Introduction to Vampire Pro 8.00 + future developments

Vampire User Event - 14th June 2022

Alan Minnis, Ian Hills

Contents

- Introduction to Vampire Pro V8.00 – Inline Creep Law

- Future Development Plans

- Bug Fixes and Enhancements

Introduction to Vampire Pro 8.00

- Vampire Pro 8.00 forms a major update to Vampire

- Brings new Inline wheel-rail contact facility previously unavailable.

- Aiming for release in July 2022

- Will be available to download from the members area of the website
  https://vampire.clyx.net
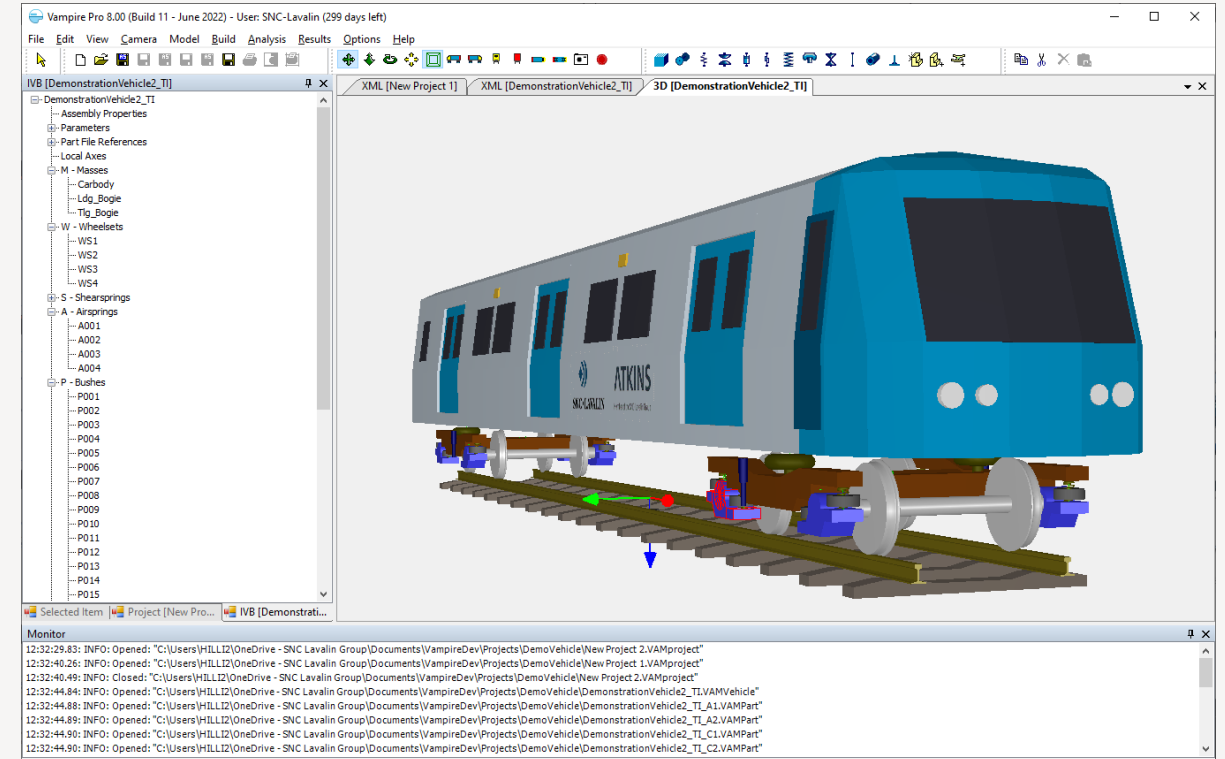
Vampire Pro 8.00 - Inline Creep Law

- Major New feature is an Inline creep law.

- What is an in-line creep law?

- What benefits does the Inline creep law bring?
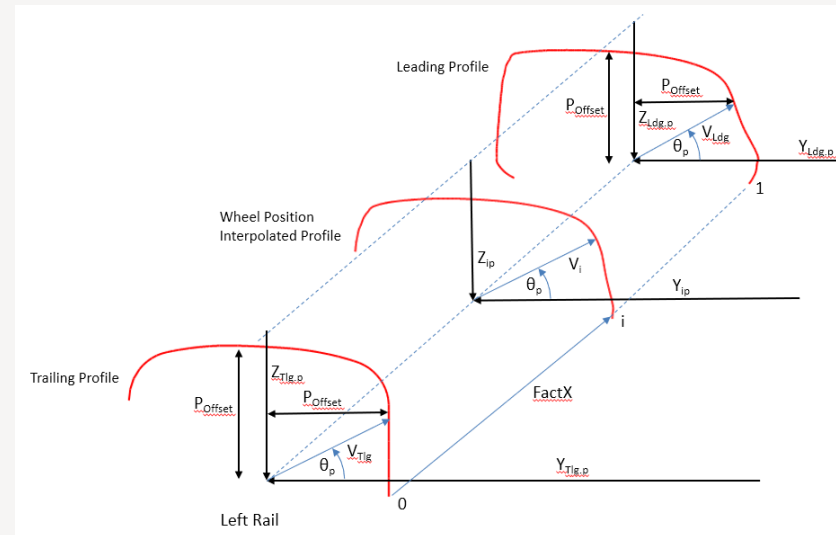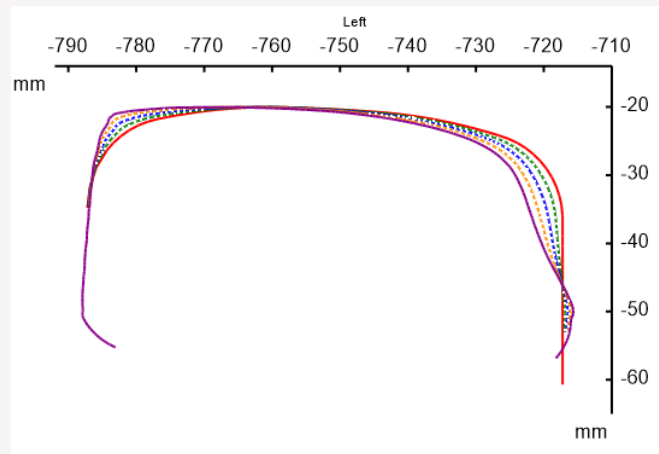
Vampire Pro 8.00 - Inline Creep Law

- Simulation with fixed wheel and rail profile

```
Pre-calculated Contact Data Simulation        In-line Contact Data Simulation
UNITS VAMPIRE                                  UNITS VAMPIRE
FouraxPro.veh                                  FouraxPro.veh
*TRANSIENT                                     *TRANSIENT
DISTANCE      200.000                          DISTANCE      200.000
INTEGRATE       0.001                          INTEGRATE       0.001
OUTPUT          0.020                          OUTPUT          0.020
SPEEDM/S       24.000                          SPEEDM/S       24.000
TRACKIRREGULARITY  TRACK160.dat                TRACKIRREGULARITY  TRACK160.dat
*CREEP                                         *CREEP
NON-LINEAR                                     IN-LINE
PROFILE   BR113a-20_BR-P8.con                  WHEELPROFILE    BR-P8.whe
FRICTION   0.30000   0.30000   0.30000  0.30000 RAILPROFILE    BR113a-20.rai
0.30000   0.30000                              FRICTION   0.30000   0.30000   0.30000  0.30000
*OUTPUT                                         0.30000   0.30000
Wheelset Lat Disp                mm            *OUTPUT
W01Y                                           Wheelset Lat Disp                mm
Wheelset Yaw Disp                mrad          W01Y
W01W                                           Wheelset Yaw Disp                mrad
DQ/Q Wheel 1L                                  W01W
QL01                                           DQ/Q Wheel 1L
Y/Q Wheel 1L                                   QL01
YL01                                           Y/Q Wheel 1L
*                                              YL01
                                               *
```

Vampire Pro 8.00 - Inline Creep Law

- Accurately simulates
  - Varying track gauge
  - Varying wheelset angle of attack
  - Varying continuous rail cross sections

- Inline Method Current Simulation Times
  - An Inline simulation is significantly slower than a pre-calculated table solution

    - Contact data must be calculated at every calculation timestep
    - The type of simulation can have a significant effect

  - A typical sample 200m run at 24m/s and 0.001s timestep with fixed profile sections

    - In-line solution takes 11 minutes (time for a cup of tea!)
    - Pre-calculated contact data table 0.4 seconds! (time to blink!)

  - Use sparingly for slow speed simulations and at 0.0001s timesteps

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Vampire Pro

Vampire Pro 8.00 - Inline Creep Law Options

- Calculation Setting Options
  - RELRANGE
  - ABSRANGE
  - INCREMENT
- Contact Data Options
  - MULTI2PTON
  - FLANGE2PTANGLE
- Investigation and Debugging Options
  - WHEELSETYAWOFF
  - GAUGECHANGEOFF
  - CONOUTPUT
  - RAIOUTPUT
- Other Options
  - All Options from Non-Linear Creep Law
  - Variable rail cross section

Vampire Pro 8.00 - Inline Creep Law

- Release Date July 2022

- System Testing and Release Candidate evaluation completed

  - Solutions to an issue relating to the required accuracy of the contact data currently being investigated prior to release

Inline Creep Law - Future Enhancements

- Improve simulation times

- Improve accuracy and reliability

- Implement rail roll

- Implement CONTACT solution (see later)

Future Developments

Future Developments – Cloud Licensing

- Existing licencing is through USB Hardlocks (dongles)
- Advantages:
  - Secure, well controlled, easy to transfer locally between users
- Disadvantages:
  - Not flexible in geographically diverse organisations or when working from home
  - Not easy to add or manage multiple licences

- Cloud licencing is next development in pipeline.
- Option in addition to traditional hardlocks.
- Flexible pool-based licence management.
- Ability to use Vampire on servers and remote desktops.
- Ability to borrow licenses for offline use.
- Scheduled for 2022

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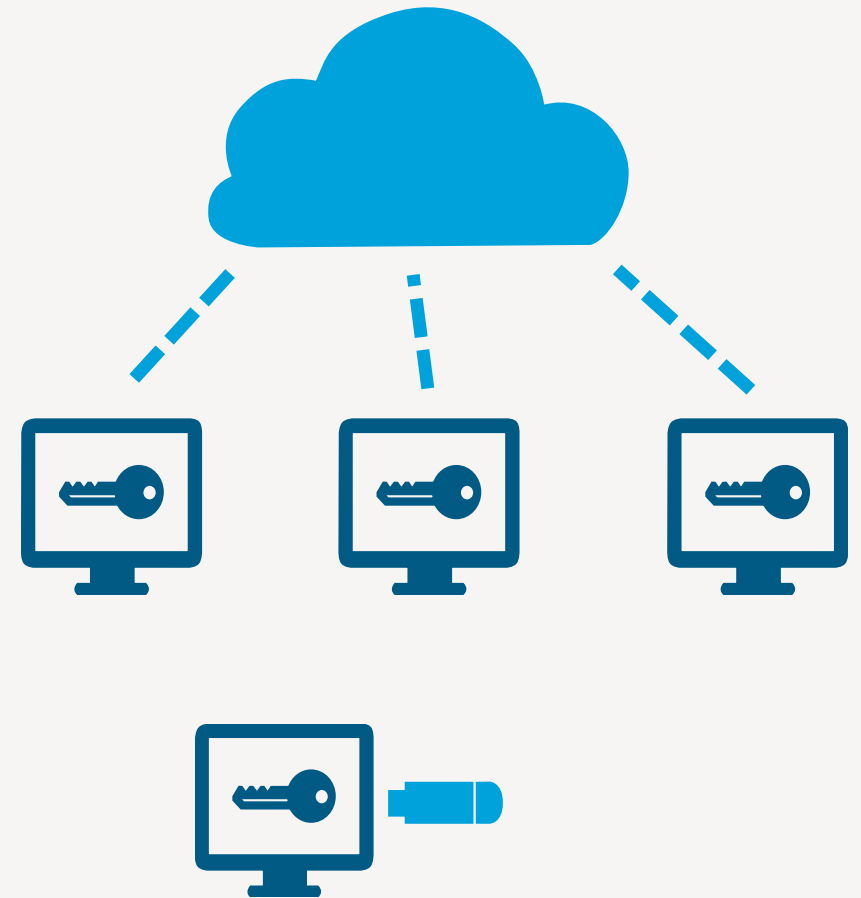
Future Developments – CONTACT integration

- Integration of CONTACT (by Edwin Vollebregt of VTech CMCC) as a new optional creep law that can be used instead of the native "In-line" creep law.

- CONTACT widely considered the gold standard of wheel-rail contact.

- Native Vampire "In-line" creep law is Hertzian, CONTACT is non-Hertzian.

- Integration of new CONTACT 3D special track works capabilities.

- Integration of new CONTACT 3D deviations in wheel and rail profiles allowing modelling of wheel defects, rail corrugations and similar features.
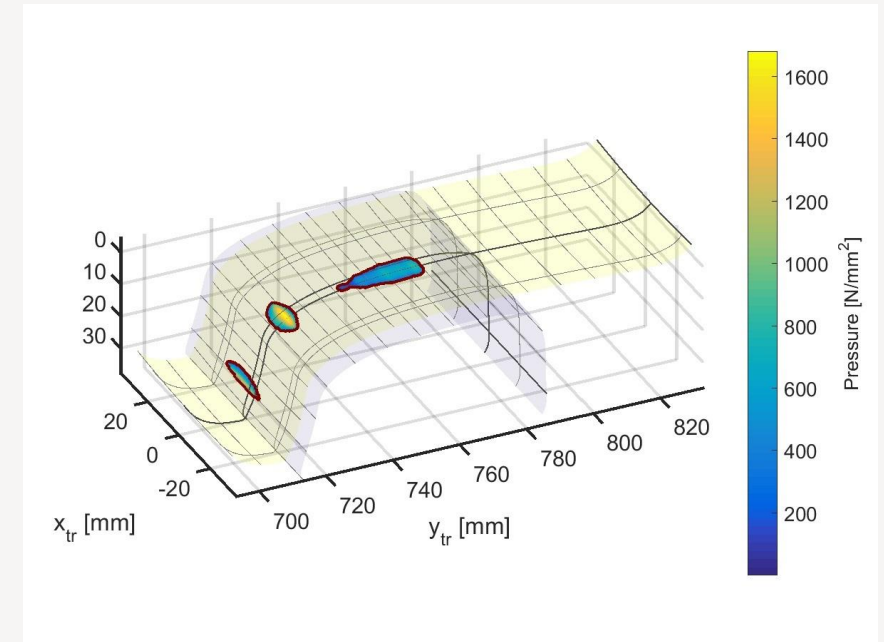

Image courtesy of Edwin Vollebregt, 2021

Future Developments – Other potential developments

- Re-write Line Element code for position format keeping link equations
  - This would allow line elements to behave correctly across multiple defined coordinate systems.

- Non-linear Shear Spring
  - Allowing the user to correctly define a shear spring with non-linear characteristic.
  - Avoids compromise of using multiple elements.

- Enhanced track flexibility model
  - Allowing different track forms to be modelled

- Bug fixes and Maintenance Enhancements
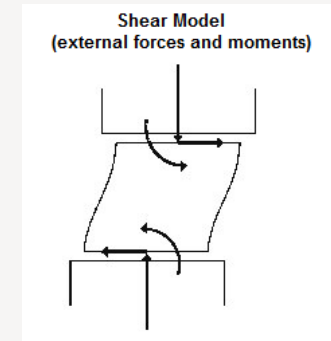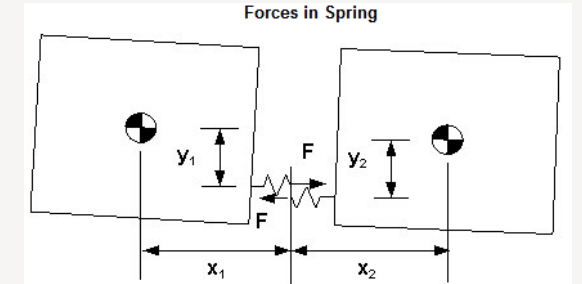
Bug Fixes and Enhancements

Reporting Bugs and Requesting Enhancements
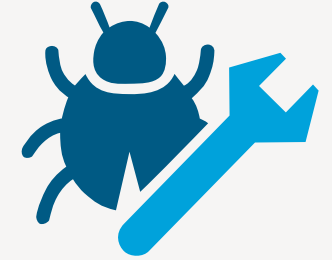
- If you discover a bug in the software, please report it via the Vampire helpdesk Email vampire@atkinsglobal.com or use https://vampire.clyx.net

- Please report it even if you think the bug is already known about.

- Reported bugs will be checked and prioritized.

- We are still keen to hear about bugs in the legacy versions of Vampire, as these may persist in subsequent releases.

- We are always keen to hear your ideas for improvements to Vampire.

- Developments of a broad interest can be funded as part of general Vampire development.

- If clients have a particular niche requirement, we are open to collaborating on a joint project to deliver that capability within Vampire or in connection with other software – please ask

Q & A

Thank you

Vampire Pro