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## HOW TO MAKE ENGINEERS EMPLOYABLE

Engineering colleges in India churn out more than 500,000 engineers annually and every year thousands are added to that number. The harsh reality is that most of them have an engineering degree in hand but no expertise at all. A mere 18 to 20% of these engineering graduates can actually be called employable. The problem is that our education system focusses more on quantity rather than quality. It follows the outdated approach of emphasizing more on theories and less on practical applications. Engineers are supposed to be problem solvers. They are provided the tools to solve problems using the knowledge they gained while pursuing their respective engineering courses. The majority of these engineering graduates are clueless when it comes to solving real world problems.

Alright, enough cursing the system, it is high time that we come up with a solution to change the scenario. Institutions and employers need to come together to make changes to the curriculum to meet the industry requirements. They need to do away with traditional

teaching methods and realize the importance of the growing era of internet. Also they should hire professionals from the industry as special instructors to give them real world insights into the industry. Students have to work on their part too; they of course are a big part of the system. They have to make themselves acquainted with the fast changing economy.

They can follow certain key points for their development to make themselves employable:

- Be focused on a particular field and gain expertise in it. Just collecting certificates for short term courses won't work.
- Create a genuine resume that reflects your individuality. Don't copy it from the seniors.
- Take up online courses or join some company during vacations for real time experience.
- Stay aware of the current trends and changing requirements of the industry, acquire new skills to meet those requirements.
- Sharpen your communication skills and work on your confidence. You've got to convince your worth to your employer.
- As much as we may hate it, most companies filter out the resumes based on scores. Scoring higher marks is important for getting a job.

CADD Centre is backed by a team of experienced and professionally qualified teachers, maintaining the highest standard for facility to create the perfect environment for professional training. CADD Centre Training Services focuses on initiatives to develop industry-institute partnership, courses on CAD, / CAE are updated constantly with inputs from the industry.



# USING SOLIDWORKS TO DESIGN MEDICAL EQUIPMENT

*"Medical instrument designers and developers face a number of business and engineering challenges specific to their industry. Several issues are to be considered during manufacturing of medical equipment, the most important among them is patient safety; others include efficiency, effectiveness, and cost containment. From regulatory data management and virtual simulation to flexible industrial design capabilities, SolidWorks enables you to design complaint medical breakthrough in record time."*

## Business challenges

The Biomedical Engineering industry is highly competitive and volatile, changing on daily basis. Not only medical device engineers have to address normal design challenges such as time to market, innovation, cost reduction and global competition, they also have the massive responsibility of patient safety and other strict regulatory guidelines.

Adding further challenges, increasing regulatory scrutiny is putting medical devices manufacturers under the gunpoint for total quality and safety. The Food and Drug Administration is keeping a full check by issuing warning letters resulting in a climb in time and budget medical devices manufacturers spend on regulatory activities.

For example, when Tensys Medical Inc. developed their first arterial blood pressure management system, the company was aware that it had narrow window for opportunity and needed to get the product released in the market quickly, it credits SolidWorks design validation tools which enabled them to shorten the design cycle by 60 percent helping the team to create a new medical market space.

Medical staff has strict aesthetic requirements that designers must meet such as reducing operating time and surgery costs. Also the materials used for medical products have been very sophisticated and product engineers need to be aware about their strengths and conductivity along with their effects of sterilization on their material properties.

Implant devices such as cardiovascular stents, must be error free as failures can cost fatalities. Orthopedic implants, such as knee and hip replacements have to function flawlessly to avoid pain and fracture dangers for the patients.

Product engineers have to predict the life span of implantable devices accurately so that the patient can have them removed or replaced timely and in a non-life-threatening manner.

Virtual simulation, with concurrent engineering approach, helps medical product engineers balance all these simultaneous requirements gaining product reliability, quality and safety.

## Design Validation for the Medical Device Industry

The main purposes for which engineers perform design analysis include proof of concept "what if". Validation studies to identify the best design, product reliability, design confirmation and assistance in answering to regulatory requirements. The studies can include variations in geometry, type of material and different operating loads.

## Why solidworks

SolidWorks customers have enjoyed many benefits while designing Medical Products. SolidWorks unique resources include: Design Ease of Use: SolidWorks exceeds in its intuitive Design and Productivity without compromising ergonomics.

**DimXpert:** SolidWorks generates Geometric Dimensioning and Tolerance based drawings per ANSI/ ISO standards for correctness and completeness.

**Integrated FEA and CFD Validation:** SolidWorks simulation helps determine factors of safety, Mean Time between Failures (MTBF), Vibration Level Monitoring, Efficiency Estimation, Development time and Reduction in Product Cost.

**Integrated Tolerance Stack Up Analysis:** SolidWorks ensures the medical equipment to meet stringent safety and

reliability standards.

**Adherence to FDA 21 CFR Part 820 and FDA 21 CFR Part 11** is a mandatory consideration for a medical product designing team. All the tools needed in compliance are available when designers use SolidWorks product data management- including complete design revision history, electronic signatures as well as full audit trial.

**Documentation and Service Manual Preparation:** This is a very important part of product development process. Being a vital and intrinsic part of the Company's Intellectual Property Rights (IPR) that needs to be stored and re-used.

## SolidWorks simulation solutions

SolidWorks software is a 3D CAD program of choice for many manufacturing firms of diagnostic and clinical equipment, surgical tools, implants, drug delivery systems and pharmaceutical packaging systems.

Testing during each phase from designing concepts to detailing and validation phases of product development is crucial. Medical products need proper understanding regarding how products will work and whether they will behave as desired. Intuitive SolidWorks Simulation design validation solutions enable SolidWorks 3D CAD software users to perform a variety of simulations and leverage CAD data for engineering purposes during all phases of the design process. Further, since SolidWorks Simulation is embedded within SolidWorks 3D CAD, users can accomplish these studies without switching between multiple interfaces.

Aligned integration between design and simulation also makes it possible for medical device engineers to perform easy design modifications and configuration-specific studios to enable the manufacturer of products customized to individual requirements.

**Proven Simulation Solution:** The virtual testing capabilities within SolidWorks Simulation are built on a strong finite element analysis (FEA) foundation. SolidWorks Simulation, together with the CFD capabilities in Flow Simulation, the plastic injection molding tools with SOLIDWORKS Plastics, the sustainability features improve overall design avoiding failures.

**Thermal:** Thermal analysis calculates the heat transfer and temperature between components during device working process in medical design and its environment. Thermal is an important consideration for medical device design and its environment as

many products contain materials with temperature dependent properties and also because there may be possible effects of human body temperatures and heat generated by electronic components embedded in the product.

**Vibration:** SolidWorks have come up with designs catering to resolve design issues that lead to unwanted vibrations in the product. Vibrations that medical devices may experience can reduce performance, shorten product life, or even may lead to improper usage of the product.

**Fatigue analysis:** Fatigue can be defined as failure under a repeated or varying load which never reaches a level sufficient to cause complete failure in a single application. Fatigue analysis examines how repeated or random load cycles cause structural failure. With SolidWorks Simulation, the designers are able to conduct fatigue analysis and optimize the designs and material selection.

**Sustainability:** SolidWorks sustainability provides actionable environmental results by measuring the environmental impacts of individual designs across the product life cycle- including the effects of manufacturing, material, assembly and transportation.

**Computational fluid dynamics (CFD):** Fluid flow issues are very critical in medical devices. Devices such as artificial heart valves, oxygen delivery or a host of other such products, the flow or a variety of fluids must be reliable at designed and at prescribed temperatures. SolidWorks Flow Simulation, integrated with SolidWorks 3D CAD makes it possible to study such concerns in a very straightforward manner.

## Conclusion

Designing medical products is a crucial trait as the designers have to meet the needs of physicians, patient safety and regulatory agencies under demanding situations. Product quality is something which cannot be compromised as life depends on their performance. To be ensured that the products meet all these requirements, medical product designers now have access to highly sophisticated tools with an embedded Simulation CAD solution. These capabilities help them to test the product very early during the design process and examine for improvements. SolidWorks have been adopted by majority of the Medical equipment manufacturers at the de facto standard in their design and testing process.