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Q: How is the common cause failure accounted for in SIL Solver?

A: Common cause failure (CCF) is a failure of more than one device, function, or system due to the same cause. For SIS with redundant devices, CCF is often the dominating contributor to  $PFD_{avg}$  and STR, therefore it needs to be carefully considered.

SIL Solver applies the widely accepted "beta-factor" model to account for CCF in  $PFD_{avg}$  and STR calculation:

- For CCF of devices in each input subsystems, recommended beta-factors are given together with failure rates in SIL Solver datasheet. The CCF contribution is automatically calculated based on the beta-factor in the datasheet. If other beta-factors are to be applied, users can create their own data sheet with the preferred beta-factor. For CCF of redundant input subsystems, it is assumed they are sufficiently diverse from either a technology, installation, access, or maintenance standpoint so that the additional CCF contribution does not need to be considered. Otherwise, users can specify this CCF contribution as part of the input manual.
- For each output action, SIL Solver allows up to three redundant subsystems. The CCF of redundant devices within a subsystem is automatically calculated based on the beta-factor in the datasheet and users may create a datasheet with their own beta-factor. For CCF of redundant subsystems in one output action, users need to select a beta-factor from the drop down list in the action tab. This CCF is calculated as a fraction of the  $PFD_{avg}$ /STR of the 1<sup>st</sup> subsystem, i.e., the CCF is a fraction (beta) of the  $PFD_{avg}$ /STR of the 1<sup>st</sup> subsystem.