectable in the 3D Editor.

  · ENTITIES that are not the same description (e.g. 3dface and polyface mesh) but are the same color will be converted to individual objects.

  · ENTITIES that have the same description and are NOT the exact same color will be converted to individual objects.

· The translator supports good conversion of FACES. These FACES may be 3DFACES, surfaces created using RULESURF or other surfacing commands, or Polygon/Polyface Meshes. AutoCAD LT does not directly provide for surface building, but add-on modules are available to extend AutoCAD LT so that all users could easily build surfaced environment models. (e.g. Toolbox LT from www.cadopolis.com)

· Supports conversion of many "drawing" entities (e.g. lines, polylines, circles), but if these objects are not easily described by points in the DXF file, then they will not be converted. A line clearly has a start point and an endpoint (or multiple points if a polyline), but the width of a line is not described by the points. Therefore, only the line will be converted and not the linewidth.

· A BLOCK is a collection of line and arc entities that create one selectable object in AutoCAD. BLOCKs may not be converted without being 'exploded'. However, the conversion process will probably generate an enormous number of separate line and arc objects which can result in a very large cumbersome file to work with in the 3D Editor. (A HATCH will exhibit the same behavior so limit your use of hatches in your drawings.)

· Supports conversion of TEXT to a standard font without additional attributes from the CAD program.

· Purging the drawing file before saving as DXF provides better chances of "error free" conversion.

· Grouping in the original DXF has no effect on the final model. It is best to explode the drawing down to common elements and then assign colors to convert the model as expected.

· Selecting the objects to be saved in the DXF file (rather than using a general DXFOUT action) provides better chances of "error free" conversion. For example, in ACAD 2002, in the Browser that appears for saving the DXF, change the *Files of Type* to Release 12 DXF, then select *Tools* (in the upper right corner of the browser dialog), *DXF Tools* and then click the check box for *Select Objects*. Then use a selection window to select the entities you want to have included in your environment model. This avoids "hidden" elements that are sometimes included in the DXF that will appear as unwanted text in the environment model in *HVE*.

· Using the 3DSOUT and 3DSIN functionality of pre-2007 AutoCAD can create optimized file sizes after conversion which are better handled by *HVE*. This functionality converts multi-point references used to describe surfaces that make up a mesh to actually using the points to define the mesh extents directly. This functionality also helps convert many entities as well, such as converting text to faces which are then easily converted. Try experimenting!

These behaviors are for AutoCAD format DXF models. Other CAD programs may produce DXF models that may or may not have the same behaviors.

Dealing with Model "White-Out" Conditions

Have you imported a DXF environment model or drawing into *HVE* and then found that it appears to have lost all assigned colors? But if you were to then go into the 3D Editor and rotate the view you actually see the colors originally assigned in your CAD program reappear on the objects? What is happening is that your object is reflecting all lighting directly back to your initial camera view resulting in a "white-out" of all colors. Why does this happen and how can you overcome it?. Let's find out . . .

When an entity is translated from DXF to .iv format using the *HVE* DXF translator, the color originally assigned in AutoCAD is converted to a Material diffuseColor in RGB values. Other color descriptor values assigned as defaults by the translator include ambientColor, specularColor and emissiveColor. If you looked at the text of a converted model, the Material statement for a RED entity may look like something like this example below:

```
Material {
    ambientColor 0.2 0.2 0.2
    specularColor 0.55 0.55 0.6
    emissiveColor 0.05 0.07 0.07
    transparency 0
    diffuseColor 0.976563 0 0
        ... }
```

The values assigned for specularColor and emissiveColor are responsible for the "white-out" behavior that users often see when viewing objects from directly overhead in *HVE*. (The *HVE-2D* camera view is always from overhead, so every object experiences the "white-out" of the assigned colors expected from the original DXF drawing.)

There are two methods to try to correct this issue. The first is to use the 3D Editor and select each object and change the Material Color values for specularColor and emissiveColor to essentially 0.0. This may require a considerable amount of time depending upon the number of objects you have to select and edit. The second method is to open your environment model in Wordpad and then search for specularColor and change the values to 0.0's and then repeat the change for emissiveColor to 0.0's as well. You may have to experiment with the value to determine what provides the best appearance for your model.

Inserting Simulation Results Into Reports

Would you like to insert the text from the Playback output reports directly into your final document? You cannot directly select, copy and paste the text from a report (e.g. Accident History) displayed in Playback, but you can print the report using a Generic/Text Only printer to produce a text document which can then be directly copied and pasted.

If you don't have a Generic/Text Only printer already installed, you can add one as follows: Click on *Start, Control Panel*, then click on *Printers and Faxes*. Choose to *Add a Printer*. This will launch the *Add a Printer Wizard*. When prompted choose to add a printer connected to your local computer. Change the 'LPT port' selection to be 'FILE' as the destination. For make and model, choose 'Generic' and 'Text Only'.

To print your report to a text file which can then be copied and pasted into another document, start *HVE* and open up the case that has your completed, executed events. Go to Playback and add the reports of interest. Select a report and then select *File, Print* and choose the destination as the 'Generic/Text Only' printer. When prompted, enter a file name for the document. (Your file will be saved at the path you specify in the dialog so be sure to indicate the complete path and filename, e.g. C:\HVEreport\Doe\AccHist.txt.)

Once the report is printed, browse to the text file and open it. You will now be able to select, copy and paste the text into your final report. You can also open the file in a spreadsheet for comparing results between runs.

2007 Year/Model Interchange List

The 2007 Year/Model Interchange List (often referred to as the "Sisters and Clones List") is now available to download from the Technical Reference Library of the EDC website. Visit www.edccorp.com and then follow the links to *Library* and *Technical Reference Library* and then scroll down the list of publications to find and download Publication 1057.

This list is provided free of charge as a courtesy to the Traffic Accident Reconstruction Community by Gregory C. Anderson of Scalia Safety Engineering. Anyone who downloads and uses this list should forward a big "THANK YOU" to Greg for all of his efforts to maintain and update this list every year!

HVE and *HVE-2D* F.A.Q.

This section contains answers to frequently asked questions submitted to EDC Technical Support staff by *HVE* and *HVE-2D* users.

Q: I'm using EDCRASH to reconstruct a two vehicle crash. I am positioning vehicles on my scene diagram and also entering Damage Profiles for both vehicles. I now need to change the Stiffness Coefficients of one of the vehicles to reflect updated information and I have gone back to the Vehicle Editor and made the changes. However, when I rerun the events and view the Vehicle Data report, I still see the original values for Stiffness Coefficients. Why?

A: In *EDCRASH*, the Damage Profiles dialog inherits the original stiffness coefficients from the Vehicle Editor and is then the "source" input for the calculations. In order to change the vehicle stiffness coefficients for the updated information you need to use, you need to go to the Damage Profiles dialog in your event and then click on the A Stiff and B Stiff buttons at the bottom of the dialog. Update the values as required for the vehicle and then when you reset and run the calculations, you will see that the updated values are now used.

Q. In my EDSMAC4 collision simulation, I am hitting a pole with the right front corner of a sedan. The sedan does have a significant curvature to the front. I'm noticing that there is visual damage to the upper portion of the sedan but not to the "underneath" even though the velocity at impact is about 25 mph. Why?

A. Most likely the issue is specific to the geometry of the vehicle model. Why? Simply stated, the *EDSMAC4* collision model uses vectors which radiate from the CG in the X Y plane. During the collision with another vehicle, those vectors are mathematically shortened. Damage visualization is performed by moving any vertices of the vehicle mesh located within the same vertical plane as the shortened vector. Therefore, if there are vertices of the vehicle mesh located in the same region as the shortened vectors, the mesh will display the damage. If you look closely at the underside of the model in wireframe mode (or hidden line) you may see that the underneath has a vertex at the nose of the vehicle and then very large triangles that extend back to the front of the wheel wells. So there is a vertex at the nose and then not again until the sides of the vehicle. The impact with the pole may be causing damage in a region where the upper portion of the vehicle mesh has vertices, but the underneath does not have vertices. Therefore the upper portion of the vehicle mesh is moving with the shortening of the vectors, but not the underneath. If you were to tessellate the sedan to about 6 inches or so, that will add detail to the mesh of the vehicle so that there are now vertices in the underneath for the shortened vectors to "pull back" during the crash. Run your event and you'll find that the underneath now is displaced just like the upper portion of the vehicle.

Q: I am using a custom vehicle geometry file. It is properly displayed on my vehicle in the Vehicle Editor, but when I go to the Event Editor, the geometry is replaced by a generic image. Additionally, when I run the event I may see that the geometry completely disappears! This geometry used to work fine in HVE 5.10, but in HVE 5.20 I'm having this issue. Why?

A: In *HVE* 5.20, the Event now requires that the vehicle geometry filename must be no longer than 30 characters (that includes the .h3d extension). Check the filename for your vehicle geometry file and shorten it to be less than 30 characters. Reapply it to the vehicle in the Vehicle Editor and reset and run your event. Your vehicle geometry should appear as expected in the Event and throughout *HVE*.

HVE-related Employment Opportunities for Users

Engineering Technician

Ruhl Forensic, Inc. is seeking a full-time individual with experience in the use of *HVE* and *HVE-2D*, AutoCAD and various other forensic software packages. This individual will work with the technical staff in providing assistance in all aspects of accident investigation and reconstruction. This position is located at the Champaign, Illinois office only. Please visit www.ruhl.com/engineeringtechnician or call 800.355.7800 for more information about the position requirements and the company.

Engineer or Engineering Technician

Castaneda & Associates Consulting Engineers is currently hiring an engineer or an engineering technician with experience and proficiency in the application of *HVE* software packages, AutoCAD & Rhino. Job duties will include providing engineers assistance in the reconstruction of vehicular collisions including the collection and analysis of field data. The office is located in Fresno, California. Please submit resumes and/or inquires to Rene A. Castaneda via email at racastaneda@comcast.net or call 559.255.7885.

EDC Training Courses

EDC Reconstruction & EDC Simulations

EDC offers an excellent training course on the use of the EDC reconstruction program, *EDCRASH*. Both new and long-time users of *EDCRASH* agree that the *EDC Reconstruction* course is extremely beneficial and challenging.

EDC also offers an excellent training course on the use of EDC simulation programs, such as *EDSMAC*, *EDSMAC4*, *EDSVS* and *EDVTS*. The *EDC Simulations* course offers the fastest way to learn what you really need to know – how to efficiently use the program and get the right results.

These one-week courses are designed to fully investigate the program's inner workings. Lectures are full of helpful hints gained from years of experience. During the course, students will use the programs (e.g. *EDCRASH*, *EDSMAC4*) in either the *HVE* or *HVE-2D* simulation environment to complete several workshops highlighting the capabilities of the programs.

HVE Forum

The *HVE* Forum is an excellent opportunity for *HVE* and *HVE-2D* users to jump to a new level of ability. By participating in workshops, attendees brush up on their present skills, learn new techniques, and learn how to use the latest advancements in the software. The *HVE* Forum also presents a great opportunity to meet other users and expand your network of resources.

Engineering Dynamics Corporation
Training Course Schedule

EDC Simulations

Los Angeles, CA . . . . January 2009

Miami, FL . . . . November 12 - 16, 2007

EDC Reconstruction

Los Angeles, CA . . . . January 7 - 11, 2008

Miami, FL . . . . November 10 - 14, 2008

Theoretical & Applied Vehicle Dynamics

TBD. . . . . TBA

2008 *HVE* FORUM

San Diego, CA . . . . February 18-22, 2008

Vehicle Dynamics

Theoretical and Applied Vehicle Dynamics extends the theory of the basic SAE course and includes direct applications using several vehicle simulation programs (e.g. *SIMON*, *EDVSM*) within the *HVE* simulation environment, as well as a solid theoretical background for such simulations. The course is focused towards vehicle design engineers and safety researchers with an interest in a greater understanding of vehicle dynamics and automotive chassis systems development.

Hands-on Training

Intensive hands-on training on how to use your *HVE* or *HVE-2D* system software, physics programs and databases is available. Contact EDC Customer Service for more information about bringing this two-day on-site course to your office.

Course Registration

You may register for a course by contacting EDC Customer Service at 503.644.4500, or by email to training@edccorp.com. You can also visit the Training pages on our website and download a course registration form. All courses are eligible for Continuing Education Units and ACTAR credits. See you at our next course!

Related Training Courses

Northwestern University Center for Public Safety (NUCPS) is no longer actively scheduling the COMPTAR and MATAR courses which used *EDCRASH* and *EDSMAC*. The material previously covered in these courses is covered in the EDC Reconstruction and EDC Simulations courses. If you are interested in hosting one of these courses at your location, please contact EDC Customer Service at 503.644.4500.