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Nyla Provost
CSUSB

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The Development of Synthetic Rubber and its Significance in World War II

By Nyla Provost

Abstract: Rubber has been one of humanity's most vital resources for hundreds of years. World War II was a pivotal event in the history of rubber that permanently altered the industry forever. Prior to World War II, the majority of the rubber in the United States came from foreign rubber plantations. The United States' reliance on foreign rubber led to a crisis in the early twentieth century. Shortly after the attack on Pearl Harbor on December 7, 1941, Japanese forces in Southeast Asia captured ninety percent of the United States' natural rubber supply. This was a monumental event as rubber was not only needed by the booming United States' automobile industry to make tires, but also by the military to produce gas masks, bombers, and tanks. This historic event effectively cut the United States and its allies off from a vital commodity that was essential in order for the Allied Powers (United Kingdom, United States, Soviet Union, and China, among others) to win the war. In unprecedented times, the United States developed a synthetic alternative to natural rubber that was far more efficient. The United States' response to the World War II rubber crisis would ultimately determine the fate of World War II and the Allies' victory over the Axis Powers (Germany, Italy, and Japan). Furthermore, World War II led to the development of synthetic rubber, which is still widely used today. This article will examine the history of synthetic rubber, a war-born material, and its significance in World War II.

One of the most elite fellowship groups in Washington, D.C., the Alfa Club, had never seen anything like it. It was an unfamiliar sight for the 250 members, largely composed of United States

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Senators, Supreme Court Justices, army generals, powerful attorneys, and Washington's elite members of society who were more acquainted with verbal duels rather than fistfights.¹ Nevertheless, on April 9, 1942, at the club's annual meeting, Eugene Meyer (1875–1959) and Jesse Jones (n.d.), two of the club's wealthiest and most distinguished members, came to blows over undoubtedly one of the most controversial topics in the capital during America's first year as a combatant in World War II (1939–1945): synthetic rubber.

Meyer, who published *The Washington Post* from 1933 to 1946, wrote an article earlier that day criticizing Jones's leadership of the country's still-developing synthetic rubber sector. Jones was one of Washington's busiest public figures, acting as Secretary of Commerce and heading many of the Reconstruction Finance Corporation's wartime subsidiary organizations. He conducted not only the pre-World War II stockpiling of natural rubber, but also the funding of plant development for the new industrial rubber industry as the chief executive of the Rubber Reserve Company, and the Federal Loan Agency board chairperson of the Defense Plant Corporation. In the spring of 1942, with the United States still trying to strengthen its economic force in preparation for war following the attack on Pearl Harbor, Jones was the target of blame and condemnation that even a modest person could not bear.²

Tensions ran high throughout the country in 1942. Above all, 1942 was a war year. Not only did the Japanese military bomb Pearl Harbor on December 7, 1941, but they also discovered the most fragile sector in the American economy: rubber. These were dark times for the United States. Before World War II, the United

¹ William M. Tuttle, "The Birth of an Industry: The Synthetic Rubber 'Mess' in World War II," *Technology and Culture* Vol. 22, No. 1 (1981): 35-67, <https://www.jstor.org/stable/pdf/3104292.pdf>.

² Bascom Nolly Timmons, *Jesse H. Jones, the Man and the Statesman* (New York: Henry Holt and Company, 1956), 6.

States was the world's largest importer of rubber, all of it natural.³ A majority of the United States' rubber supply came from rubber plantations in Southeast Asia, which was sufficient up until the beginning of World War II.



Figure 1. Natural rubber being drained from a tree in a process called "tapping." Courtesy of Wiki Commons.⁴

Then, in the first few months of 1942, Japan seized ninety percent of the world's natural rubber supply and ninety-seven percent of the American supply in Southeast Asia during Japan's invasion of the South Pacific territory.⁵ Without the creation of a new rubber alternative, the Rubber Survey Committee, created by President Franklin Delano Roosevelt (1882–1945) in August 1942, anticipated that "military and other crucial [rubber] demands"

³ Paul Wendt, "The Control of Rubber in World War II," *Southern Economic Journal* Vol. 13, No. 3 (1947): 203–27, <https://www.jstor.org/stable/1053336?seq=2>.

⁴ "Koh Chang, Thailand, Rubber tree, Latex," Wikicommons, February 7, 2010, https://commons.wikimedia.org/wiki/File:Koh_Chang,_Thailand,_Rubber_tree,_Latex.jpg.

⁵ Brendan J. O'Callaghan, "Rubber in World War II: A History of the U.S. Government's Natural and Synthetic Rubber Programs in World War II" (unpublished manuscript, 1948), 1, <https://www.jstor.org/stable/pdf/3104292.pdf>.

would exceed the available supply by 211,000 tons by January 1, 1944.⁶ The Rubber Survey Committee's estimate did not account for the cost of maintaining tires on the millions of civilian vehicles on the road. In an unprecedented effort, the United States formed an alliance with private businesses and organizations in a span of five years, overcoming significant challenges to develop its own synthetic rubber industry within its territorial borders, which ultimately aided in its triumphant efforts in World War II. The industry that arose as a result of this endeavor continues to play a significant role in American economics.

Without these incredible triumphs in the acquisition and development of rubber, the United States could have ultimately lost the war. This was the fear that spread throughout the nation in 1942. The head of the Army and Navy Munitions Board, Ferdinand Eberstadt (1890–1969), was even more concerned. In May 1942, Eberstadt wrote to banker and powerful Democrat, Bernard Baruch (1870–1965): “Unless synthetic rubber is ready in quantity by the time the crude stockpile is gone, say, around July 1 next year, we would appear to have no option but to call the entire thing [World War II] off.”⁷

Automobiles had become ubiquitous by the turn of the twentieth century, with emerging economies relying on them heavily for the transportation of goods and people. Natural rubber demand expanded in tandem with the growth of vehicles. Automobile sales in the United States exploded in the 1910s; even farmers and factory employees were able to purchase a Ford Model T, the most popular automobile of its time.⁸ Throughout the interwar period, the United States built eighty-five percent of all automobiles in the world.⁹ The American rubber industry grew to be the world's largest and most technologically advanced. By the

⁶ Tuttle, 35-67.

⁷ Tuttle, 35-67.

⁸ “Automobile History,” *History*, last modified August 21, 2018, <https://www.history.com/topics/inventions/automobiles>.

⁹ Gary Cross, *An All-Consuming Century: Why Commercialism Won in Modern America* (New York: Columbia University Press, 2000), 1.

late 1930s, the United States used half of the world's natural rubber supply, most of which came from Southeast Asia.¹⁰



Figure 2. Postcard from a rubber plantation in South America (c. 1910). The illustration depicts harvesters at work; a French traveler introduced the word “caoutchouc,” meaning “weeping wood,” from a local language in the 1700s. Courtesy of BBC News.¹¹

As the demand for natural rubber in the United States expanded, other countries began developing alternatives for the organic material. Germany was the world's chemical powerhouse in the early twentieth century, supplying the majority of textile dyes, artificial fertilizer, and medications (such as Bayer aspirin) consumed in the United States and abroad.¹² German chemists succeeded in creating a synthetic rubber, but unfortunately, it was

¹⁰ “U.S. Synthetic Rubber Program – National Historic Chemical Landmark,” American Chemical Society, August 29, 1998, <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/syntheticrubber.html>.

¹¹ Tim Harford, “The Horrific Consequences of Rubber’s Toxic Past,” BBC News, July 24, 2019, <https://www.bbc.com/news/business-48533964>.

¹² Stephen L. Harp, *A World History of Rubber: Empire, Industry, and the Everyday* (New Jersey: John Wiley & Sons, 2015), 100.

too expensive to produce.¹³ IG Farben, Germany's massive chemical conglomerate, continued to do research throughout the 1920s. The colorless gas, butadiene, was eventually introduced into the process. Butadiene is produced through the treatment of petroleum and is mainly used in the production of synthetic rubber.¹⁴ It was combined with styrene, another known chemical used in the formula. In the late 1920s, IG Farben scientists developed buna, a more pliant synthetic rubber.¹⁵

When Adolf Hitler (1889–1945) took power in 1933, he immediately began making war plans. In contravention of the Treaty of Versailles (1919), Hitler began projects to support rearmament and expand the military soon after assuming office.¹⁶ He made military duty mandatory and expanded the army's size to 550,000 troops. Nazi Germany made rearmament a national economic priority, but the aim was difficult to achieve since German companies were highly reliant on imported raw materials. At the Nuremberg Party Conference in 1936, Hitler introduced the Four-Year Plan, a new economic policy. Hitler urged party delegates that "all raw materials that may be generated by German talents, by our chemistry, by our mechanical industries, and by our mines must be produced by German skills, by our chemistry, by our mechanical industries, and by our mines."¹⁷ This proclamation would become the foundation for Germany's new campaign for self-sufficiency.

¹³ Diarmuid Jeffreys, *Hell's Cartel: IG Farben and the Making of Hitler's War Machine* (New York: Macmillan, 2008), 203.

¹⁴ "1,3-Butadiene," *PubChem*, National Library of Medicine, National Center for Biotechnology Information, accessed April 13, 2022, https://pubchem.ncbi.nlm.nih.gov/compound/1_3-Butadiene.

¹⁵ Harp, 101.

¹⁶ Johannes Dalfinger and Dieter Pohl, eds., *A New Nationalist Europe Under Hitler: Concepts of Europe and Transnational Networks in the National Socialist Sphere of Influence, 1933-1945* (London and New York: Routledge, 2019).

¹⁷ Arthur Schweitzer, "Foreign Exchange Crisis of 1936," *Journal of Institutional and Theoretical Economics* Vol. 118, no. 2 (1962): 243-77, <http://www.jstor.org/stable/40748563>.

To prevent a repeat of Germany's humiliating defeat in World War I (1914–1918), Hitler sought economic self-sufficiency, particularly in metals and rubber. To refine and improve buna for military use, Hitler approached IG Farben. IG Farben chemists cut the production time in half. They discovered that while still less elastic than natural rubber, synthetic rubber was superior at resisting the damaging effects of sunshine and petroleum compounds like gasoline, giving it a distinct edge on the battlefield. With government sponsorship, buna became a success story.

Before the German invasion in 1941, the Soviet Union continued to export natural rubber to Nazi Germany. Still, beyond that date, the Nazi war machine had almost no natural rubber other than scrap rubber. German occupying forces took natural rubber trees in France for the German war machine, but supplies were limited. By February 1943, roughly a mere eight percent of German tires were made of natural rubber. In 1939, IG Farben produced 70,000 tons of buna synthetic rubber and, in 1944, they produced 140,000 tons.¹⁸

Unlike Germany, the United States did not recognize the necessity for a synthetic rubber industry at the time because most of their rubber supply was imported from Southeast Asia. Germany and the United States had two different outlooks on the possibilities of a second world war at the beginning of the 1940s. While Germany was preparing for war, the United States was doing its best to stay neutral and as far away from war as possible. Nevertheless, by the late 1930s, the American rubber industry discovered how to create synthetic rubber. B.F Goodrich, one of the leading companies in the United States' rubber and automotive industry, founded by Benjamin Franklin Goodrich (1841–1888) in 1870, built a trial facility for generating butadiene-copolymer synthetic rubber in 1937. It employed synthetic rubber in several of its commercial goods within two years.¹⁹ Synthetic rubber,

¹⁸ Harp, 101.

¹⁹ American Chemical Society, "U. S. Synthetic Rubber Program."

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however, remained a costly option as long as natural rubber sources were cheap and plentiful. After ten years as the head of a British rubber manufacturer, John L. Collyer (n.d.) took over as Goodrich's president in 1939. Collyer returned to the United States and determined that synthetic rubber manufacturing must be developed before the country was pulled into another European conflict. In June 1940, under his leadership, Goodrich developed the first synthetic rubber passenger automobile tire in the United States.²⁰ This was a significant achievement for the United States; America now had the chance to establish a synthetic rubber industry in the United States, just like the Germans did in Germany.



*Figure 3. B.F. Goodrich scientist working on synthetic rubber experiment
Courtesy of the American Chemical Society.²¹*

²⁰ American Chemical Society, "U. S. Synthetic Rubber Program."

²¹ "United States Synthetic Rubber Program, 1939-1945," Akron, Ohio, August 29, 1998,

<https://www.acs.org/content/dam/acsorg/education/whatischemistry/landmarks/syntheticrubber/us-synthetic-rubber-program-historical-resource.pdf>.

Throughout the first part of the twentieth century, the B.F. Goodrich Company was a leader in the rubber sector. Vinyl was invented by a B.F. Goodrich scientist in 1926, while America’s version of synthetic rubber was created by B.F. Goodrich scientists in 1937. B.F. Goodrich began advertising synthetic rubber tires in 1940. *Figure 4* shows a B.F. Goodrich ad from 1940 that tells the story of the company’s new invention: synthetic rubber.



Figure 4. Synthetic rubber tire ad from B.F. Goodrich, dated 1940
 Courtesy of Philipp Lenssen, Vintage Ad Browser.²²

Many Americans were aware and fearful of the United States’ dependence on foreign rubber. The Rubber Reserve Company (RRC) was created in June 1940, by President Roosevelt to store rubber in case it became impossible to obtain, which

²² Philipp Lenssen, “Vintage Industry Ads of the 1940s,” Vintage Ad Browser, accessed April 13, 2022, <https://www.vintageadbrowser.com/industry-ads-1940s/37>.

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indeed was a smart move as the Axis Powers began to enter European territories in the early stages of World War II.²³ It became apparent that territories in Southeast Asia would be the next target. However, despite warnings that if the United States lost access to its natural rubber supply, the military would be left without the supplies necessary to produce automobiles, tanks, trucks, and planes, the country continued to rely primarily on Southeast Asia, specifically Malaya, for natural rubber.



*Figure 5. Rubber plantation in Malaya, circa 1920. Courtesy of Children in History.*²⁴

By 1941, the White House—along with much of the nation—began to realize the importance of finding an alternative

²³ Germany, Italy, and Japan were the three main members in the Axis alliance, which later came to be known as the Axis. German dictator Adolf Hitler, Italian dictator Benito Mussolini (1883–1945), and Japanese Emperor Hirohito (1901–1989) commanded these countries. Great Britain, the United States, and the Soviet Union headed the Allied Powers. British Prime Minister Winston Churchill (1874–1965), United States President Franklin D. Roosevelt, and Soviet Premier Joseph Stalin (1878–1953) headed these countries.

²⁴ “World War II Economics: Raw Materials - Rubber,” *Children in History*, accessed April 13, 2022, <https://histclo.com/essay/war/ww2/eco/raw/rub/w2ern-rub.html>.

to natural rubber. Then-President Roosevelt classified rubber as a “strategic and crucial material” in 1940.²⁵ The President did this because German U-boats were blocking Atlantic commerce lines, and the Japanese were threatening to halt shipments from Asian rubber plantations. The Rubber Reserve Company also regulated the manufacturing of the raw ingredients needed to manufacture synthetic rubbers, as well as the rubber itself and the fabrication of rubber-based goods. The sale of new tires for vehicles was prohibited by the wartime administration in Washington in late 1941 and many citizens were asked to donate their tires to the government as seen in *Figure 6* and *Figure 7*.²⁶

As previously noted, at the beginning of World War II, the United States lost access to ninety percent of the natural rubber supply. The United States had a natural rubber stockpile of around one million tons, a consumption rate of roughly 600,000 tons per year, and no commercial technology for producing a general-purpose synthetic rubber at the time.²⁷ Rubber was regarded as one of the most vital material resources required to battle the Axis Powers. In addition, tires had become an absolute need for the millions of cars that Americans owned and adored by this point. Unfortunately, each of the tens of thousands of combat tanks required one ton of rubber to construct.²⁸

²⁵ Sophia Crabbe-Field, “What a Real Wartime President Does,” *Democracy Journal*, April 30, 2020, <https://democracyjournal.org/arguments/what-a-real-wartime-president-does/>.

²⁶ Jeff Davis, “The Last Time VMT Dropped This Sharply – WWII Gas Rationing,” The Eno Center for Transportation, accessed April 8, 2022, <https://www.enotrans.org/article/the-last-time-vmt-dropped-this-sharply-wwii-gas-rationing/>.

²⁷ American Chemical Society, “U. S. Synthetic Rubber Program.”

²⁸ “Tire Rationing during World War II,” *Antiques and Auction News*, June 22, 2018, <https://antiquesandauctionnews.net/articles/Tire-Rationing-During-World-War-II/>.

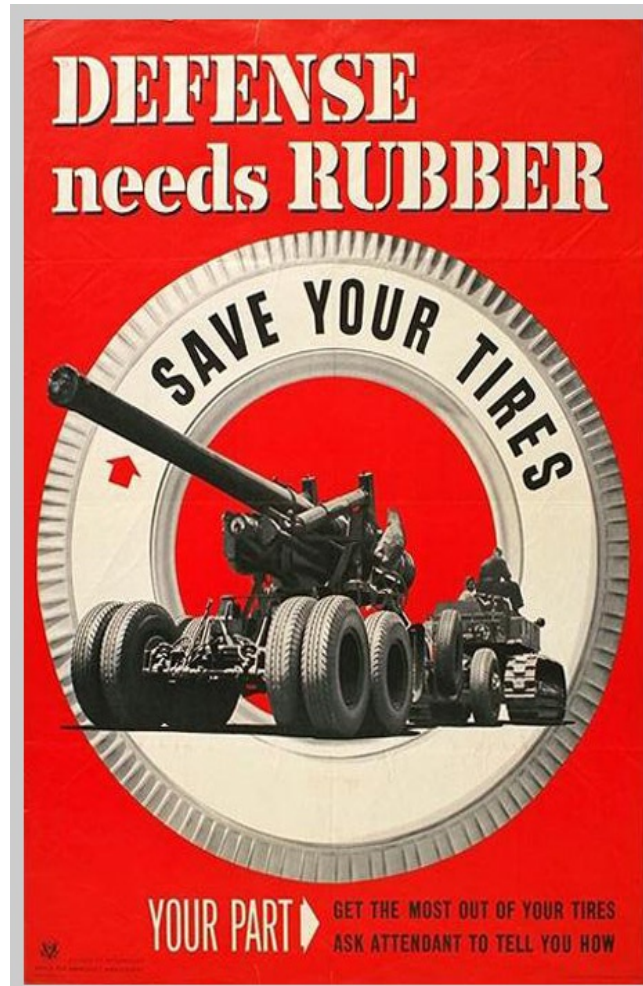


Figure 6. A rubber rationing poster from 1941. Beginning in 1940 the United States began asking American citizens to donate tires to the government. Courtesy of Northwest University.²⁹

²⁹ Government & Geographic Information Collection, Northwestern University Libraries. "Defense needs rubber : save your tires," World War II Poster Collection, accessed May 30, 2022, <https://dc.library.northwestern.edu/items/85826039-ea06-4dc4-b0d5-107bad7e4a08>.



Figure 7. A group of boys donating tires to the United States government at a scrap metal drive at Lincoln High School in Portland, Oregon (c. 1942). Courtesy of Oregon Historical Society, OHS Research Library, Al Monner news negatives, Org. Lot 1284, box 18, 656-4.³⁰

Authorities devised a strategy to preserve the tires already on the rims of the nation's automobiles and ensure that they lasted until the conclusion of the war. To stop excessive driving and slow down wear and tear, then-President Roosevelt called for gasoline rationing and a forty-mile-per-hour speed restriction. He addressed the nation with the following message:

Rubber experts agree that fast driving wastes rubber and that tires run many more miles when driven at limited rates of speed. May I suggest that this waste could be curtailed to the advantage of the individual motorist, and likewise to the advantage of the country, if the speed of all motor vehicles were limited to a maximum of forty miles per hour and if

³⁰ Lindsey Benjamin, "From Sugar Rationing to Rubber Drives: A Glimpse at World War II through the Al Monner News Negatives," Oregon Historical Society, April 16, 2020, <https://www.ohs.org/blog/from-sugar-rationing-to-rubber-drives.cfm>.

regulations were promulgated requiring frequent checking of tires in order to insure their repair or, where possible, retreading at the proper time. I would greatly appreciate your cooperation in an effort to achieve these objectives throughout the country.³¹

Following the attack on Pearl Harbor and the subsequent mobilization of the United States military, Americans were already stunned by the rapidly unfolding chain of events. Gas rationing and other economic measures soon followed.³² The government started a nationwide campaign to gather support for its massive rationing program by telling residents that they were now home front warriors at the start of World War II. Nearly all meals, as well as gasoline, cigarettes, alcohol, heating oil, and clothes, were on the rationing list at one point or another. The government's new rationing initiative received much backlash from American citizens. In newspapers, comics criticized the rationing program through illustrations as seen in *Figure 8*.

³¹ Franklin D. Roosevelt, "Appeal to Governors to Conserve Rubber by Reducing Speed Limits," *The American Presidency Project/Gerhard Peters and John T. Woolley*, accessed March 22, 2022, <https://www.presidency.ucsb.edu/documents/appeal-governors-conserve-rubber-reducing-speed-limits>.

³² Jeff Davis, "The Last Time VMT Dropped This Sharply."

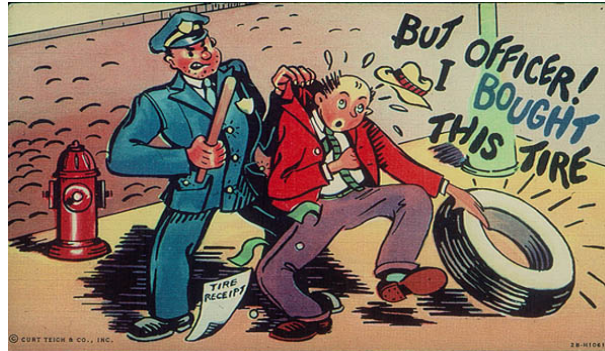


Figure 8. Newspaper comic from 1941. Courtesy of Antiques and Auction News.³³

President Roosevelt formed the RRC to evaluate the situation and give recommendations for resolving it. The committee produced two proposals to fix the rubber issue in less than a month. The first was to select a rubber director who would have total authority over the supply and usage of rubber, and the second was to build and operate fifty-one synthetic rubber factories right away.³⁴ Additionally, the RRC asked the four major rubber businesses (Jersey Standard, Firestone, Goodrich, Goodyear,) and the United States Rubber Company, to produce four hundred thousand tons of general-purpose synthetic rubber per year. Jersey Standard, Firestone, Goodrich, Goodyear, and the United States Rubber Company signed a patent and knowledge exchange agreement on December 19, 1941.³⁵ As a result, synthetic rubber facilities sprang up across the United States, and their combined scientific and technological knowledge aided in the development of synthetic rubber in the country. The United States had spent as

³³ Antiques and Auction News, "Tire Rationing during World War II."

³⁴ American Chemical Society, "U.S. Synthetic Rubber Program."

³⁵ American Chemical Society, "U.S. Synthetic Rubber Program."

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much money on its synthetic rubber effort as it had on the atomic bomb by the end of World War II.³⁶

While the Goodrich Tire Company was the largest synthetic rubber plant in the United States in the 1940s, they were not the first company to achieve success. On April 26, 1942, Firestone made the first synthetic rubber bundle for the U.S Synthetic Rubber Program, followed by Goodyear on May 18, 1942, United States Rubber Corporation on September 4, 1942, and Goodrich on November 27, 1942. These four factories produced 2,241 tons of synthetic rubber in 1942 alone. By 1945, the United States was manufacturing around 920,000 tons of synthetic rubber per year, with Government Rubber-Synthetic (GR-S) accounting for eighty-five percent of that total.



Figure 9. A group of scientists working together to create a general all-purpose synthetic rubber that could be produced on a commercial scale. Courtesy of American Chemical Society.³⁷

³⁶ “Technical Reports and Standards,” *Science Reference Services*, The Library of Congress, accessed March 22, 2022, https://www.loc.gov/rr/scitech/trs/trschemical_rubber.html.

³⁷ American Chemical Society, “U. S. Synthetic Rubber Program.”



Figure 10. Goodrich Tire Company, the largest synthetic rubber plant in the United States in the 1940s Courtesy of Akron Postcards.³⁸

The four biggest companies (Jersey Standard, Firestone, Goodrich, Goodyear, and the United States Rubber Company) produced 547,500 tons per year on average.³⁹ The American synthetic rubber industry was a success. After the war ended, the United States continued to produce synthetic rubber as its main rubber source, as synthetic rubber was a better all-purpose alternative. While the four major tire companies had put aside their differences and worked together in solidarity during World War II in an effort to end the rubber crisis; after the war ended, the companies began to compete with each other once again.

³⁸ Thom Conte, “B. F. Goodrich Rubber Co.,” Akron Postcards, April 10, 2018, <https://akron.thomconte.com/b-f-goodrich-rubber-co/>.

³⁹ American Chemical Society, “U.S. Synthetic Rubber Program.”

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LOOK, OFFICER... I'VE BEEN RIDING ON B.F. GOODRICH TIRES MADE WITH SYNTHETIC RUBBER MORE THAN TWO YEARS

"In 1940 they sold thousands of Silvertowns made with more than half their rubber synthetic," said the Grand Union maintenance man to the WAAC. In fact, he's pointing to one of those tires, bought by his company to help get America's synthetic rubber program started. Grand Union reports wonderful results from these tires—in some cases they outwore natural rubber tires on the same vehicle. Two of them ran 7,000 miles more! Thus synthetic rubber passed its first great test.

The Army rides on synthetic rubber. Today, B. F. Goodrich is making tires for combat vehicles with *practically* synthetic. Already we are overcoming Germany's head start in synthetic rubber. But there still isn't enough for you. The Army and Navy need all the rubber they can get.

Delivery guaranteed in 1947. We can't say when your new car will be ready. But we can say that its tires will probably be made wholly, or partly, from synthetic rubber. So look for the best from B. F. Goodrich, the company that pioneered American synthetic rubber.

A few of the companies that bought Ameripal tires in 1940 and 1941
 Aetna Life Insurance Co. . . . American Airlines, Inc. . . .
 American Can Co. . . . Baltimore & Ohio Railroad . . . J. I. Case Co. . . .
 General Outdoor Advertising Co. . . . General Baking Co. . . .
 Gulf Oil Corporation . . . Geo. A. Harrel & Co. . . .
 Ingersoll-Rand Co. . . . Kellogg Company . . . New York Central System . . .
 New York Telephone Co. . . . Pat Mills Sales Corp. . . .
 Railway Express Agency . . . Secony-Vacuum Oil Co. . . .
 Standard Brands, Inc. . . . Swift & Company . . .
 The Texaco Co. . . . U. S. Gypsum Co. . . .
 Western Union Telegraph Co. . . . and many other important companies in communities from coast to coast.

In war or peace B.F. Goodrich FIRST IN RUBBER

Figure 11. Pictured above is an ad that was created by Goodyear Tire and Rubber Company stating that they offered the best synthetic tires on the market in an effort to promote their tires. Courtesy of Old Paper.⁴⁰

⁴⁰ "B. F. Goodrich Ad," Old Paper, accessed March 22, 2022, <https://paper.thomcont.com/b-f-goodrich/>.

The United States' development of its own synthetic rubber, a war-born material, evolved into one of humanity's most essential inventions at a time when much of the world was still reliant on the unstable natural rubber supply. While natural rubber is a sustainable source, because of its vulnerability, it wasn't always the most sustainable. Throughout the last century, natural rubber gradually lost prominence in favor of its synthetic equivalent, which is typically used in automotive tires. Synthetic rubber plays a large part in society, accounting for seventy percent of all rubber used in manufacturing and industry. GR-S accounts for a substantial amount of this rubber.⁴¹ Because the automobile industry is one of America's largest manufacturing sectors, synthetic rubber continues to play a critical role in the economy.

Ultimately, the United States suffered when it lost access to its natural rubber supply, as did its allies. However, a group of rubber research organizations worked diligently to overcome these obstacles by developing a general-purpose synthetic rubber that could be mass-produced on a large scale. These companies worked tirelessly across the United States, in partnership with government researchers and industrial laboratories, to develop and manufacture enough synthetic rubber to fulfill the demands of the United States and its allies during World War II, resulting in the Allied forces' triumph.

⁴¹ American Chemical Society, "U.S. Synthetic Rubber Program."

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Author Bio

Nyla Provost is currently working towards a dual bachelor degree in global studies and history at La Sierra University. Her main interest and areas of focus include the Vietnam War, Cold War, Terrorism, Organized Crime, the Middle East, and the American West, with a focus on race relations in the South and the American West. She would like to pursue a career in both teaching and the practice of law. Nyla also enjoys reading and writing and hopes to one day publish a book. She would like to thank her editor, Cecelia Smith, and the editors at California State University, San Bernardino for their continuous support. She would also like to thank the faculty in the history, politics, and sociology departments at La Sierra University for their motivation and willingness to be of service throughout this process.



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