Unit 6: Gear Systems Part II

Classroom

Topic	Format	Learning Aids	Preparation
HOMEWORK REVIEW *Gear Systems*	Discussion Students will present their gear model from last week to a peer and exchange feedback.		
KINEMATIC MODELS	Lecture, discussion or activity Recommended resources: - Cornell University Brings Pieces of History Back to Life - http://goo.gl/826TLB - Kinematic Models Digital Library (Cornell University) - http://goo.gl/JvwuVU	Educator-provided content*	Lesson plan
CASE STUDY	Review one of these case studies with students to highlight more challenges and advantages of 3D printing gear systems.	Da Vinci case study (PPTX) ↓ Gear System case study (PPTX) ↓ Gear Ball case study (PPTX) ↓	Print speaker notes

* *If you have an amazing lesson plan you'd like to share with the Stratasys Education Community, tell us.*
If we add it to our curriculum, you'll be eligible to receive free FDM or PolyJet materials for your 3D printers.

Computer Lab

Topic	Format	Learning Aids	Preparation
WEEKLY ASSIGNMENT *Gear Systems*	Hands-on Students will improve upon the gear system they began designing last week and incorporate feedback from their peers. Use lab time to aid and advise students as needed, encouraging model complexity. Students will need to complete their models as homework if they don't finish in class.		

Assignment: Gear Systems

These assignments reinforce and extend the classroom learning for **Units 5 & 6**.

Deliverables	Requirements
OPTION 1: *Gear System (STL)*	1. Design a system that uses more than one gear to produce motion. 2. Consider the trade-offs between speed and force and document your design decisions. 3. Consider the tolerance and layer thickness capabilities of the 3D printer you'll use, and document design decisions related to those capabilities.
OPTION 2: *Da Vinci Machine (STL)*	In this assignment, you'll get inside the shoes of a great artist, inventor and engineer. 1. Find a da Vinci machine sketch and reproduce it using CAD. 2. Consider the ways in which 3D printing differs from Renaissance-era fabrication technologies and adjust the designs accordingly. 3. Consider the tolerance and layer thickness capabilities of the 3D printer you'll use, and document design decisions related to those capabilities.
DOCUMENTATION & PRESENTATION	Both options require documentation and a final presentation. Your presentation should include a video of your final product in action and should demonstrate your use of Design Thinking. As you work, be sure to address your problems, challenges and lessons learned. Include the following: **Material use:** What design challenges have you encountered as a result of your material? If you could have chosen another material, what would you have chosen? **Technology:** What design challenges have you encountered as a result of your 3D printing technology? If you had access to other fabrication technology, what would you have chosen? Why? **Wall thickness:** Have you encountered problems with thin areas in your model? Were any supporting parts affected? How did you fix this? **Details:** Does your design contain areas with small embossed or engraved features? Are they necessary for your design to function? Have you encountered issues with details getting lost? **Holes and Gaps:** Have you encountered any tiny holes or gaps? How did you fix this? **Scaling:** Have you been able to resolve some of your issues by increasing the scale of your model? Or have you had to significantly alter your design?

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