

SIMPACK Chain GUI

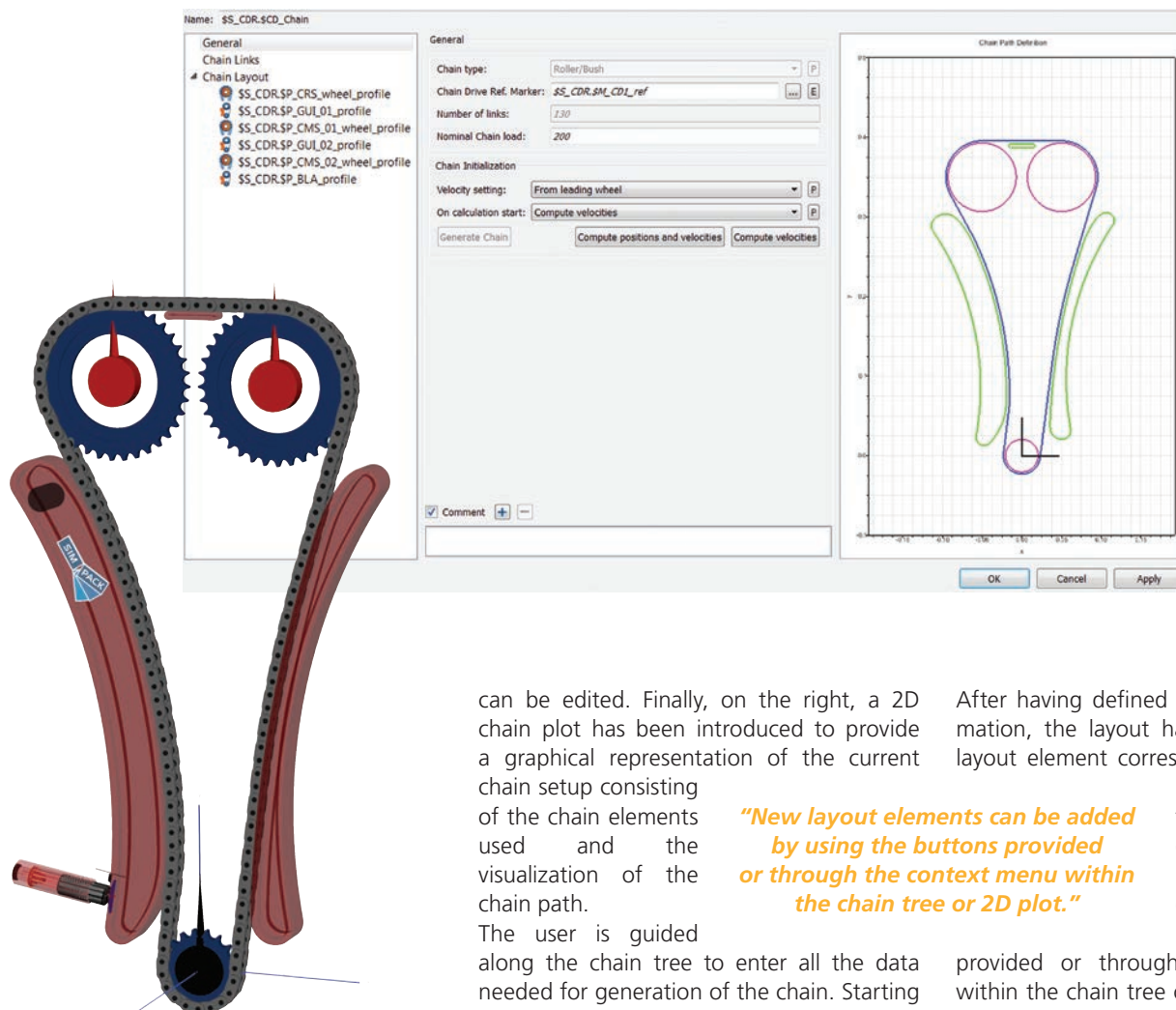


Fig. 1: New SIMPACK Chain GUI

Expanding the possibilities, SIMPACK 9 offers a complete new SIMPACK Chain generation process in terms of implementation of graphical user interfaces. Various features to ease the set-up of a chain drive have been introduced. This greatly enhances the ease of use for the chain set-up process.

A new graphical user interface has been developed for the Chain element consisting of three fields (Fig. 1). On the left, the chain tree offers a quick survey of the chain elements (such as wheels or guides) forming the chain drive and can be used to quickly navigate through the chain definition. In the center, the parameters of the currently selected tree element are displayed and

can be edited. Finally, on the right, a 2D chain plot has been introduced to provide a graphical representation of the current chain setup consisting of the chain elements used and the visualization of the chain path.

The user is guided along the chain tree to enter all the data needed for generation of the chain. Starting with the general chain information such as chain type, number of links, and nominal chain load, the second step involves the definition of the chain itself, i.e., the link pitch and link definition. To decouple the chain definition from the layout of the drive, a new element type has been introduced: the Chain Link Template. The template consists of the mass, geometry and 3D representation data for inner or outer link of a specific chain type. Using the chain link templates the user is able to set up a chain database consisting of template pairs (inner/outer link) saved as SIMPACK submodels. The current chain model can then be easily filled with predefined link definitions using SIMPACK's substructure technique.

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After having defined the basic chain information, the layout has to be given. Each layout element corresponds to a SIMPACK Primitive (either of type 46: chain wheel or 47: chain guide). New layout elements can be added by using the buttons provided or through the context menu within the chain tree or 2D plot. Missing or not yet defined layout elements, i.e., missing SIMPACK Bodies, can be directly created from within the Primitive selection menu.

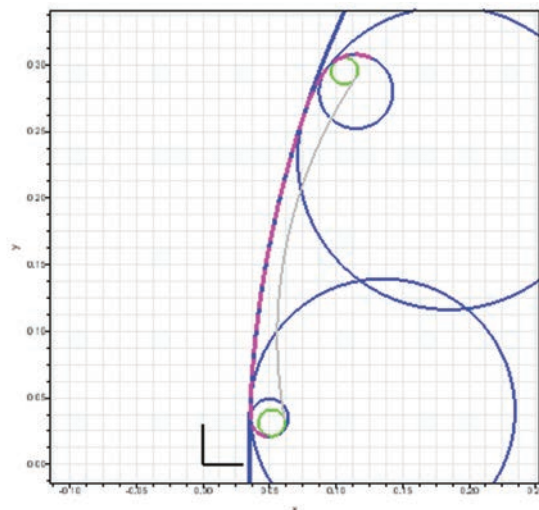


Fig. 2: 2D plot of a chain guide

All layout elements can be accessed directly from the chain GUI. It is now possible to set-up and edit the complete chain from within the chain GUI.

All chain specific elements (wheel and guide Primitives, Link Template) have been enhanced by element specific plots; providing direct feedback to data entered by the user (Figs. 2 and 3). These plots allow the user to directly review the impact of a changed parameter or clearly point out possible entry errors.

After having defined the chain layout, the SIMPACK Chain generator can be used to automatically create the link Bodies

and the chain Force Element. Following the path defined by the layout, SIMPACK places the links. After successful generation of the chain, SIMPACK provides further information concerning the resulting final gap in the chain (of positive, negative or zero length, depending on whether the chain is too long or too short) to the user. The user can now decide if the setup based on number of links, link pitch and layout fits his needs or if one of the mentioned needs to be revised.

The newly implemented features greatly add to the usability of the SIMPACK Chain set-up process.

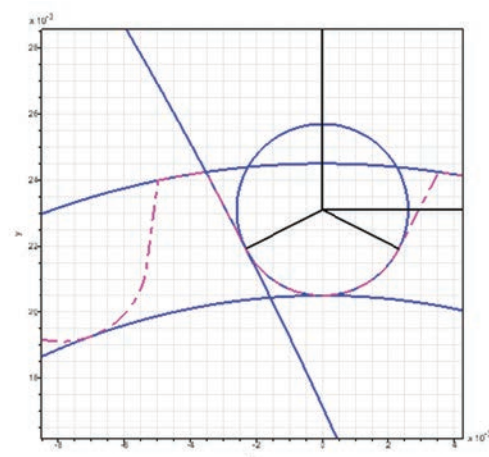


Fig. 3: 2D plot of a chain wheel

SIMPACK Control Improved

The module SIMPACK Control has undergone a major improvement step already in SIMPACK 9.0. Further, smaller improvements have been added in releases 9.1 and 9.2 and the module

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SIMPACK Control provides Modeling Elements (the so-called “Control Elements”) that provide a lot of functionality used in typical feedback control loops, but also in open signal processing chains for advanced measuring and excitation purposes. All Control Elements can be interconnected to each other. Specialized sensors provide all types of kinematic or dynamic measurements. Actuator Markers or Force Elements are available for applying the control outputs to the model. In between, there is a large number of filters, signal tools, controllers and other devices for processing the signal. The number of control chains or loops in a SIMPACK model is limitless.

The following new features have been provided in SIMPACK 9 releases:

- Arbitrary connections between the Control Elements are now possible. (There are no longer distinct “force classes” as in Classic SIMPACK).
- The elements appear in the standard Model Tree and can be arranged in any arbitrary order. SIMPACK automatically

checks in which order the elements must be evaluated and detects circular references, even when the signal passes through Expressions, Moved Markers, etc.

• As with the other element categories, Control Elements can be grouped in the Model Tree. This allows for easy separation and visualization of the different control chains.

- Standard Model Tree functionality allows one to easily find cross-references between Control Elements and other elements.
- Control Elements are fully enabled for parallelization.
- And last but not least, the element type, parameter, and Output Value descriptions as well as the element categorizations, have been completely revised and often dramatically improved.

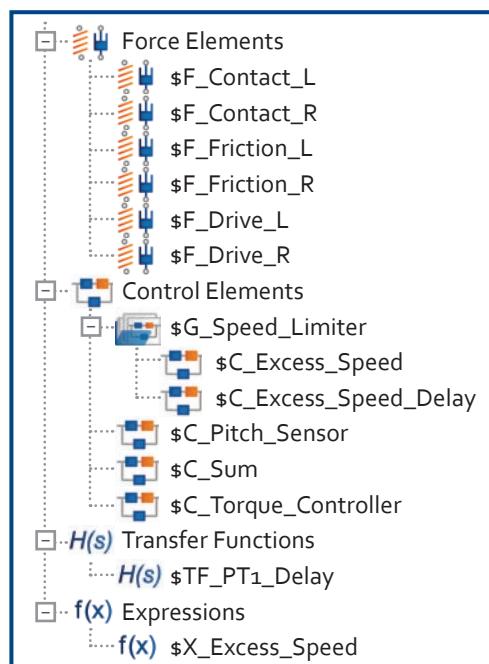


Fig. 4: Control loop of a simple Segway® model



SIMPACK Control provides a very efficient way to set up signal processing chains and closed control loops of simple to medium complexity within SIMPACK.