

How iPhone Is Made: The Global Assembly Line



iPhone, that iconic brand that is uniquely American as hamburgers and a can of Coke. Or is it? But we already know that behind this made-in-America smartphone is a mix of other products that are made in, yes, elsewhere. Truth is, when you buy an iPhone, you're also buying a little of something that is maybe an LG, Samsung or Sharp and myriad other commodity parts that are everything but American. This is the economics of a smartphone, one that is built on the principle of "frenemies," an enemy is a friend for one's sake. Apple asking Samsung for

help to cut costs for example. To see the bigger picture, let's tear down an iPhone 5, Steve Job's last hurrah, and follow its journey from rare earth to your pocket.

Made in USA

iPhone is a genuine American product because its engineering and design are borne out of the ingenuity and skill of American developers and industrial designers in Cupertino, California, Apple's headquarters. The battle plan to innovate and shake the smartphone industry started here in as real fashion as when, perhaps, Edison shouted eureka! after figuring out how to make a light bulb or when the Wright brothers flew the maiden flight in American soil.

Beyond the planning stage, iPhone 5 is still being made in America. Its brain, the A6 chip, is manufactured by a semiconductor company based in the US, perhaps an Intel or IBM plant or even a Samsung American subsidiary in Austin, Texas. The smartphone may be made from different countries, but it thinks as an American like you and me.

The software is also designed locally and a \$500-million data center was even built in North Carolina. The radio frequency part is made by Ohio-based Triquint, the audio chip by Cirrus Logic, a Texan company and the controller chips by California-based PMC Sierra and Broadcom Corp. Evidently, the specialized parts and design are American, making the iPhone a first-rate, cutting edge product. Interestingly, the glass is developed and manufactured by a Corning plant in Kentucky, although the bulk of manufacturing has since been shipped out to the company's plants in Japan and Taiwan.

The technical specifications aside, iPhone creates local derivative economies around it: its innovative marketing is handled by TBWA with offices in Los Angeles and New York, and its apps are written by American software companies. Apple is also one of the few companies that maintains a US-based local customer call center in Indiana, Texas and California to name a few.

Made in Mongolia



An iPhone is not only assembled in China, but it starts in that country at a much earlier stage and much deeper part of the earth. Ninety percent of rare earth minerals, naturally occurring solids whose combination comprises essential iPhone parts, are mined in China, notably in Mongolia. Although things may change soon as newer eco-friendly mining technologies will allow the US to tap its rich mineral fields.

Lanthanides, scandium, yttrium and some other alien-sounding names at the bottom of the periodic table (remember your secondary school?) make the iPhone “light, bright and loud.” Its color screen, glass polishing, circuitry, speakers and vibration unit come from a mix of these rare earth minerals.

Made in Japan, Korea, Taiwan

They are the Asian immigrants. Made in Japan, Taiwan and Korea but are married into the American product. Apple has had sourced its LCD panel from Sharp, Japan Display and LG in the past. The engineers in Korea and Japan allowed you to enjoy that smooth sensation of control when you swipe, pan, zoom out and in the iconic iPhone touchscreen. But these engineers want you to have more fun that LG has developed an in-cell display for iPhone 5. It eliminates a glass layer in between the touch pad and the liquid crystal to make the smartphone thinner and its battery life longer.

Ironically, iPhone’s microchips are made by Samsung, Apple’s mortal enemy now. Its patent scuttle with Samsung transforming into a global war, Apple is also tapping Taiwan’s TSMC and SK Hynix (formerly Hyundai) for chip-making, DRAM and flash memory to diversify its supply chain. Still, Samsung or a subsidiary is providing iPhone with rechargeable batteries.

Made in Europe

It sounds like Europe’s diminishing share of world economics, but, true, a French-Italian company based in Geneva, Switzerland, STMicroelectronics, managed to get a slice of the iPhone pie: the gyroscope used for tracking the smartphone’s orientation. STMicroelectronics is Europe’s largest semiconductor chip maker, but not large and flexible enough to compete with the Asian giants.

Made in China



When Americans protest that iPhones are made in China, they mean that it is assembled by the Chinese. The blueprint, crystal, specialized parts and processors from the US, display panels, chipsets and memory from Japan, Korea and Taiwan, gyroscope from Europe and rare earth minerals from Mongolia all come together in China, the world's factory.

It's a touchy issue, but the late Apple founder Steve Jobs once told US President Obama that these iPhone jobs won't be coming back to the US. And cheap labor is not the reason; it's the economics of scale in both human resources and manufacturing facilities.

It is reported that where American companies would take months to pool thousands of industrial engineers and even more months to construct new assembly lines to accommodate a trivial but urgent change in iPhone's spec—say, its glass panel must curve to hatch on the body six weeks prior to launching—it only takes 15 days in China. In a cutthroat industry where a fast turnaround can spell a phone's success, China is not an option. To put it in perspective, one production line in China can assemble 72,000 iPhone 5 back plates daily; one factory can have four to five production lines and China can have as much as a hundred of these factories, opening or closing a few of them depending on the current demand. The last part—opening and closing plants like a mom-and-pop store—is almost impossible in an American economy. It is no longer a city counting the number of manufacturing plants it has, but the manufacturing plant can be counted as a city in many Asian economic zones.

CONCLUSION

Hundreds of thousands of iPhones come out of Chinese factories every day. Each one is an iconic symbol of American consumerism, and each one consists of parts made in different countries. But like the US president or Albert Einstein, or Joseph Pulitzer, or Martina Navratilova, or Ieoh Ming Pei or Bruce Lee, and many other great Americans who are "made" elsewhere, the iPhone is a true American in spirit. Its ideals are built on the ingenuity and competitive spirit that has made and is making this country great, be it in peace or troubled times.

Next time you get hold of your iPhone, how about saying hello to the world... from America with love.

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