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CONSERVATION OF BIG STUFF AT THE HENRY FORD – PAST, PRESENT AND FUTURE

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Abstract

Henry Ford's acute personal interest in restoring his "treasures" inspired astonishing exhibits that have attracted visitors for 75 years. His museum, including the 80 historic sites in the Greenfield Village "history park", was Ford's obsession from the 1920s until his death in 1947. He acquired enormous collections of Americana but it was in collecting and restoring technological and transportation artifacts that he was a pioneer. His resources for acquiring huge collections seem to have been almost limitless. His drive to restore objects demanded his individual attention even while he was at the helm of one of the world's largest automobile manufacturing companies. His approach to restoration was sometimes idiosyncratic since he mistrusted intellectuals.

Today Ford's legacy is an institution (now called The Henry Ford) with a consciously maverick approach to public program development. It is a dynamic "history attraction" with huge unique artifacts and vast numbers of collections. We actively use hundreds of antique collections every day. This paper explores the stewardship of key industrial artifacts at The Henry Ford, especially steam engines, from the days of our foundation to the present. It shows how Ford's involvement has had a lasting effect our current approach to stewardship. Conservators at THF recognize the rewards and drawbacks inherent in the conflict between using and preserving collections and in so doing we embrace the complex challenges of caring for large industrial collections. Our approach to this dichotomy has been built on Ford's legacy with the goal of creating successful preservation strategies that champion the ethical stewardship and responsible use of the collections.

Henry Ford and his collections

"These relics of days that are gone by tell only truthful tales. They can not lie."
Henry A. Haigh, friend of Ford, 1929 (Greenleaf 1964, 100).

"Henry Ford never does things by halves." H.B. Morton (1934).

The collections of Henry Ford's Edison Institute are huge in number and many are massive in size. The institution stewards one of the world's greatest accumulations of important large technological artifacts. Yet it is also burdened by Ford's reputation for over-restoration that calls into question the value of these collections as authentic historical records. Conservators and curators at The Henry Ford are constantly assessing and judging Ford's original approach. He rescued and revived the objects, and he was a pioneer in the field of Industrial Archaeology. But he had an insatiable appetite for slick cast iron and shiny nickel finishes and he wanted everything to operate. He used his company's skilled craftsmen and took advantage of his

immense industrial complex that provided resources for restorations of industrial artifacts. He also had absolutely no patience for scholarship. So contemporary keepers of these collections will always wonder which of his philosophies should be embraced and which should be discarded as they try to work within professional codes of ethics to fashion a reasonable conservation strategy in a consciously maverick institution.

Research into Ford's choices and methods has led to some insights into the conservation decision-making processes of the past and it has allowed conservators to question in particular some assumptions about the proper handling, maintenance, operation and storage of all the artifacts but especially the large technological collections. The "Big Stuff" at The Henry Ford today presents unusual conservation challenges not simply due to the scale and complexity of the objects themselves but also because of the collector's own priorities and peculiar approach to exhibiting them in the first place. Solutions to these challenges in a growing and ever evolving "history attraction" must be as innovative and bold as our founder's vision yet must also be rooted in an ethical framework that sustains the objects themselves.

During the nineteen twenties, by the time his Model T was a worldwide success that made him a household name, Henry Ford was already in his fifties and a multi millionaire. Although he indulged in a number of philanthropic activities, collecting old stuff was his major pastime. Well before he had anywhere to put it all, he had been happily amassing historical artifacts. He worked with agents who found relics and supervised their transformations to his own idea of beauty. He commonly delighted every visiting dignitary who came to pay homage to the celebrity industrialist at his Dearborn headquarters by showing them roomfuls of treasures in his Engineering building. He filled up his office, and used an area behind a new Ford Motor Company engineering laboratory, called Building 13, to sort his objects and prioritize restoration projects (Upward 1979, 21). He eventually acquired millions of artifacts. Dozens of men, collectors and restorers, were employed by Ford to support his obsession. He traveled to Britain on frequent antique shopping sprees where he collected almost everything his heart fancied, including some of the most ancient relics of the Industrial Revolution. Soon he developed an interest in restoring historic buildings, starting with a couple of inns out east and his own childhood home. He accumulated buildings and furniture, as well as all description of technological antiques from clocks to sewing machines. Ford also amassed roomfuls of rather small stuff: Edisoniana, phonographs, music boxes, firearms and fiddles. One of the objects he scoured the country for early on was the very agricultural traction engine he had operated as a young man (Lacey 1987). His interest in farm machinery, industrial production and electrical equipment soon outpaced the room he had to keep it in. Many objects that Ford did not want or that he considered duplicates were simply scrapped from Building 13 (Ford Motor Company Archives 1956, Peter York). There is no record of how many were scrapped, but estimates suggest about one third of the machinery shipped to the site survived. Before he had even conceived of the museum, he had a sizeable crew employed in the restoration of the relics. For restoring each of these treasures, Ford had access to a talented pool of his own Ford Motor Company employees. He took personal responsibility for the restoration of each of his treasures, guiding the process with meticulous attention to detail. The idea for the Institute grew out of his interest in bringing back his collections to their original appearance.

All this effort eventually led to the idea of a new kind of museum: a twelve-acre museum

building and an historic Village containing houses and businesses, but especially structures that could exhibit working machines showing his favorite industrial processes. It was to be a vast illustration of Man's Great Technological Progress that he called The Edison Institute. (The complex eventually became known as Henry Ford Museum & Greenfield Village but more recently adopted the name "The Henry Ford" to encompass the entire facility, which now includes a recently revived Rouge factory tour.) Starting in 1927 and throughout the 1930s, in the midst of a worldwide depression, Ford spent millions building his museum and historic village, "America's first theme park" (Lacey 1987). He bought out entire manufacturing machine shops and furniture stores. But nothing is a better measure of his collecting passion than the Big Stuff: hundreds of British and American steam engines (stationary, locomotive and agricultural), and enough machine tools to outfit three working machine shops in Greenfield Village and then some. Ford also acquired about a dozen airplanes and a considerable number of railroad rolling stock, not to mention fire engines and horse drawn vehicles. He shipped countless tons of cast iron machinery to restore and power his living history project, having boilers and even whole engines re-fabricated if none were in reach to buy. Workers once reported unloading five carloads of artifacts in one day…five train carloads, that is (Ford Motor Company Archives 1951, Roy Schumann).

Henry Ford spent his time and seemingly endless resources to indulge in a hobby that eventually grew to epic proportions. By the mid 1930s, after production at Ford Motor Company moved from Detroit to the enormous Rouge complex in Dearborn, Michigan, Ford "held the reins of control tightly in his hands" but was actually less and less involved with the car manufacturing business (Nevins and Hill 1962, 71). Instead Ford pursued his other interests, chief among them being his obsession with antiques. His manufacturing lieutenant Charles Sorenson made the observation that: "After Ford started Greenfield Village and the Museum at Dearborn he was seldom at the Rouge Plant. In his later years he actually put more hard work into the Museum than into the Ford Motor Company" (Sorensen 1956, 19). It could be said that Ford became more deeply involved with the old stuff than the new and by the 1940s his erratic control of both the company and the Village meant trouble for both. His ambitions were almost megalomaniacal and he ran out of time to do everything he wanted to do. Although he did not write nor record anything directly about his major collecting passion, anecdotal stories of Henry Ford's personal interaction with his historical collection offer a view of his restoration philosophy and his idiosyncratic notions of history.

For almost three decades, Henry Ford spent the better part of every day when he was home in Dearborn guiding the work at the Museum and Village. He called every shot: "The old man told everybody what to do" said one hand who had worked for Ford for many years (Ford Motor Company Archives 1953, LeoRugg, 23). Ford would come around every day, after visiting the schoolchildren saying their prayers in his Greenfield Village chapel, to check on works in progress and give orders to the foreman. Many anecdotes of his visits to restoration projects under way in the Village attest to the acute interest he had in works in progress. A born tinkerer, according to his own favorite personal legend, he needed to be present as his men worked to fulfill his dream of elevating technological contrivances to their proper glory. "The details of practically everything were taken up with Mr. Ford. It was learned that if something were done in the Village or the Museum that he didn't like it would soon have to be done over again. It was much easier to have a complete understanding with him originally, than to tear something down

and re-do it, though that did occur in some instances" (Ford Motor Company Archives 1951, Fred L. Black, 40). It is well established that he supervised restorations personally. Evidence of Ford's own approach to restoration can be seen in the remainders of these gigantic collections still at The Henry Ford.

A series of oral histories with former employees and acquaintances of Henry Ford conducted by the Ford Motor Company archives in the 1950s reveal some of Ford's approach to the preservation of his collections. Ford hired carpenters, cabinetmakers, machinists, die makers and laborers to work on his antiques. They remembered working on antiques before the museum was created. Ford singled out factory workers he liked and showed them antiques he wanted to have them work on. The oral history project interviewed men like Roy Schumann, who was a steam shovel operator before he started working on Ford's antiques. He was foreman of the "bull gang" of men who rigged up all the huge British and American steam engines for Ford's museum. Schumann's crowning achievement was the installation in the museum of an enormous gas/steam engine weighing 750 tons, one of nine massive engines that powered the famous Highland Park plant where the assembly line was born. He was proud to do it all "by hand" using men's muscle power, winches and cribbing. He recounted that Ford would check on his work daily: "If he was really interested he'd drop back and look the job over maybe half a dozen times a day" (Ford Motor Company Archives 1951, Schumann, 5).

Schumann was one of the handpicked elite that Ford put to work on restoration and installation. Some of them thought they had been hired to work on experimental engines only to find that they were instead spending all their time perfecting old antique engines (Ford Motor Company Archives 1956, William Mielke, 154). They first set up shop in the huge new Ford Engineering building in proximity to where the antiques were flooding in. But there they were liable to be caught by the hardnosed Superintendent of Production at the Rouge nicknamed "Cast Iron Charlie" Sorensen who, one day, summarily ordered twenty men back to work at the Factory. Ford got wind of it and they were back in the workshop the next day. Apparently the scenario was repeated more than once. "Mr. Sorensen would abruptly order them all back to work, and Henry would bring them back the next day." (Ford Motor Company Archives 1952, Harold M. Cordell, 16). Much of the work on the wooden antiques, smaller domestic arts devices and machine tools was done in the recreated Village buildings after construction began there in 1927. As much as possible was done at the Village where Ford could keep an eye on progress and the men could work in peace away from the bustling manufacturing complex. Anything that was too large or specialized, like casting, re-machining of steam engine crank shafts or plating could be sent to the Rouge shops, where they also had a locomotive maintenance department. There was also a team working on automobiles throughout the 1930s and 1940s who had only to "send to the Rouge" for parts, plating and bodywork whenever necessary. They restored about one or two cars per year. The largest steam engines were restored in the Locomotive shop at the Rouge complex under a man named Bill Miller (Ford Motor Company Archives 1954, Ernest Foster). Any part they needed, no matter how large, could be designed, cast, machined and finished right on the premises. About one hundred agricultural engines were restored on museum property. Eventually at least a dozen stationary steam engines operated in Greenfield Village. (Fig 1).

Fig. 1. View toward the High Park Engine, Henry Ford Museum, 1941.

Ford's apparent mistrust of intellectuals affected how he ran things at his private park (Morton 1934). A report defending the Edison Institute from government questions under the new Fair Labor Standards Act of 1938, when Ford was decidedly at the helm, listed all the jobs at the Edison Institute and it is clear from this record that Ford's emphasis was squarely on the machinery restorations. The report lists 81 janitors, 11 millers (wood & grist), 8 men each for foundry work and antique car repair, 4 men in the boiler shop, 4 blacksmiths, 1 shoe repairer and no fewer than 20 machinists. They were *all* restoring other machines. Yet there were only 4 office workers and one librarian (Edison Institute Archives 1938). Stories still circulated decades later that Ford's son Edsel (who with Henry and his wife Clara represented the board of the Edison Institute) tried to professionalize the place during this period. As Ablewhite recalled, "…Edsel would get somebody out here whom he thought might become interested in the place and maybe become a curator or director. Mr. Ford would take him out, and if he couldn't talk intelligently about a piece of machinery, he was out; that was his criterion" (Ford Motor Company Archives 1956, H. Ablewhite, 76).

Ford's attention to detail but his lack of research: a belief in "horse-sense"

The craftsmen and machinists working for Ford had fond memories of all the attention they received from the Great Man as he began spending more and more time directing their restorations. Said Peter York, a craftsman who worked on Ford's antiques from the earliest days, "Mr. Ford took a lot of interest in what we were doing with these things. He was right with me every day" (Ford Motor Company Archives 1956, PeterYork, 31). Henry Noppe was a Dutch die maker who came from the Highland Park plant to work on Ford's antiques in Building 13. He hand-picked his crew of up to 25 men from the tool room at the plant and began restoring anything Ford asked him to, starting with the guns. "When I first came over here in '29, Mr. Ford ran the village himself. He was always in charge; nobody had anything to say. Mr. Ford would get there in the morning and be waiting for me when I showed up….He was very much interested in what went on here in the Village. That was his hobby, even though he didn't do it himself; it was his hobby to see things done the way he wanted it" (Ford Motor Company Archives 1953, Henry Noppe, 10).

Edward Cutler was Ford's self-taught architect in charge of reconstructing buildings brought to Greenfield Village. Referring to the restoration in the early 1930s of the Sir John Bennett jewelry shop that contains a tower clock, bells and bell-striking "Jack" figures [1] of Gog and Magog from London, England, Cutler said:

> You know Ford was the kind of man, if he singled you out to go to Chicago to sell some cars, you would go and do it, whatever he told you to do you did. I would do things around here that I would have to cart home a bunch of books every night, and my wife would laugh at me, because they were so new to me, but I had to find out. You were told to do it and you did it, you never said you couldn't do it. You always went ahead and made a stab at it, and tried to do it and did it (Ford Motor Company Archives 1956, Edward J. Cutler, 53).

Ernest Foster also worked on the wooden figures of Gog and Magog. He worked on everything from guns to furniture to tractor parts. As far as he was concerned,

> Mr. Ford run it himself. In other words, when Mr. Ford wanted anything done, that's what was done. He was the boss. I think Mr. Ford had plenty of people down at the Rouge to run the automobile end of the business. Mr. Ford was here in the Village every day when he was home. It was his hobby (Ford Motor Company Archives 1954, Ernest Foster, 8).

Ford's "better than new" restoration philosophy

Although Ford was conscious of his role in preserving technological history, he did not have much patience for exhaustive research on authentic details. As for Ford's restoration philosophy, if it can be called that, "very shiny" might be the operative words. Many of his restorers saw nothing wrong with this approach. Foster mentions this specifically: "We didn't do any research on any antiques at all. We just reconstructed it according to the lines of the object itself" (Ford Motor Company Archives 1954, Ernest Foster). "I rebored cylinders, remachined crankshafts

and everything that come along for the steam engines" remembered William Reinhart. "Ford never brought in blueprints or sketches for us to work from. He just told us what he wanted done." He would just say, 'Fix it up'"…"We had to put more finish work on them than was originally on them because Mr. Ford liked it." Rinehart was proud to declare that, "He always wanted a draw file finish. That was his finish. A lot of those engines are better now than they were originally." (Ford Motor Company Archives 1954, William Rinehart, 19). Rinehart was the only interviewee who remembered keeping notes. He recalled keeping a little book in his tool box for his own interest, but this book was not retained by the institution.

Ford often imposed his vision of beauty onto these artifacts, transforming too many into not altogether accurate representations of a type. Little restraint was shown and the term "minimal intervention" would have been a foreign concept to the men restoring Ford's treasures. Many machines and engines had their bright work nickel- or even chrome-plated, and too many were painted with shiny black lacquer paint. Today, the stewards of the collections refer to artifacts having been "Fordized" when they exhibit plating where none would have been originally, when inappropriately elaborate parts are added and when all the castings are rendered perfect by applications of thick, shiny black paint. It is clear that the restorers working in the Village and at the Rouge had free rein to show off their design and machining prowess. On the one hand historians can lament liberties taken in the restoration of some of these relics. Yet at a time when few men had the means, much less the will, to acquire such significant collections of technological artifacts, Ford's liberties can also be interpreted as a mark of his intense respect for the engines and their makers. Who could appreciate the art in derelict machinery? Bright and shiny, just like a gleaming black Model T, the objects would get notice and esteem.

The story of the Dotterer steam engine tells of a classic "Fordization" treatment to "one of the very earliest American steam engines in existence" (Bowditch 1993). Built in 1835, the engine was "badly compromised" by Ford once he acquired it. The most obvious change made during the Ford-era restoration was the replacement of the original wooden base frame. Instead of finding proper southern yellow pine to recreate the frame timbers clearly visible in photographs taken of the engine in-situ, Ford made massive steel members, carefully tapped and drilled to hold the cast iron bedplate of the engine.

The Dotterer engine is now destined for loan to a restored pre-civil-war iron foundry museum in Tannehill Ironworks State Historical Park near Birmingham, Alabama. The current restoration scheme was carried out by Robert Johnson who worked on many engines for the Smithsonian's centennial exhibit in the Castle on the Mall in 1976 and has many years of familiarity with the Ford collections. Johnson was eager to be a part of the resurrection of a significant American icon. And he knew where to acquire the massive southern yellow pine timbers required for the bed. So a decision was made to restore the engine to an era closer to its original use and undo the "Fordization" as far as possible. Johnson discovered numerous interesting incongruities. Every bit of bright work on the engine was nickel-plated by Ford's men at the Rouge. Johnson drew the conclusion that virtually all parts except for the castings are replacements. He expected the link-rods and beams to be wrought iron, but they are all, in his view, homogenous modern steel. John Bowditch, the Institute's former Curator of Industry thinks on the other hand that the parts are original but simply machined down to a smooth finish and then plated. Perhaps metallurgical testing can improve our understanding of this conundrum. However the Dotterer

was treated, Ford might have realized it would be rarely used once it was set up in the Rice Mill in the Village (now re-purposed). The "bright work" of rarely used machinery soon rusts without regular oiling, so Ford plated the bright work to keep it shiny. The same restoration problems that might have plagued Henry Ford plague conservators today. How to keep previously over-restored, recently re-polished metal from corroding overnight in humid environments? Today the answer is often lacquer or wax coating but nickel-plating seemed a great solution at the time.

Another story of a steam engine relates a Fordization that may have resulted in a treatment more in keeping with current conservation practice. Herbert Morton, the Engineer in Charge of Plant at the Ford Motor Company, England, was commissioned by Henry Ford in the late nineteen twenties and thirties to acquire old engines and other objects in Britain. Morton traveled far and wide gathering "suitable specimens" that could "only be found in Europe" (Morton 1934). He looked after their restorations and shipped them to Dearborn. He collected many objects that struck Ford's fancy, whatever he could convince the owners to part with. He set them all in their places of honor in Ford's Edison Institute museum.

The earliest Newcomen and Watt engines that Ford so desired were icons of the Industrial Revolution and well known to British engineering societies. Morton warned Ford that the "cost of obtaining them, and their dismantling, shipping and re-erection in America might be enormous". Ford declared, "Well, I'll tell you – I'll spend Ten Million Dollars" (Morton 1934). Morton's most important find was a rocking beam steam engine from about 1760 that John Bowditch has declared "quite possibly the oldest extant steam engine in the world" (Bowditch 1993). Morton recounts a delightful story of his attempts to reproduce authentic replacement parts for this great Newcomen engine, known as "Fairbottom Bobs." Yet even this venerable acquisition barely escaped Ford's penchant for making things "better than new". Ford himself visited the site of the derelict engine in Fairbottom Valley of the English mining county Lancashire. After having actually jumped up on poor Morton's shoulders to peer into the vertical cylinder and tumbling down in a fit of laughter, Ford made up his mind that he had to have it. Great obstacles were overcome to dismantle the relic. The foundations and many parts were unearthed and the well shaft dredged in hopes of recovering the pump chain and bucket. Back at the museum, Morton worked with Roy Schumann and his gang to reproduce the foundation pits and reassemble the carefully documented stone columns. At last, after the engine was completely reassembled, Morton found that he had disappointed Ford on one detail. He had replicated the badly rotted rocking beam with a massive oak timber that had been adzed to replicate what Morton was certain must have been the authentic finish. "Ford came along and said 'I don't like that, let's have it planed and made nice and straight'". Feeling certain that he would be criticized by aficionados for such a decision, Morton risked "decapitation, which everybody assured me would happen", but took a risky compromise and had it straightened but then covered it with thick tar. Ford's reaction was, "My, that looks fine". So Morton had his "rough appearance" and "Mr. Ford had his straight lines" (Ford Motor Company Archives 1956, Hayward Ablewhite). This solution, which is actually well in keeping with current philosophies that call for replica parts to be distinguishable from originals, offers some insight into the approach Ford's agents took to make him happy.

It is clear that the intent of Ford's restorations was first, to render the machines operable whenever possible, and second, to make them look attractive. Today the practice of conservation

for large industrial artifacts employs a more systematic approach to rigorous methodological standards. Justification for decisions like replacing parts and finishes and even sometimes merely polishing surfaces must be duly recorded. Retreatability – a goal difficult to achieve with big stuff, especially if it has been left to deteriorate in aggressive environments – must also be considered. Treatment decisions and methods must be documented and photographed.

But for Ford these notions would likely have been met with impatience if not disdain. In rare cases restraint was shown in the replacement of only missing elements or badly worn parts. Many agricultural wagons and processing equipment exhibit their original finishes as do some machine tools and a few engines. Agricultural implements like plows and harrows have been documented recently with very few wooden elements replaced. In many instances new repairs are beautifully applied with obvious restraint, leaving worn parts that bear the character of their original use in the farmer's field. More often machines were "improved upon" by the restorers under Ford's direct supervision, with some highly questionable results. For instance, if one were to study the history of steam engines solely from the collections of the Henry Ford, one might draw wildly inaccurate conclusions about the prevalence of nickel plating on machined engine parts.

An example of an artifact that was not Fordized is the beautiful horizontal steam engine made by Franklin Machine Works in 1848. Considered to be emblematic of its type, the engine has gracefully curved spokes on its flywheel/belt wheel, and two pairs of fluted columns to hold the valve motion transfer shafts. Clearly, it was never left to deteriorate outdoors. As a contract conservator of large objects on the Made in America exhibit project in 1991, the author was asked to conserve the original paint surfaces on this remarkable survivor. Under dozens of layers of over-paint, staff laboriously uncovered one of the earliest layers: a deep rich green. The flywheel spokes were red, and the original paint still in remarkable condition. An area of original paint was left as found on the cast frame and one side of the flywheel. This was due to time constraints, but also as a form of visual documentation of its restoration history.

Loss of focus on "Big Stuff" after Ford's death

After Henry Ford's death in 1947, some restoration projects were left unfinished, and the institute's resources shifted away from the industrial collections. Things were left pretty much untouched in the museum where Ford had left them, and in the Village his handpicked restorers eventually left or retired. Rather than build on this particularly resource-intensive aspect of Ford's legacy, most of the industrial collections were kept fairly stagnant. Slowly the engines stopped whirring. Rather than maintain everything in working condition, many of the big machines and engines in the Village were allowed to lie fallow. The machine shops closed. There is evidence that employees of the Detroit Edison electric company still sent employees to the museum to study power generating equipment for hands-on demonstrations as late as 1952 (Detroit Edison Company Newsletter 1952). But very little "Big Stuff" was collected or restored during the1950s and 1960s.

Clara Ford was left with the daunting task of running the Edison Institute after her husband's death (three years after his son Edsel had passed away). She hired H.B. Ablewhite, a former

Episcopal Bishop and Supervisor, Ford Motor Company Sociological Department, to run the museum for her. Ablewhite knew he was walking into a hornet's nest. In 1949 he found "the files in deplorable condition" and no one who could actually be said to be running the operation. He knew this was because Ford had "guarded the place so carefully and refused to let anybody come in who would interfere with him" (Ford Motor Company Archives 1956, H. Ablewhite). The exhibits remained almost stagnant for years thereafter. Very little mass collecting of industrial collections took place throughout these years, but a few significant large pieces were acquired. One of these was a 600-ton Allegheny locomotive that was squeezed into the museum in 1956. Visitors to the Museum in the mid 1970s could still climb to the mezzanine of the Highland Park engine and look out over the tractors and agricultural engines which held a place of prominence in the central axis aisle of the great hall of the museum.

The coming of museum professionals

Professional curators hired during the 1970s saw the potential of the collections to fulfill the newly refined educational goals of the institute. Efforts were made to save some of the industrial relics that had been left outdoors in the Village once Ford's twelve-acre Hall of Technology had filled up. Two huge steam engines, a beautiful circa 1855 Gothic beam engine, and an 1895 Triple-expansion steam engine and generator set, were brought inside. Due to the extensive deterioration sustained by these behemoths after many decades of exposure, a conscious decision was made by then curator John Bowditch to restore rather than conserve both engines. Bowditch also reinstated tours of some of the engines in the museum that could be run at very slow speeds on compressed air. He revived the Armington and Sons machine shop in the Village, which is a recreation of a typical 19th century "small jobs" metal forming facility, complete with clerestory windows and two line shafts. Ford had placed it prominently near the front of Greenfield Village to educate the public about the importance of American precision manufacturing but over the years it had become inaccessible to the public because it was crammed with unrelated machinery. He cleared out decades of accumulated junk and installed a remade boiler so the steam engine could work again. Although setbacks occurred such as the death of a steam engine attendant in the early 1980s, progress in dealing with the industrial collections as valuable and non-renewable resources was steady.

Since Clara Ford's tenure, curators, facilities maintenance and administration staff had been required to cope with all aspects of collections management and care. Eventually, however, the museum eventually saw the need for a separate department of Conservation. After a devastating fire in the museum in 1970, curators began to make formal requests for a full conservation department (Upward 1979). This step was taken and a new laboratory wing was built onto the museum in 1972. It took some years for conservation staff trained in fine art conservation and horology to turn their attention from the fascinating decorative arts collections to the industrial collections. The transition was truly underway when work began on the Made in America project in 1989. That large museum exhibit employed a range of approaches to present industrial artifacts to the visitor. The conservation strategies kept these approaches in mind, dedicating a large specially-hired crew to completely disassemble, repaint and rebuild into operational condition the Triple Expansion steam engine and Westinghouse generator that until then had become eyesores in Greenfield Village. Other rare survivors, such as a stationary steam engine

made by the Franklin Works in 1848 and a small metal planing machine from 1868 were discovered to have original paint surfaces under years and years of over-paint. Because these objects did not need to operate, a much more conservative treatment of selective and careful over-paint removal was applied to them. Since the Made in America project there have been rare instances of new operational collections; the majority of these are small crafts working machinery and historic automobiles.

Today a new generation of conservators and curators embraces the challenges of caring for the industrial and transportation collections of The Henry Ford. Conservation of "Big Stuff" at The Henry Ford now endeavors to adhere to the basic tenets of professional standards. These standards are applied to every possible use of industrial artifacts, whether that use is educational demonstration or the presentation of a non-operational historic relic. Individual treatments may involve replacement of badly deteriorated parts, while within the same artifact other elements may be treated in a much more conservative fashion. Rare original paint on industrial objects is highly valued. Treatment reports are complicated and lengthy, sometimes best presented as a treatment log where essential decisions and methodology are carefully recorded. Stated policy is still "to conserve rather than replace, to repair rather than restore", and great effort is often spent in the retention of original parts and finishes.

The Dymaxion House project illustrates the collaborative nature of large-scale conservation projects. This three-year project hired contract professionals and technical staff to prepare Buckminster Fuller's prototype round aluminum "Dwelling Machine" for an exhibit that opened in October 2001. The conservation task was carefully planned and well funded. It was designed according to the principles of well established Building Conservation practice, applying architectural methodologies to an artifact that is more Industrial Prototype than Historic Structure. The unusual structure of the Dymaxion House posed unique problems. It hangs from tensioned rings and cables off a central mast. It was a prototype and not designed to withstand the traffic of about a half-million visitors a year. So the restoration required an engineering study and some shoring up of the structure. The project was directed by a professional architectural conservator and included structural engineers, metallurgists, chemists, museum conservators, the U. S. Forestry Service and numerous volunteers and paid staff to accomplish the job over a three year period. It applied the tenets of the Venice Charter (International Charter for the Conservation and Restoration of Monuments and Sites 1964) and began with a well reasoned Historic Structures Report that identified the history of the physical structure and established clear priorities for the million-dollar project. Progress was recorded in many ways; the most accessible to the public was a Conservators Journal on the Museum's website. It culminated in a set of "as built" drawings [2] of the restored Dymaxion House produced by an intern from an International Council for Monuments and Sites (ICCOMOS) program. The drawings conform to standards established by the Department of the Interior's Historic American Building Survey/ Engineering Record. The Dymaxion project shows how large scale treatments can be organized.

Although large scale projects are exciting and garner the most attention, conservators at The Henry Ford maintain an interest in all aspects of collections preservation. An equal amount of time is spent departmentally on recognizing the most pressing conservation needs of the whole institution and addressing these preservation issues globally and across the whole Institution. A Conservation Assessment Program through the Institute of Museum and Library Services in the

1980s helped focus attention on systematic policies to preserve all the museums collections. Thus efforts are spent improving daily use and repair of the hard-working operational collections as well as improving exhibit and storage conditions for all collections. Conservators engage in collections care from new acquisitions to exhibit planning by focusing on a holistic approach to collections management with an emphasis on preservation planning. The institution has a long history of using historical collections "as originally intended". Yet conservators regularly advocate for the responsible utilization of these collections. Efforts to counteract a culture of consumption sometimes appear to be uphill battles. Conservators emphasize the need for comprehensive maintenance plans, not only for collections in use or on static exhibit, but also in storage.

In terms of the actual work entailed in preparing "Big Stuff" for exhibit, contemporary stewards probably deal with many of the very same kinds of treatment issues that Henry Ford's men did. It is only the philosophical approach that differs. In most cases the museum no longer has the same access to men who personally remember operating the machinery. Access to highly skilled industrial craftsmen for restoration work can be more difficult today than it was in Ford's time. But just like the men at the Rouge Locomotive shop and Mr. Schumann's "bull gang" of museum riggers, present-day restorers must consider many of the same issues: How is the huge stuff best moved without risk to the staff or the collections? How can the machinery be used and operated responsibly? Where can it be stored safely? Where is there space to restore and reassemble it? Is there good evidence for the treatment choices?

The millions of industrial artifacts at The Henry Ford still pose huge management challenges today. Merely storing and handling "Big Stuff" that is measured by the ton can be a particularly daunting task. Another useful tool in this endeavor is the recently adopted ranking policy. The ranking policy classifies objects based on the historical rarity of each artifact and its relative importance to the collections. It is used as a guideline to help set preservation priorities for individual collection items. It also serves as a framework to assist in the critical decision to operate a collection artifact. The ranking may also influence the level of funding and effort that will be spent improving the physical access and mitigating environmental agents of deterioration in storage. In a fast-moving organization with collections so vast that major cataloging initiatives are still ongoing, ranking collections based on their relative value helps conservators prioritize work. The ranking policy helps conservators accept that not every collection item is rare or even valuable and that conservation efforts must be reasonable and focused to be effective. It is an approach that allows preservation to keep pace with program expectations for responsible use of the collections.

There is a proposition that the operation and preservation of historical artifacts are mutually exclusive concepts. This is doubtless true, but not altogether tenable as the only guiding conservation principle in a public institution. Making a costly decision to maintain an artifact in operating condition may be justified after rigorously weighing a range of issues. After considering each artifact's restoration history, its past use, the detrimental potential of wear and the artifact's potential for creating memorable learning experiences, running artifacts in controlled circumstances and at reduced loads can sometimes be justified. Today, there is a whole department of skilled professionals dedicated to the maintenance of the Greenfield Village Railroad. Other full time staff (although nowhere near the numbers Henry Ford employed for

the same jobs) maintain the Historic Operating Machinery and Antique Vehicles. Their primary job is to inspect and maintain over two hundred working artifacts in the museum and Village. Conservators developed these positions, and have coached the staff members ever since the positions were created starting in the 1980s. Conservators established training and maintenance protocols throughout the 1990s, guiding skilled men who were interested in machinery and restoration but did not have formal conservation training in the philosophy and practice of museum conservation. Conservators also supervised these departments until early in 2006 when conservation's role in the daily operation of artifacts was relegated to that of adviser. There is an official Preservation Policy for the collections that includes conservation oversight of all the collections. Any new operational artifact would theoretically require a conservation treatment and a maintenance plan. But this process has not yet been tested in the new management structure.

Conclusion

Henry Ford put a great deal of time, effort and money into finding and restoring antiques. He amassed a huge number of collections, some of them artifacts of very large proportions: hundreds of steam engines, agricultural machinery, electrical production, machine tools and Edison's entire Menlo Park complex were dismantled, transported by ship and train car-load to Dearborn Michigan for re-erection. Although he "Fordized" many things, his collecting vision was impressive. His "concrete and inductive approach to history" was very different from an intellectual's aesthetic, reasoned analysis (Greenleaf 1964, 95). Unlike other wealthy collectors who wanted fine art and high-end antiques to show off their superior aesthetic understanding, Ford assembled his own version of history where agricultural, industrial and domestic arts objects prevailed. Yet Ford's ultimate vision for the collections themselves was so personal and eccentric that after he died it became difficult to sustain or augment this dream on the scale he must have envisioned. After his death, the institute he founded had serious challenges maintaining his collections without his financial resources. Slowly, inexorably, the machinery he fired up went dormant.

Today, teams of curators, conservators and living history professionals recognize the great advantage that access to this great collection grants them to tell powerful history. Programs that extol the value of the "Big Stuff" also advocate for its responsible use. Since the 1970s curators have been refining plans to add to the collections in specific areas. Real strides have been made in bringing machines that had been left outdoors into the museum. Conservators, registrars and collections managers meanwhile have been struggling to establish preservation priorities in a rapidly expanding, dynamic institution. Ongoing efforts continue to document, survey and care for these collections. Treatment decisions need to be based on diligent research and careful artifact analysis. Preservation plans and strategies that align themselves with the greater institutional vision contribute to an ever more responsible approach to the utilization of the collections. Documentation, especially recording the justification for major compromises, is a crucial legacy that this generation of caretakers can give to the future stewards of the "Big Stuff".

In Ford's day it seems that no expense was ever spared for restorations. The fact that The Henry

Ford is now a non-profit institution means that there is no longer carte blanche for funding any initiative, conservation work included. The conservators of today would have been able to talk a lot of great shop with Ford's restoration gangs. The men were skilled workers but they were not guided nor governed by anyone else's scholarship. Yet many of the actual techniques of treatment for large industrial artifacts that are employed today would not be unfamiliar to Ford's men. The real difference lies in basic methodology. Ford's faith in the "good old horse sense" of his men probably stood him in good stead when it came to the machine tools, motors and engines that he himself knew so much about. Unfortunately, Ford's way of learning by doing allowed some collections to loose their original finishes. Ford expected virtually every piece in his collections to operate and his taste for the aesthetics of shiny surfaces sometimes outweighed historical veracity. Yet Ford's unique vision saved many significant artifacts from destruction. The technological and industrial artifacts that he retained from the truck- and train-car-loads that arrived for years at his property were in some cases better cared for than the decorative arts such as furniture. Ford employed all the men necessary to polish up old lathes, motors and massive steam engines almost as fast as he could collect them. There is no intention of undoing every "Fordization" in the Ford collections. But the artifacts will continue to be studied and recorded. Contemporary stewards must be humbled by the great trouble and expense Ford took in restoring his treasures, to his great pleasure.

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Endnotes

1. The large wooden figures with moveable arms which strike the bells are called "Jaquemart", or in Britain, "Jacks".

2. "As built" drawings are measured architectural drawings of the structure as it was actually constructed, as opposed to the architect's original renderings or construction drawings. [Editor's note: Many building projects now require the submission of "as builts". Renovations to older buildings are often complicated by the lack of this documentation.]

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