OVERVIEW
To succeed in today’s competitive global market, manufacturers of packaging machinery must find ways to compress design cycles and accelerate product time-to-market, while simultaneously controlling costs, increasing product complexity, and delivering consistently high levels of quality. Meeting these challenges requires that you modernize your product development systems and implement an integrated 3D design platform, so you can realize the benefits of automation and eliminate the unnecessary tasks, costs, and delays associated with traditional, non-integrated approaches to machine design. By taking advantage of a proven integrated 3D environment like the SOLIDWORKS® design to manufacturing ecosystem, you can design, validate, and produce higher quality, better-performing machines in shorter amounts of time—and at lower cost.
REVAMPING DEVELOPMENT, MANUFACTURING PROCESSES CRITICAL FOR SUCCESS IN TODAY’S MACHINE DESIGN MARKET

Whether you design packaging machinery as standard products to be sold at volume, or as unique models engineered to meet the specific needs of a single customer, you face the daunting pressures brought on by increased competition in a global market. Customers today not only demand shorter and shorter lead times for all types of packaging machine design—including custom one-off designs, standard models, or machines having a variety of configurable options—they also want them to perform better and provide greater capabilities.

How your organization responds to these market pressures will have a direct impact on your company’s profitability and success. You can’t just increase resources—spending freely to produce more sophisticated products more quickly, as if money were no object—or continue working in a manner that was effective in the past, but must find ways to work more efficiently, intelligently, and cost-effectively. Controlling development costs is just as critical to your success as shortening development cycles. Thus, you need integrated 3D design, engineering, and manufacturing tools that can help you accelerate large assembly design, increase design reuse, reduce prototyping requirements, facilitate the transition to manufacturing, minimize warranty claims and field failures, and improve your overall quality processes.

In addition to needing to save time and control costs, competing in today’s global packaging machinery market demands improved communications. These include streamlined internal data exchanges and better interactions with your customers—during pre-bid exposure via online and traditional marketing materials; and throughout the development process—from the initial proposal through design reviews, and on into the preparation of final documentation and operating manuals. When you combine requirements for time savings, cost reductions, and more effective communications with the need to deliver higher quality, increasingly innovative, more sophisticated products, the traditional, sequential, non-integrated approach to packaging machine design is woefully inadequate for achieving these goals.

Succeeding in today’s challenging packaging machine design environment requires manufacturers to automate processes by upgrading from methods that rely on non-integrated, point solutions in favor of faster, better-controlled, data-driven, concurrent, fully integrated 3D design, validation, and manufacturing approaches. This paper examines how traditional packaging machine design methods and technologies can hold your organization back, how you can streamline development with a fully integrated 3D platform, and how the integrated SOLIDWORKS design to manufacturing ecosystem provides you with the greatest competitive advantage.

TRADITIONAL, SEQUENTIAL MACHINERY DEVELOPMENT DOESN’T CUT IT ANYMORE

The traditional, step-by-step, non-integrated approach to developing packaging machinery carries a plethora of limitations that diminish a product development organization’s competitiveness in today’s global market. These limitations involve the duplicative effort, unnecessary tasks, and numerous data exchanges associated with working with a variety of non-integrated tools for machine design, validation, manufacturing, quality control, assembly, and documentation, all of which adds time, costs, and a greater probability of errors to the process.
**Wasted Time**

It doesn’t matter if you are using 2D tools or non-integrated 3D modeling applications for packaging machinery design, the lack of data integration across functions that are critically important adds time to your development process and lengthens time-to-market. The lack of data compatibility among your CAD application, finite element analysis (FEA) tools, product data management (PDM) system, quality control software, CAM application, and assembly instruction and documentation preparation tools results in duplicative efforts and unnecessary tasks. Data incompatibility forces you to operate sequentially because of the need to import/export and convert/translate files to support other functions. Working in a non-integrated development environment also inhibits your capacity for making design changes quickly and easily, and complicates your ability to communicate efficiently and effectively with customers, resulting in additional delays.

**Unnecessary Costs**

Time is money, but there are also a litany of unnecessary costs associated with developing packaging machinery in a sequential, non-integrated fashion that have nothing to do with time. Do you rely too heavily on physical prototyping or are you utilizing integrated FEA simulation tools to minimize prototyping cycles? Is it easy for you to find and reuse proven design concepts or do you often need to start from scratch? Are you leveraging 3D design data throughout the development and manufacturing process—for design visualization; design validation; electrical schematics creation; electronic (PCB board) design; inspection reports; cost estimating/ quoting; generation of bill of materials (BOM), product manufacturing information (PMI), and geometric dimensioning and tolerancing (GD&T) information; CAM tool path generation; and product documentation preparation? Can you make changes quickly and easily at any stage of the process or do such changes cost too much?

**Inconsistent Quality**

Trying to maintain consistently high levels of quality while also attempting to accelerate time-to-market and reduce costs is a losing proposition if you continue to work in a sequential, non-integrated way, because the steps that many manufacturers choose to cut from the process—the traditional engineering tradeoff—can influence and affect the overall quality of your products. Do you use design simulation technology to check machine performance? Are you maximizing design reuse? Are you assessing the manufacturability of designs as part of your process? Are your quality and revision controls formalized and tightly managed? Have you identified errors related to file transfers and data conversions? Does data incompatibility limit your ability to make design changes quickly and easily? Does this prevent you from making quality improvements late in the process?
CONCURRENT, INTEGRATED MACHINERY DEVELOPMENT BOOSTS COMPETITIVENESS

Developing and producing more innovative, higher quality packaging machinery in less time and at lower cost is the very definition of success in today’s competitive packaging machinery design market. Achieving this success requires a level of automation that is only possible through the use of integrated 3D design technologies, concurrent workflows, total data compatibility/management, and the ability to completely leverage 3D design data across all vital functions. By utilizing an integrated, 3D development ecosystem for machine design, validation, manufacturing, quality control, assembly, and documentation, you can boost efficiency, control costs, and improve quality—all at the same time.

Greater Efficiencies

With an integrated 3D packaging machinery design platform, you can take advantage of workflow automation to completely eliminate duplicative tasks and redundant efforts—as well as trim time wasted on file transfers and data exchanges—and achieve additional efficiencies by completing certain steps in the process concurrently instead of consecutively. For example, you can use design configuration tools to automatically create an entire family of products from a single, base design; automatically generate BOM, PMI, and GD&T information for the entire line; and begin creating product documentation in the time that it would take to model a single design in the past. Customer communications in a 3D integrated system become virtually instantaneous, and because 3D design technology is parametric, design changes at any stage of the process ripple across all related data, including manufacturing tools paths, product documentation, and assembly instructions.

Read the full story here: Gerhard Schubert Case Study.

...a case in point

Since introducing the world’s first packaging robots in 1984, Gerhard Schubert GmbH has become the recognized market leader in the development of packaging machines. Companies worldwide rely on Schubert automated machines to package everything from underwear to beer to chocolate bunnies. Each Schubert machine is custom-designed to meet the individual customer’s unique packaging needs.

Until 1997, Schubert developed machines using PROCAD® 2D tools. The introduction of parametric 3D CAD systems fit perfectly with Schubert’s vision for accelerating machine development through the use of standardized components that can be configured in a variety of ways. This led Gerhard Schubert himself to decide to move the company’s development platform from 2D to 3D.

Schubert chose SOLIDWORKS solutions—implementing SOLIDWORKS Professional and SOLIDWORKS Premium design software in conjunction with SOLIDWORKS Simulation analysis and DraftSight® 2D layout solutions—because the software is easy to use; allows for design automation through the SOLIDWORKS Application Programming Interface (API); and includes robust design configuration, sheet metal design, and design communication and visualization capabilities.

“SOLIDWORKS helps us work more quickly and collaborate more efficiently,” says Design Engineer Wolfgang Sedlak. “Using SOLIDWORKS and our development approach, we can design custom machines in half the time it takes our competitors.”

By implementing integrated SOLIDWORKS 3D design, simulation, and 2D layout solutions, Schubert has produced packaging machines twice as fast as competitors, saved five hours on each assembly design, improved design visualization, and enhanced customer communications.
Fortune 100 companies rely on OYSTAR North America’s Packaging Technologies Group for the development of rapid filling and packaging machines. While the company’s expertise has made it the world’s largest aerosol equipment manufacturer, OYSTAR also produces a variety of other filling machines that package products as varied as yogurt, applesauce, and coffee.

In 2001, management decided to upgrade its design environment from the Vellum® 2D tools that it had used to a 3D design platform to accelerate development of both standard and customized packaging machines, some with more than 8,000 components. By utilizing 3D design, simulation, and configuration tools, OYSTAR believed it could develop its packaging machines more precisely and realize improved efficiencies, enabling the company to respond to customer demand for faster turnaround.

OYSTAR decided to standardize on SOLIDWORKS, implementing integrated SOLIDWORKS design, SOLIDWORKS Simulation analysis, and SOLIDWORKS PDM solutions because they are easy to use, facilitate large assembly design, and provide integrated visualization, simulation, and data management tools.

“SOLIDWORKS software makes the whole design process more efficient and faster, because many of the steps that previously required manual tasks are automated—such as drafting, projecting sections, views, and assembling schemes,” says Technical Director Fabio Di Minico.

By implementing integrated SOLIDWORKS design, simulation, and product data management solutions, OYSTAR has reduced its design cycles by 50 to 60 percent, accelerated production throughput tenfold in some cases, cut configurable design time from weeks to days, and increased revenue.

Read the full story here: OYSTAR North America Case Study.

Cost Savings
Accelerating machine design cycles won’t blow the budget if you use an integrated 3D development platform. Potential cost savings related to working in an integrated 3D design environment include reduced prototyping requirements, through the greater use of FEA simulations for virtual prototyping iterations and design validation; increased design reuse by leveraging the PDM system to advance efforts toward modular design; and more extensive use of 3D CAD data to perform other functions, such as design visualization; electrical schematics creation; electronic (PCB board) design; inspection reports; cost estimating/quoting; generation of BOMs, PMI, and GD&T information; CRM tool path generation; and product assembly instructions and documentation preparation. With integrated parametric 3D design technology, you can make design changes at any stage of the process—your change will ripple across all related data, including manufacturing tools paths, product documentation, and assembly instructions—without incurring additional costs.
Improved Quality
An integrated 3D design environment will complement your quality improvement efforts in a number of ways. In addition to supporting the use of integrated FEA simulation tools, to identify and resolve potential performance issues, and an integrated inspection application, to generate inspection requirements and catch errors in manufactured components, an integrated 3D system provides the structure and controls that you need to consistently maintain high levels of quality. Integrated PDM not only provides the workflow constraints needed to drive development processes forward, it also will improve your handling of engineering change orders (ECOs) and encourage reuse of proven design solutions. Increased mechanical/electrical collaboration can eliminate space issues surrounding electrical panels and housings. With an integrated parametric 3D development ecosystem, design changes become so fast and simple that you will be able to take steps to improve quality at any time, instead of waiting to make improvements to a future model.

...a case in point
Aiger Engineering Ltd. designs, engineers, manufactures, and installs high-precision production systems and has delivered numerous new production technologies and processes in the pharmaceutical and tobacco industries. The company faces substantial technical challenges—like installing flavor capsules at a rate of 14,000 per minute—which is why Aiger moved from the AutoCAD® 2D design tools to the SOLIDWORKS 3D development platform in 1998. The company soon added other integrated SOLIDWORKS solutions, including SOLIDWORKS Professional design, SOLIDWORKS Premium design and analysis, SOLIDWORKS Composer™ technical communication, and SOLIDWORKS PDM Professional software.

“We continually strive to shorten lead-times, improve quality, and increase innovation,” says Executive Manager Dimitar Yanchev. “As our machines become increasingly more complex, we need to integrate electrical and mechanical design into a single, unified workflow.”

To achieve this integration, the machine manufacturer added SOLIDWORKS Electrical Professional 3D electrical design software. “Before we implemented SOLIDWORKS Electrical software, there were two different workflows and two separate BOMs for electrical and mechanical design,” Yanchev notes. “Now, we have a single platform, one workflow, and a unified BOM for everyone, which results in fewer mistakes and misunderstandings and greater attention to the overall branding aspects of how our machines look and operate on the factory floor.”

By implementing SOLIDWORKS Electrical software, Aiger cut electrical design time by 50 percent, improved the accuracy of electrical designs and schematics, increased collaboration between electrical and mechanical engineers, and automated wiring and cabling processes.

Read the full story here: Aiger Engineering Case Study.
SOLIDWORKS INTEGRATED 3D ECOSYSTEM STREAMLINES DEVELOPMENT AND MANUFACTURING

Manufacturers of packaging machinery can maximize the time, cost, and quality advantages of using an integrated 3D development platform and streamline development processes by implementing the integrated SOLIDWORKS 3D design to manufacturing ecosystem of design and engineering solutions. Using integrated SOLIDWORKS mechanical design, electronic design, electrical schematics, simulation, product data management, model-based definition (MBD), inspection, communication, documentation, and visualization solutions, you will realize the greater efficiencies, cost reductions, quality improvements, and effective communications that are essential to your future success.

Mechanical Design
SOLIDWORKS 3D mechanical design software will help you design better, more accurate products more cost-effectively and rapidly—50-percent reductions in design cycles are common—allowing you to satisfy demands for shorter lead times. Because SOLIDWORKS is parametric, and updates and propagates design changes to models and drawings automatically, making design changes doesn't create duplicative effort or delays. Industry-leading large assembly, interference detection, and sheet-metal design tools—as well as integrated simulation and design for manufacturability capabilities—are perfectly suited to large machine design. And, you can use the same SOLIDWORKS mechanical design model data to support all downstream engineering and manufacturing functions.

Design Visualization and Communication
Using your SOLIDWORKS model, you can efficiently create photorealistic renderings and animations to support design visualization with SOLIDWORKS Visualize software, and easily share design information with customers via email through the use of SOLIDWORKS eDrawings® tools. There's no need to extrapolate complex machine designs from 2D line drawings with the integrated SOLIDWORKS design to manufacturing ecosystem, because you can quickly create 3D renderings that are virtually indistinguishable from photographs, and then use tools like cutaways and transparency to fully interrogate machine designs. SOLIDWORKS Visualize can also help companies that create proposals in response to RFPs win more business, because your customers will be able to see what your product or system will look like from a 3D rendering. With the new SOLIDWORKS 3D Interconnect capability, you will also be able to seamlessly work with design data in other 3D CAD formats, enabling you to collaborate more effectively with customers and partners, and allowing you to reuse design data accurately and efficiently.

Electrical and Electronic Design
Unlike all other mechanical design packages, SOLIDWORKS supports electronic printed circuit board (PCB) design within the mechanical design environment via SOLIDWORKS PCB software, which provides an unmatched level of mechatronics collaboration between mechanical and electrical engineers. Using SOLIDWORKS Electrical 3D and SOLIDWORKS Electrical Schematics software, you can complete your electrical designs and electrical schematics from within your mechanical design envelope, and then automate the placement of wiring and piping runs, including the configuration and positioning of wire and cable harnesses.

Design Validation/Virtual Prototyping
Integrated SOLIDWORKS Motion (Kinematics and Dynamic Motion) and SOLIDWORKS Simulation (FEA) software provide the tools that you need to conduct virtual prototyping of machine design concepts early in the conceptual design phase without having to incur the delays and costs associated with physical prototyping. Whether you need to complete design optimization runs or perform structural, thermal, flow (CFD), deformation, vibration (frequency and dynamic), buckling, fatigue, or nonlinear analyses—on a single component or a multi-part assembly—SOLIDWORKS Simulation packages provide the capabilities that meet your needs—all from within your 3D modeling environment.
...a case in point

Automatic Handling International, Inc. is a worldwide manufacturer of custom handling and packaging systems, serving leading companies in the pulp and paper, tissue and towel, nonwovens, fiberglass, agriculture, stone, and steel industries. The company brings the same focus on efficiencies and cost reductions that it applies to its handling/packaging technology to its own machine development, manufacturing, and assembly operations.

In 2002, Automatic Handling transitioned from AutoCAD 2D development tools to SOLIDWORKS Professional 3D design software to improve design accuracy and efficiency, choosing SOLIDWORKS for its ease of use, large-assembly capabilities, and extended suite of integrated solutions.

Automatic Handling then implemented SOLIDWORKS Premium design and analysis software to take advantage of integrated FEA tools, SOLIDWORKS PDM Professional to automate workflows and revision controls, and SOLIDWORKS Composer to accelerate the development and improve the quality of machine assembly and usage documentation.

“We’re an engineered-to-order business with over a dozen mechanical engineers, all working on overlapping projects,” explains Media Group Manager Nathan Pienta. “The structure and control provided by SOLIDWORKS PDM workflows enable us to work more accurately and productively, using virtual documents to develop, manufacture, and assemble machines, instead of pushing paper.”

By implementing SOLIDWORKS design, simulation, PDM, and technical communication solutions, Automatic Handling cut manufacturing release times by 80 percent; replaced paper drawings with digital 3D models for production; empowered machinists and fabricators as part of its Development Team; and eliminated printing, paper, and administrative costs.

Read the full story here: Automatic Handling International Case Study.
**Product Data Management**

The SOLIDWORKS PDM solution does much more than manage your product design data. It allows you to fully automate your machine design workflows, tightly control revisions, and encourage designers and engineers to reuse proven concepts. SOLIDWORKS PDM provides fast system search capabilities, so you can find the design, assembly, or component that you’re looking for with little effort. With email notifications and electronic signatures, the system is configurable and scalable to your specific requirements. SOLIDWORKS PDM lets you automate your standard product development workflows, ECO approval and execution processes, and any other processes related to your product development effort.

**Quality Controls**

In addition to realizing the product quality benefits associated with using SOLIDWORKS Simulation technology for virtual prototyping and design validation, and with using SOLIDWORKS PDM solutions to more tightly control revisions and all associated product design data, you can leverage SOLIDWORKS Inspection software to formalize your quality assurance and inspection procedures and generate inspection reports. With SOLIDWORKS inspection, you will be able to document, track, and know when vendors supply inferior or defective parts long before they can negatively affect your business.

**Transition to Manufacturing**

When it’s time to transition a product design into manufacturing, SOLIDWORKS software provides a range of valuable capabilities. You can use the Costing module to estimate what it should cost to build your product and use that information to secure and negotiate quotes. The software’s Design for Manufacturability tools enable you to assess whether your current design can actually be made or whether you need to make modifications to support manufacturing processes. SOLIDWORKS also allows you to automatically generate production drawings and BOM information without the tedious effort required by non-integrated systems.

**Production**

Are you ready to design and manufacture in 3D? SOLIDWORKS MDB software enables you to digitally output all PMI in 3D—including GD&T information—permitting you to completely eliminate paper 2D drawings and drive production with the same 3D design data that you utilized for all other functions. SOLIDWORKS data is directly integrated with leading Gold CAM machining, milling, and manufacturing partners, enabling you to make changes to your SOLIDWORKS design and have the model changes automatically update associated tool paths. You can also tap SOLIDWORKS Composer software to automate the preparation of assembly instructions, user manuals, and product documentation, again using the same 3D design data that you leveraged for other functions.
Streamline the Development of Packaging Machinery with SOLIDWORKS

...a case in point

DCF Mexicana, S.A. de C.V., is the leading Mexican original equipment manufacturer (OEM) of advanced, high-speed labeling and material handling technology, machinery, and equipment. The company provides effective automation solutions for labeling and material handling ranging in size from a roll of mints to an automobile, with applications at speeds as high as 400 packages labeled per minute. DCF Mexicana serves a growing set of customers, including large, multi-national corporations like Procter & Gamble, Pepsico, Bimbo, Kimberly-Clark, and Fresenius Kabi.

In 2007, the company decided to replace the AutoCAD 2D design tools it had used to develop its high-speed labeling and material-handling automation machinery with SOLIDWORKS 3D design software to speed up its development process, increase accuracy, and improve machine performance. Since then, DCF Mexicana has added SOLIDWORKS Professional design, SOLIDWORKS Premium design and analysis, SOLIDWORKS Electrical Professional design, SOLIDWORKS PDM Professional, and SOLIDWORKS Composer software solutions.

“It’s so much easier to work in SOLIDWORKS,” says Director General Jorge Smart Cruz Arenal. “Plus, the integrated solutions that we’ve added have all contributed to achieving our goals of compressing design cycles to shorten customer delivery times, enhancing machine performance to boost customer satisfaction, and increasing accuracy to reduce development and assembly costs.”

By implementing SOLIDWORKS mechanical design, electrical design, simulation, PDM, and technical communication solutions, DCF Mexicana has cut its development process by 50 percent, reduced electrical system design time by 50 percent, grown its business by 500 percent, and increased design accuracy, resulting in improved machine performance.

Read the full story here: DCF Mexicana Case Study.
**IMPROVE PROFITABILITY WITH THE INTEGRATED SOLIDWORKS 3D DESIGN TO MANUFACTURING ECOSYSTEM**

As a manufacturer of packaging machinery, your organization faces mounting pressure to design better products faster and at lower cost. Demand for shorter lead times, improved quality, and greater capabilities in machine design is constant, and competition is increasing from every corner of the globe. How your organization responds to these competitive forces will directly affect your company’s future profitability and success.

Addressing these market realities while continuing to utilize the traditional, step-by-step, non-integrated approach to product development and manufacturing is improbable if not impossible. Saving time and controlling costs while ramping up quality and innovation requires a more streamlined, automated approach. With an integrated 3D design, engineering, and manufacturing platform like the integrated SOLIDWORKS 3D design to manufacturing ecosystem, you can achieve your efficiency, cost reduction, and quality goals and secure a real competitive advantage, no matter where your products are sold.

To learn more about how the SOLIDWORKS 3D design to manufacturing software can improve your packaging machinery development and production processes, visit www.solidworks.com or call 1 800 693 9000 or 1 781 810 5011.