



## Stanford eCorner

### Historical Example of Convergence - Steam Powered Factory.

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Video URL: <http://ecorner.stanford.edu/videos/936/Historical-Example-of-Convergence-Steam-Powered-Factory->

Wirt explains that the invention of the electric motor revolutionized the way factories operate. With steam power, there was one central boiler which dictated how the factory had to be organized. As electric motors evolved, it became possible to make small motors that could be distributed around the plant to provide power to individual machines allowing for greater flexibility. Now, electric motors are everywhere, he says.



#### Transcript

A lot of times it's helpful, instead of being in sort of the thick of things, like right now you can get caught up in the intricacies of the phone, PDA, MP3 war but let's go back to maybe a simpler time and see if we can learn something from history on this. An interesting one to look at, if you go back far enough, is what happened with the change from steam-powered factories to electrical power in factories. And what happened when you had steam-powered factories is you didn't have distributed steam power. I mean, you had a boiler in the basement that you fed with coal. And I looked for a good diagram which I couldn't find, but you can see down here, the way it worked is there's a boiler and pulleys and the pulleys went all over the factory. And factories were organized kind of vertically. And if you go back and look at clothing factories in the early 1990s, for example, you see they are vertically oriented because you get the shortest run of belts. The belts go down to this boiler in the basement and you get belts that go up five stories and over three stories and the belts are kind of the shortest that way. And you couldn't have distributed steam processing. What happened is when electric motors came out, and they were really dynamos, they just ripped out the big steam boiler and they put in this big electric motor and they hooked the belts and pulleys that they already had in places, hooked them up to the big electric motor, and it was the same kind of thing.

But what happened over a period of about 20 years is that electric power got to be distributed. You don't have to have one giant electric dynamo. You can make a lot of little electric motors and you can spread them around. And so what happened is over 20 years, though, the plants, the physical five-story high factories, kind of got rebuilt. And factories tended to be much shorter--one- or two-story factories--because you could spread that power out. You didn't have to have the big dynamo in the center and run belts and pulleys. You could put the power right where it's needed at the individual machines. And if you look at where we are now, the average car has more than 60 electric motors in it. I'm sure you can't even count the number of motors that you have in your car or in your home. For example, you try and count how many motors are in your home and you try and add up all the hair dryers and appliances and the furnace and the little motors that are in all different kinds of appliances.

I mean, they are everywhere. So that's one example if we look back.