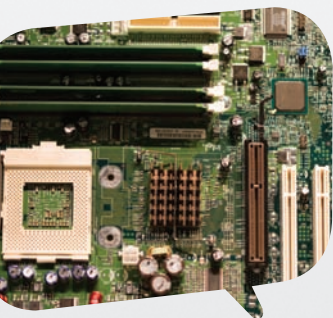# onInnovation

Visionaries thinking out loud.™

Gordon Moore

Highlight Video Transcript

Who charted the course for the microprocessor's future?

In 1965, Gordon Moore formulated Moore's Law: the assertion that circuits would double in complexity every 18 months. Ever since, he's provided the proof behind the prediction, developing increasingly powerful microprocessors over a 40-year career. In practical terms, this has meant ever more powerful, compact and accessible computers as chips have not only grown more complex but also smaller. With greater power and accessibility, the microchip's evolution has had an increasingly profound effect on people's lives.

At the turn of the twentieth century, Detroit was a hotbed of automotive innovation.

A combination of inventors, investors, tinkerers and entrepreneurs turned the city into something bigger: the center of a new global industry.

Years later, a similar convergence of talent turned California's sleepy Santa Clara Valley into the world's center of computing innovation.

Gordon Moore was one of the engineer entrepreneurs who put the silicon in Silicon Valley.
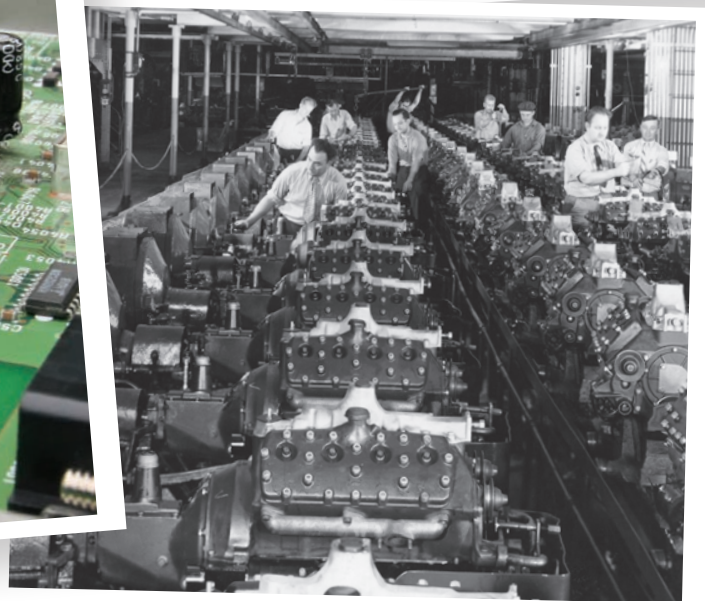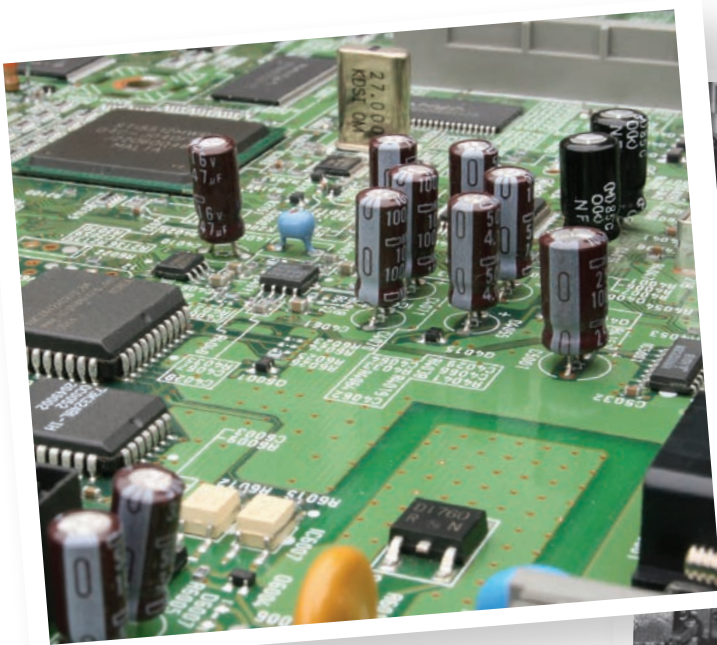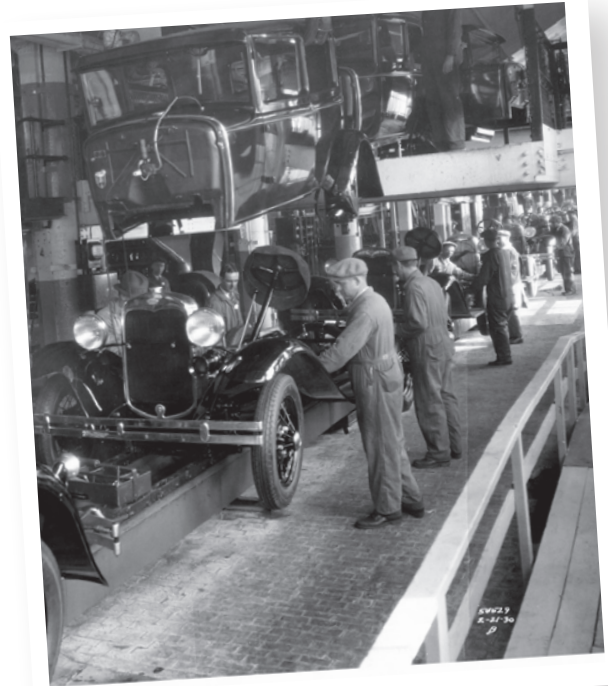
Upper right: The body and the chassis of a 1930 Ford Model A come together on the assembly line at the Ford Motor Company Rouge Plant, Dearborn, Michigan, February 1930. Lower left: Close-up view of a computer circuit board. Lower right: Workers testing engine blocks at the Ford Motor Company Rouge Plant, Dearborn, Michigan, August 1937.

Based on a verbatim transcript of an interview at Intel Corporation, Santa Clara, California, September 24, 2008 — www.OnInnovation.com

Gordon Moore,
Chemist, Co-Founder of Fairchild Semiconductor Corporation and Co-Founder and Chairman Emeritus of Intel Corporation

06:13:19

You give good people – the opportunity and – they go out and do the innovations. It's hard to control it very much. In fact, I think the more you control it, the more you're likely to stifle innovation. It requires a – the – people be given a fair amount of latitude if they're gonna - proceed and come up with new and different things.

06:13:42

Now, we were fortunate that we were very early in a very rich technology. In fact, Fairchild was a source of a huge number of spin-offs. Because we're developing opportunities a lot faster than Fairchild Semiconductor could grow to exploit them. So, dozens of companies, literally, spun out of Fairchild to exploit some of the new ideas coming along. It was a very innovative time period and did much to seed the entire industry.

The Engineer Entrepreneur

06:19:51

You know, in a bigger company . . . if an engineer came up with a new idea, it was rather frustrating to see that – his idea wither on the vine . . . It was much more attractive to spin off, have an opportunity to exploit the idea that came along in an environment that was pretty much controlled by the engineer himself.

06:20:25

. . . It became relatively low risk to set up your own company. In this area, failure wasn't a stigma. You could go out and set up a company and fail and get a job the next day at another company.

06:17:19

It was the – development of the engineer entrepreneur. The engineer would see the opportunity, run off and get financing . . . It was really the blossoming of the venture capital industry along with the technology . . . out here that– created the phenomenon known as Silicon Valley.

Gordon Moore

"You give good people – the opportunity and – they go out and do the innovations. "
— Gordon Moore
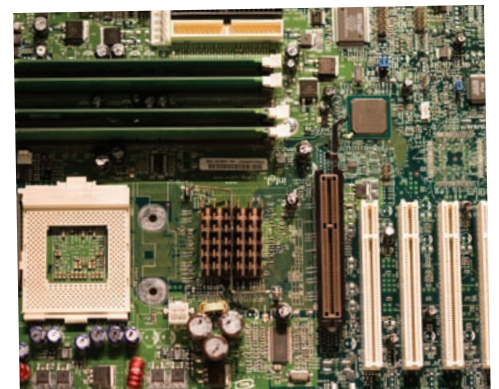
Computer circuit board displayed at the Intel Museum, Santa Clara, California.

Building the Microprocessor

06:22:55

. . . when we set up Intel . . .

06:24:38

. . . We tried to – just preserve an environment where people could – do new things. . . . For example, when one of our young engineers invented the microprocessor. For years, the industry had talked about some day putting a whole computer on a chip. Well, that was way out in the future. But one of our engineers is looking at a family of calculators that – we were asked to produce. So heck, I could make a general purpose computer architecture, do all his calculators and be useful for a variety of other things, too, and it wouldn't be much more complex than the memory chips we're making.

06:25:26

That was really an intellectual breakthrough. He saw an opportunity . . . And we pursued it, and it, over a period of time, has become Intel's principal business by far. But – you know, we've tried to encourage our engineers to think like that. To come up with completely new ideas. And they've been successful often enough that the company has grown quite significantly.

06:27:46

So, while the opportunity was there, we didn't see how we could take advantage of it. And that's when Ted Hoff looked at those and said, "You know, we could make all of these out of a general purpose computer architecture. And it shouldn't be much more complex than the memory chips we're making already." That was really an insight. He also said, "And – not only will it do the calculators, but it can do controllers, like elevator controls, traffic lights," I remember were two examples he came up with. So, here's a general purpose chip that can do a lot of different functions and – we should be able to make.

06:29:23

That really got us going in the microprocessor area. Now, those first chips went into all sorts of weird applications. Generally, by a little company, they're written by individuals. I remember one of our directors one time saying, "When are you gonna get a customer I've heard of." These things were going to really obscure places.

Front entrance to the Intel Corporation, Santa Clara, California

". . . Lack of fear of failure is an important part of it. People are willing to try things. They figure if they don't make it, they can do something else."
— Gordon Moore

A visitor explores one of the displays at the Intel Museum.

Be Fearless

08:06:38

. . . lack of fear of failure is an important part of it. People are willing to try things. They figure if they don't make it, they can do something else. The availability of venture capital is an important – people with a good idea can generally get it financed. Or at least under most circumstances can. I hope that continues to be the case.

A visitor interactive at the Intel Museum

Gordon Moore has a lot more to say. Visit OnInnovation.com

to see his full, unedited interview, read the complete transcript and connect with other visionaries thinking out loud.

Gordon Moore