TestEquity

What Engineers Learned During the Pandemic

(And What They Should do Next)

In 2019, product design and production were akin to the proverbial well-oiled machine. For design engineers, it was a year of relative ease in obtaining raw materials, tools, and components. Test and measurement schedules were simple, and inventory was always on the shelf.

Throughout 2019, the design and manufacturing sectors were also economically strong. By year-end, the unemployment rate dropped to levels not seen since the 1960s and low inflation kept business moving along nicely. Growth was supported by a significant fiscal stimulus, the effects of tax cuts and strong new jobs numbers—all adding impetus to the economy and greater demand for electronics.

Then, virtually overnight, it all changed.

SPONSORED BY

KEYSIGHT TECHNOLOGIES

Tektronix · KEITHLEY A Tektronix Company · Weller

Chemtronics · TECHSPRAY

DESCO · SCS · MENDA

IAC · O.C.White Co. · Vision Engineering · Anritsu

The Impact of COVID-19

As 2020 rolled in, so did chaos in the form of a global pandemic. Slowly at first, then rapidly picking up steam—COVID-19 brought design, production and the economy to a grinding halt. China, ground zero for the pandemic and home to a huge number of manufacturers, instituted a country-wide lockdown, causing severe material, component, and equipment shortages. Given the strict edict, the world rapidly saw outrageous prices four to six times higher than just months earlier. Supply chains broke down and deliveries of materials and components took at least three times longer, if they could be had at all.

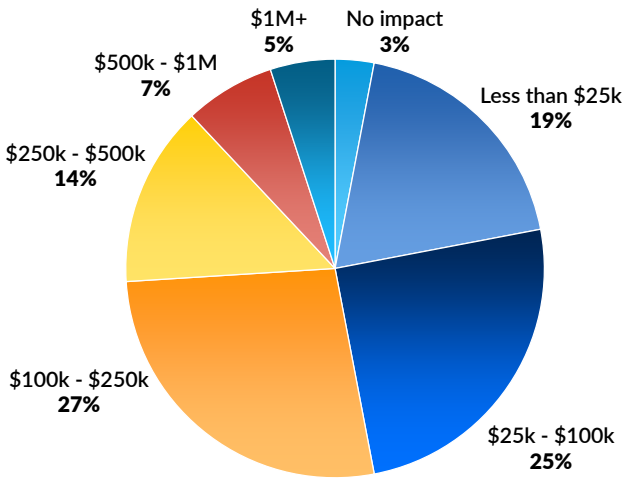
The pandemic moved fast. In Q1 2020, The World Health Organization (WHO) declared COVID-19 (coronavirus) to be a global pandemic. **The semiconductor and electronics industries, including automotive and consumer segments, were severely hit, owing to their dependence on China and other Asian markets.** Other segments were more fortunate, including cloud-based data centers, communication, connectivity, and medical.

The pandemic's reported impact was devastating:

- Wakefield Research predicted global revenue for the semiconductor industry will drop by 5-20%
- Yole Développement reports that demand for electronics components used in sensing and computing devices, such as advanced driver-assistance systems (ADAS), has slowed to a halt, and that market recovery may take years
- A March 2020 Axios article claims that COVID-19 disrupted supply chains for at least 75% of U.S. companies.
- The Institute of Supply Management's CEO Thomas W. Derry reported, "For a majority of U.S. businesses, lead times have doubled, and that shortage is compounded by the shortage of air and ocean freight options to move product to the United States even if they can get orders filled."
- By March 5, 2020 manufacturers in China operated at 50% capacity with 56% of normal staff—and the situation worsened from there.

Early in the year, even mainstay supplies were nowhere to be found. Nitrile gloves, for example, relied on by the electronics industry, disappeared. **Swabs used to clean PC boards were redeployed to perform COVID-19 tests as U.S. and Asian governments rapidly purchased them for medical purposes and they had priority.**

Weller is part of the Apex Tool Group and offers a global network and comprehensive service.



Company cost from losing one day of engineering time due to equipment problems?

Dimensional Research study — cost of losing one day of engineering time

Graphic: Business Wire

Test and measurement also suffered. According to a survey performed by Dimensional Research, more than 90% of companies experienced revenue loss because of preventable delays related to test and measurement equipment. Fifty-three % (53%) of reporting companies lost revenue more than $100,000 of waste per day waiting to resolve technical support issues, and 5% reported that it was more than $1 million. Ninety-four % (94%) of electronic test professionals said they needed committed, fast-response technical support.

Coventry sterile swabs have been efficiently engineered to collect biological fluids for elution and analysis.

Actions Taken

When the pandemic hit, there was a scramble to resurrect normalcy amid the chaos. Actions included relocating operations and discovering alternative ways to do business.

For example, several large manufacturers cut reliance on China, moving operations to Mexico, Vietnam, and India. TE Connectivity's Aerospace, Defense, and Marine business increased its limited production capacity in Hermosillo, Mexico to support commercial air, medical, and telecommunication industries. Other companies rapidly moved operations to Vietnam.

While some efforts raced away from the problem, others raced toward it. Early on, engineers joined efforts to prevent the coronavirus outbreak from growing even more deadly. They revamped factories to make ventilator parts, designed and 3D printed critical medical supplies, set up virtual hackathons and open-source groups to aid in development of ventilators and to boost N95 respirator production.

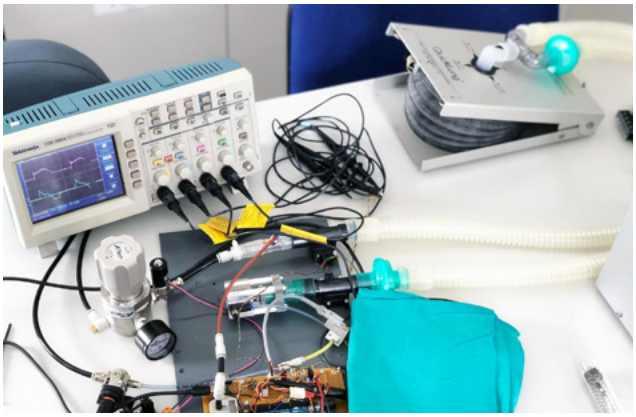
GM teemed with medical equipment maker Ventec Life Systems to make ventilators, supplying 95% of the parts necessary. Ventilators were made at GM's Kokomo, Ind. plant that made small electronic parts that could be repurposed for control systems. Ford teamed with GE Healthcare to simplify GE's existing ventilator and with 3M to make powered air-purifying respirator masks using HEPA filters and seat cooling fans from the F-150 truck and 3M power tool battery packs.

Hundreds of engineers joined the Open-Source Ventilator Project on Facebook to design and build a prototype from 3D-printed parts and open-source hardware resources.

Personal protective equipment from Desco can provide the protection your team needs to stay safe in the workplace.

As the largest test and measurement distributor in the U.S., with Keysight as a key partner, TestEquity has the most testing solutions available. In 2019, TestEquity had a large inventory of equipment, a solid supply chain, and a wide range of solutions in stock. As soon as the virus hit, the company experienced the same crunch in the supply chain that was felt globally. For products typically in stock, lead times moved from four weeks to as much as twelve weeks.

TestEquity is, however, a good rapid-recovery example. While many competitors cut back substantially or even dissolved, the company quickly initiated necessary precautions to protect staff and customers and to keep products in stock and rapidly shipped. The company attributes its recovery to focusing on its customers and their time-to-market requirements. Proactive product status communications, virtual meetings and demos, a team-based troubleshooting effort and rapid response were key. As a result, customer problems were solved faster.



Tektronix products were used in the Open-Source Ventilator Project.

Keysight Technologies is a key partner to TestEquity.

An important lesson was the need for transparency between supplier and customer. Improved communications results in greater productivity and in enhanced relationships.

What Engineers Should Consider Now

When disaster strikes and the dust settles, it's important to look at lessons and opportunities. Engineers not only jumped in to help with medical supplies, but they also innovated ways to help their own companies do better during and will continue to do so after the uncertainties of the pandemic.

Honeywell engineers, for example, are concentrating on solving the problems created by COVID-19, including the development of products that protect people against the virus and technical solutions to solve the shortage of materials to produce the protective equipment. To stay on top of supplying airflow sensors, its engineers are also dramatically increasing production capacity with testing and calibration systems that now produce 10x the number of pre-COVID sensors.

Remember the critical shortage of swabs? Necessity spurred the Department of Radiology at the University of South Florida (USF) Health in Tampa to design, develop, and test swabs they made by using a 3D printer. Printing more than 100,000 swabs themselves, they've shared the 3D files with hospitals around the world, to print tens of millions more.

As a result of COVID-19, there will be a greater use of robots and greater investment in their development. Robotic systems are rapidly expanding with machine learning, artificial intelligence, and software improvements and in the future, robotic systems will collaborate to improve productivity and efficiency.

By late May, 50,000 nasopharyngeal swabs were produced for USF Health and its affiliates, including Tampa General, Moffitt Cancer Center and the James A. Haley Veterans' Hospital. [Allison Long, USF Health Communications] Source: Department of Radiology, USF

Yole's analysts expect that the industrial market will recover in 2021, and double in size in five years driven by such long-in-coming applications as robotic cars, autonomous and collaborative robots, IoT, and micro/nanosatellites.

A recent survey by Honeywell, Weber Shandwick, and KRC Research indicates that 51% of companies are more willing to invest in automation as a result of the pandemic, including 55% of logistics companies.

It's clear to see where additional engineering opportunities are in the future based on lessons learned as a result of the pandemic.

A recent survey by Honeywell, Weber Shandwick, and KRC Research indicates that

51%

of companies are more willing to invest in automation as a result of the pandemic, including

55%

of logistics companies.

Next Steps

So, what preparations and actions do engineers need to take now?

Recently, National Academy of Engineering President John Anderson was interviewed about the challenges brought on by the pandemic for engineers, and what they are doing to address them. In the resulting article, Engineering a Response to the COVID-19 Pandemic, Anderson highlights the work of engineers and scientists, including:

- Sequencing within weeks, the genetic structure of the SARS-CoV-2 virus
- The production automation engineering challenge of moving from 100 doses to a billion doses of vaccine and therapeutics—is an engineering role
- Maintaining supply-chain integrity to implement vaccines and therapeutics
- Harnessing AI and machine learning to develop vaccines and therapeutics rapidly
- Engineering enabling telework and communications to empower industries to actually work

So far, innovations engineered include COVID-19 diagnostic tests, risk modeling, and the ability to adjust processes and actions on the fly. Engineers are **using a digital twin**, a model of the real world, to anticipate problems and plan how to address them.

As a result of COVID-19, digital adoption is speeding up in the design and prototyping stage. Today, engineers are more at ease collaborating on a virtual prototype, even remotely. By **harnessing the cloud**, product design engineers, industrial engineers, and manufacturing can all work from the same data housed in the cloud, allowing greater design for manufacturability (DFM) without waiting until the end of the process for it to be a consideration.

Using IoT information to aid product development is not a new concept, but adoption has been slow until now. As manufacturers grapple with working remotely, digital engineering tools are becoming a more important consideration. For example, Instrumental Inc. recently reported a threefold jump in inquiries from electronics manufacturers concerning its IoT platform. Equipment manufacturers are beginning to understand that they need the **real-time connection**. Using IoT, sensor and instrument feedback is digitized to deliver trends and potential equipment failure. Digital engineering technology will help customers and improve production processes. Real-time connections can all but eliminate the "it isn't working" phone call that demands an in-person visit to assess and repair equipment.

COVID-19 is impacting rapid innovation surrounding the shortages of 2020—new materials, devices, and products are already emerging. Risk management is being taken more seriously and companies understand that this is an opportunity to build **agile supply networks** to support a more flexible future.

If we look closely at what has happened, we see the truth. Technology was placed in an unusual position by COVID-19. Transformational technology that addresses a specific challenge is usually the catalyst for massive disruption and innovation. What we've seen, however, is a disruption caused by an event. Instead of being the driver of change, technology was relegated a responding role.

Going forward, engineering has a front-and-center, albeit different, role to play. From advances in medical applications, test and measurement, all the way out to the edge of supply chains, engineers will have new tools and new methods of collaboration with their own teams and with teams in diverse industry segments. Throughout the crisis, engineers were thorough, fast, and determined when solving COVID-based problems. Current and future challenges will benefit from the experience. Greater opportunities will exist for engineers in a variety of segments including medical equipment, IoT, tracking, and digital engineering. We've seen 5G IoT interest increase significantly as a result of the health crisis.

Virtually every aspect of engineering has been, or will be, impacted by the pandemic. For engineers that recognize the possibilities that exist, and for their employers that foster a renewed dedication to innovation, it will be an exciting time.

Often, we see technology advances as the catalyst for major disruption. This time, a disruptive event spawned the chance for greater innovation. It is a unique opportunity for engineers to recognize and capitalize on the opportunities caused by the global pandemic and for their employers to **foster an environment of innovation.**

SPONSORED BY

KEYSIGHT TECHNOLOGIES

Tektronix · KEITHLEY A Tektronix Company · Weller · Chemtronics · TECHSPRAY · DESCO · SCS · MENDA

IAC · WHITE LITES O.C.White Co. · Vision ENGINEERING · Anritsu

TestEquity

Our Brands

TestEquity 800.950.3457 TestEquity.com

Techni-Tool 800.832.4866 Techni-Tool.com

Jensen 800.255.5370 JensenTools.com