**A Hands-On Look at the New Industrial Revolution**

**Overview**

How are the Internet, crowdsourcing, and social networking tools revolutionizing manufacturing?  Is the US economy entering a new industrial age? This video highlights MakerBot, a 3D printer which is changing the nature of manufacturing.

**Background**

What does it take to become a manufacturer in America today? Contrary to the 19th century when it was not enough to have a good idea - you also needed resources such as money, a labor pool, and a professional network to launch a successful product - the world of 21st century manufacturing is very different. The American industry is riding a remarkable way of innovation. Using the Internet, anyone has the tools to build a business. In this “new industrial revolution,” an individual or company with a good idea and some expertise has the potential to succeed. Relying upon the availability of common platforms, easy-to-use tools, Web-based collaboration, an open source environment, and Internet distribution, individuals have the potential to become large scale producers. In this episode, which profiles MakerBot, a 3D printing company based in Brooklyn, NY, we examine an example of a small business that is leading the new industrial revolution by democratizing manufacturing.  Most modern factories use expensive, high-tech robots to create their products, but MakerBot produces machines that give the customer the power to become a micro-factory.

**Featured Vocabulary**

* *innovation*- the introduction of an invention into a use that has economic value
* *invention* - the process of creating a new system or object out of an idea
* *intellectual property* - a work or invention that is the result of creativity, such as a manuscript or a design, to which one has rights and for which one may apply for a patent, copyright, trademark, etc
* *patent* - a government authority to an individual or organization conferring a right or title for the sole right to make, use, or sell some invention
* *open source* - software which grants the right of users to study, change, and improve its design through the availability of its source code; also a term used to describe a general attitude of communities that allow free access to source code of programs or designs in such a way that anyone can alter, add to, and develop a software or design
* *creative commons* - a non-profit organisation founded in 2001 that encourages the copying, legal sharing, and reuse of intellectual and artistic work.

**Warm Up**

Look at [www.thingaverse.com](http://www.thingaverse.com) a community-based open source site where users share and collaborate on digital designs that can be made into real, physical objects, ranging from practical things like doorstops and plugs to playful things like robots and bugs. After exploring the website share your impressions. Explore questions such as: What is unique about this site? Is this concept of sharing ideas and information familiar to you or a novel one? Do you know of other similar websites (eg: Wikipedia, Internet Archives, Creative Commons)? Why would a website like Thingaverse.com attract users?

**Discussion Questions**

While watching the video take notes on the following. Afterwards, use the following questions to prompt discussion:

* How is a venture such as MakerBot different than the assembly line?
* How is it democratizing manufacturing?What distinguishes the industrial revolution of the past from the “new industrial revolution”?
* What is opensource? How does it challenge the dominance of patents?
* What economic principle is a company like MakerBot challenging?
* How is the MakerBot an innovative company and how does it have the power to transform American manufacturing?

**Extra Activity**

Using the reproducible on [DIY Design](http://www-tc.pbs.org/america-revealed/static/media/downloads/2012-02-21/DIYDesign.pdf) work in pairs or groups to conceptualize and design a “thing” that they would want to showcase on a website such as [Thingaverse.com](http://www.thingiverse.com/) or at [Maker Faire](http://makerfaire.com/), an annual DIY festival which showcase of invention, creativity and resourcefulness. Students can either invent a completely original product or select a design from Thingaverse.com and “crowdsource” ideas on how to improve it. In both instances, use [Google Sketchup](http://sketchup.google.com/) to design and present a 3D version of their object along with a brief sales pitch that addresses the target audience and market of the product.

Afterwards, discuss design experience. What were the challenges? Pros? Cons? Benefits? of the experience. How do you see that extending into “real-life”?

**Resources**

* [The New Industrial Revolution](http://www.wired.com/magazine/2010/01/ff_newrevolution/). (<http://www.wired.com/magazine/2010/01/ff_newrevolution/> ) In depth and extensive feature article on the impact of DIY manufacturing on the economy from Wired magazine.

Source: <http://www.pbs.org/america-revealed/teachers/lesson-plan/2/>