# Creating the Perfect System: Siemens Minerals Utilizes ESI's SimulationX to Optimize Belt Conveyors

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## Challenge

Performance, investments and operating costs are pivotal factors for any piece of machinery throughout its lifecycle. Siemens Minerals' core competency and basis for business is to supply the mining industry with drives that fit the customer's requirements for performance, costs and energy efficiency. All must be considered in the section of a specific drive configuration. Many variables can impact cost including high energy conversion efficiency, maximum load capacity, and reduction of slip.

## Benefits

ESI's SimulationX provides Siemens Minerals with an efficient, modular and user-friendly solution to build fast and reliable workflows for the design, testing and commissioning of belt conveyor drive systems for the mining industry. With that, Siemens Minerals is able to deliver performant and energy-efficient drives in minimum time to operation.

## Story

Designing, dimensioning and modifying drive systems for belt conveyors is one of the core competences of Siemens Minerals, which requires extensive knowledge of a conveyor's behavior. No prototypes are built for these machines making it difficult to test emergency and hazardous scenarios and requires time-consuming and costly on-site commissioning processes. Yet finding the most energy-efficient and cost-effective layout while delivering expected performance is a priority. Most simulation solutions available today represent only a part of the system – but they don't address the dynamic and physically realistic conveyor system's behavior, including that of the belt, drives and controls.

Siemens Minerals discovered that by using dynamic system simulation, it enabled a significant part of the commissioning process to be completed before the machine was installed. This reduces time to operation and eliminates the need to send staff on-site for extended periods of time. Additionally, it makes it possible to explore various scenarios in a cost-efficient manner and without risk to humans or the environment.

To realize the benefits described above, Dr.-Ing. Torsten Hellmuth and his colleagues at Siemens Minerals turned to ESI's SimulationX belt conveyor solution; a solution that is more than a software tool because it comes with the extensive experience and technical expertise of ESI engineers, specifically in the mining industry.

Siemens Minerals uses SimulationX to:

- Create a model of a planned or existing belt conveyor system, based on data from a supplier or operator, as a basis for the drive system design, optimization and virtual commissioning
- Analyze the belt conveyor's behavior in conjunction with the planned or existing drive system
- Assess the effects of modifications on the drive system or the belt conveyor (e.g. increased loads, changes in the topology)
- Test control algorithms for the drive system and evaluate the effects on the belt conveyor's behavior
- Analyze the belt conveyor's overall behavior in extreme situations, such as emergency shutdown, power outage or component failure.

For Siemens Minerals, the use of simulation goes beyond design optimizations and virtual commissioning of the belt conveyor. Realtime testing of controller hardware with a Hardware-in-the-Loop (HiL) platform is one of the next steps. In that context, a SimulationX model on the HiL-platform represents the behavior of the complete belt conveyor system. Based on that model, the HiL platform provides the same feedback to the controller device as for the real plant.

> *"Linking the digital models of a belt conveyor's mechanical and electrical components in ESI's SimulationX produces a digital twin which allows for design optimizations and virtual commissioning of the belt conveyor. We're able to test parameters for converters and motors, as well as complex controllers, and chose in advance to validate the technical performance, and to minimize time and tests on site for a faster and safer commissioning process – something from which we benefit as much as our customers.""*
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for more information
**www.simulationx.com/belt-conveyor-systems**
**www.industry.siemens.com/verticals/global/en/mining-industry/pages/mining-industry**