



SUB-ZERO GROUP, INC.

ADVANCING ELECTRICAL DESIGN FOR PREMIUM KITCHEN APPLIANCES WITH
SOLIDWORKS ELECTRICAL SOLUTIONS

Case Study



By rolling out SOLIDWORKS Electrical design software across Sub-Zero Group, Inc.'s product development organization with refined, documented workflows, the premium kitchen appliances manufacturer shortened electrical design cycles, cut material costs, and eliminated first-build revisions and rework.



Challenge:

Replace manual, error-prone legacy process for creating electrical schematics, wire harness models, drawings, and wiring diagrams for premium kitchen appliances with a more efficient, error-free, automated process through a seamless, integrated connection between 2D electrical schematics, 3D mechanical models, and 2D mechanical drawings.

Solution:

Add SOLIDWORKS Electrical Schematic Professional and SOLIDWORKS Electrical Professional solutions to its existing SOLIDWORKS installation.

Results:

- Shortened electrical design cycles
- Simplified flattened configurations and cut material costs
- Eliminated first-build revisions and rework
- Automated generation of BOM and wire tables directly from electrical schematics

Sub-Zero Group, Inc. designs, manufactures, and markets premium kitchen appliances under the Sub-Zero®, Wolf®, and Cove® brands, which have been icons of design and paragons of performance for more than 80 years. These products include best-in-class refrigeration, cooking, and dishwashing appliances found in the world's most luxurious homes. Based in Madison, Wisconsin, Sub-Zero Group is dedicated to helping customers create the functional, flexible, and beautiful kitchens of their dreams.

In developing its high-end, luxury appliance designs, Sub-Zero Group has relied on SOLIDWORKS® 3D mechanical design solutions since the late 1990s, when the company moved away from AutoCAD® 2D design tools. The strategic initiative of the move was to boost productivity, accelerate time to market, and extend its history of innovation by moving to 3D product development. Since then, Sub-Zero Group has continually researched and evaluated new design and engineering solutions to improve its processes and the quality of its products, according to Lead Design Engineer Jared Norgal.



Each location in the schematic contains the symbols, connections, and metadata needed to create a wire harness model in SOLIDWORKS mechanical design software. Then, the same SOLIDWORKS Electrical schematic is leveraged to create a wiring diagram package, which accompanies every product to support field service. This enables us to leverage the initial schematic for each downstream task, while also eliminating the manual tasks in our legacy process which were time-consuming, costly, and prone to error."

– Jared Norgal, Lead Design Engineer

Norgal and Senior Designer Isaac Semrow have recently rolled out SOLIDWORKS Electrical across the organization after spending significant time and effort developing and refining their workflows and documenting them for broad consumption.

"The legacy process that we used to develop electrical schematics, route wiring throughout the appliance, design wiring harnesses, and create bills of materials (BOMs) and wire tables was a manual, disconnected process that took weeks," Semrow recalls. "It involved drawing a schematic in Visio®, AutoCAD, or SOLIDWORKS 2D, manually translating that data into a wire table and BOM, and creating a hand-drawn 2D wire harness layout which was eventually used to produce a detailed drawing. It was then accompanied by a manually sketched 3D model which lacked detail and was inherently disconnected from both the schematic and 2D drawing.

"Because of the manual nature of this process, it was not only slow and tedious but also prone to error, resulting in unexpected revisions, rework, and material costs all the way up to preproduction builds," Norgal adds. "To improve this process, we looked to SOLIDWORKS Electrical solutions in an effort to find a more efficient, cost-effective, accurate, and integrated method for electrical design."

Sub-Zero Group added SOLIDWORKS Electrical Schematic Professional and SOLIDWORKS Electrical Professional solutions to its existing SOLIDWORKS installation to take advantage of the integration with SOLIDWORKS mechanical design solutions to improve the appliance manufacturer's electrical design, wire routing, and wire harness design processes.

SOLIDWORKS ELECTRICAL — ONE SCHEMATIC DOES IT ALL

Using SOLIDWORKS Electrical solutions, Sub-Zero Group has replaced its former legacy process for electrical design with a more efficient and accurate integrated approach, shortening electrical design cycles, reducing material costs, and improving quality in the process. "Using Dynamic Connectors in SOLIDWORKS Electrical allows us to create a clean, streamlined, and intelligent schematic," Norgal explains.

"Each location in the schematic contains the symbols, connections, and metadata needed to create a wire harness model in SOLIDWORKS mechanical design software," Norgal continues. "Then, the same SOLIDWORKS Electrical schematic is leveraged to create a wiring diagram package, which accompanies every product to support field service. This enables us to leverage the initial schematic for each downstream task, while also eliminating the manual tasks in our legacy process which were time-consuming, costly, and prone to error."

SEAMLESS CONNECTION FOR SCHEMATICS, MODELS, AND DRAWINGS

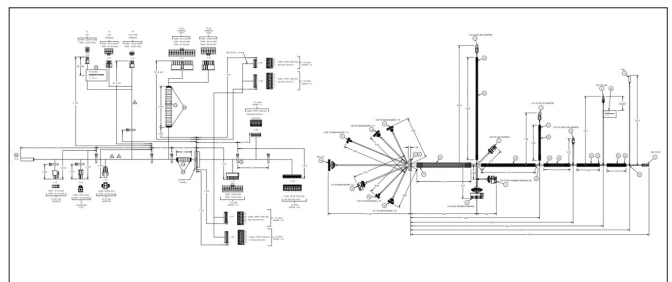
Sub-Zero Group has realized productivity gains in its electrical design operations due to the seamless connection between the SOLIDWORKS Electrical Schematic, the SOLIDWORKS mechanical 3D model, and the SOLIDWORKS mechanical drawing. "Connectors are inserted into the SOLIDWORKS Electrical schematic, and additional components — such as terminals, cavity plugs, seals, and other accessory items — are added as needed," Norgal points out.

"The complete schematic data is added to the wire harness function within SOLIDWORKS



"The complete schematic data is added to the wire harness function within SOLIDWORKS Electrical, and the schematic items are associated to the SOLIDWORKS mechanical model through association or insertion. The BOM and wire table data are automatically generated and inserted into SOLIDWORKS mechanical to quickly and easily generate SOLIDWORKS mechanical 2D drawings."

— Isaac Semrow, Senior Designer



With SOLIDWORKS Electrical and SOLIDWORKS Electrical Schematic solutions, all downstream tasks related to the electrical design of an appliance are associated with and derived from data in the initial electrical schematic — including the wiring package diagram, like the refrigerator wiring diagram shown here; the bill of materials (BOM); the wire table; and the wire harness design — providing a seamless, integrated, error-free electrical design process.

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DESIGN, SIMULATION, AND MANUFACTURING ADVANTAGES

In addition to being faster, less costly, and more accurate, Sub-Zero Group's new SOLIDWORKS electrical design process provides design, simulation, and manufacturing advantages. "On the design side, the routed wire harness models provide other teams with better visibility into as-built wire routing paths and space claims. This has helped to remove the illusion of wide-open spaces, which has reduced interferences in final designs and improved manufacturability assessments," Semrow stresses. "BOMs and wire tables are automatically generated from the SOLIDWORKS Electrical project, and because wire lengths are accurate, we avoid adding the (just in case) wire lengths, which increase costs and could lead to installation issues."

"On the production side, manufacturing engineers gain detailed visibility of wire harness routing early in the design process, allowing them to provide input to improve the design and avoid assembly issues down the road," Semrow notes. "We're also expecting to see more accurate foam and airflow simulations, now that we have the ability to adequately represent our wire harnesses in CAD."

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VAR: GoEngineer, Madison, WI, USA

Products:

- SOLIDWORKS Standard
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