

SIA's Malta Study Tour, Apr. 2012

From Salt to 100-Ton Guns

The first possibility of a Study Tour to Malta began with informal discussions in late 2010 with a proposal by Mary Durfee of Michigan Tech, who was on sabbatical in Malta and is also the wife of SIA Office Manager Don Durfee. Fast forward to Sunday, April 22, 2012 as 40 SIA members and friends boarded a bus for a tour of the island of Malta!

Malta is tiny, 14-km wide and 27-km long, but it occupies a strategic position in the central Mediterranean that has been recognized for thousands of years. Our first day's overview tour encompassed ancient Malta; Malta under Roman, then Arabic control; Malta as the seat of power for the Knights of St. John from 1530 until Napoleon took over in 1798; Malta as a key strategic asset of the British Empire from the end of the Napoleonic era through the Cold War; and modern Malta as a mixed economy with a strong tourist industry. Our guide for the entire week, Manella Bose, provided a rich commentary.

Malta and the smaller island of Gozo have a population of about 400,000. There are few natural resources, save abundant limestone. There are no permanent rivers, but some seasonal streams during the winter rains. Manella gave an introduction to the complex linguistic heritage of Maltese, a Semitic language based on ancient Arabic, but written in Latin characters (plus a couple of additions), and incorporating features from all the cultures that have touched Malta. Bewilderingly lovely to listen to! Most of the place names in use today are from when the island was under Arabic control. We ended the day with tea at the **Palazzo Parisio**, a lovely palace with a spectacular garden. A special treat was a chance to examine the first electrical generator on Malta, installed in 1898 to service the palace.

Monday was spent in the capital city of Valletta, founded by the Knights of St. John (also known as the Knights of Malta), after a 1693 earthquake damaged Mdina, the ancient capital. The Knights were the dominant force on the island from the early 16th century to the end of the 18th, and a military order that had, effectively, the status of a nation. Their members were often the second or third sons of noble families throughout Western Europe, so they were "well connected." The funds from the Order's extensive land holdings were used to create massive fortifications, primarily for defense against their historic enemy, the Ottoman Turks, who laid siege to Malta in 1565-6 only to be repulsed.

Our visit to Valetta started at the **Upper Barrakka Gardens**, with a view of the Grand Harbour, Malta's historic main port. These lovely private gardens were established in 1661 for the Italian Knights. We then went to the **National Archeology Museum** to view the Neolithic and Bronze Age collections. Of particular note were the discoveries from Hagar Qim (pronounced "argar eem"), which we visited on Tuesday. Our tour continued to the magnificent **St. John's Co-Cathedral**. The exterior is fairly plain, but inside is a lavish display of carved stone covered in gold leaf, and the ornate tombs of generations of Knights, adorned with Latin inscriptions to service and dedication, and the images of skeletons (not very industrial, but magnificent and inspirational!). Monday ended with presentations at the University of Malta by Dominic Fenech and Robert Ghirlando, our local hosts, who set the stage for the rest of the Study Tour. Following the presentation, the Rector of the University, Juanito Camilleri, welcomed us with a reprise of food and drink.

Tuesday began with a unique industrial site, the **underground tanks at Has Septan**. Imagine a Cold War program to ensure that NATO's Mediterranean naval forces would have fuel, no matter what, then dig out a massive complex

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Dennis Furbush, all photos

The Palazzo Parisio, built in 1733 for Portuguese Grand Master Manoel de Vilhena, was one of the first properties in Malta to have electric lights and telephones. The generating system, installed in 1898, featured this little gas-powered engine provided by Crossley Brothers of Manchester, England.



The temple of Hagar Qim (c. 3600–3200 B.C.) stands on a hilltop overlooking the sea. A massive tent protects the archeological site.

of tanks, 34 ft. in diameter, 720-ft. long, and more than 100 ft. below the surface, connected by deeply buried pipelines to the two major harbors in Malta. Fortunately, the Cold War never became hot, and today these tanks are used by Enemalta, Malta's state-owned energy company. In chatting with Enemalta's staff engineers, we found we were the first tourist group ever to visit the tanks.

Next we stopped at the village of **Hagar Qim** and a small archeological museum featuring a remarkable Neolithic stone temple, which must have required tremendous labor to construct. Tuesday ended with a delightful visit to **Heritage Malta's** training program in artifact restoration, housed in a restored British naval hospital. In collaboration with the University of Malta, students earn a four-year degree with a curriculum strong in hands-on work. We saw students working on paintings, books, and objects of stone, glass, and metal. I was mystified by a broken light bulb until a student told me it was a difficult exercise; the glass is thin and restoring it would teach him valuable skills.

Wednesday began with a cruise about the **Grand Harbour**, the largest natural harbor in the Mediterranean. We docked at Birgu, and then proceeded for a special visit to the home and offices of the Knights of St. John. This site is rarely open to tours, so we were honored to be admitted, and to enjoy the amazing views. The northeast side of the harbor is a series of deep inlets, so after lunch we made our way to the next inlet and the former **Dockyard Boiler Shop**, a cavernous building once used for the repair of the British navy's boilers. The shop is now being used to house a collection of large objects for a future **National Industrial Heritage Museum**. Two radial aircraft engines, salvaged from the sea and encrusted in calcium/salt deposits, were exemplary of the great deal of work that will be needed to prepare the objects for exhibition, but we all agreed that the boiler shop will make a very appropriate venue. We had a compressed visit to the **National Maritime Museum**, which traces Malta's maritime history from the 16th century when



The Dockyard Boiler Shop is a steel-frame structure built by the British to replace an earlier stone shop destroyed during WWII. It now houses old buses and an assortment of machinery, most of it from the dockyards. Some day, some of these artifacts may find their way to display in a proposed industrial heritage museum.

the fleet of the Knights of St. John was a major force in the Mediterranean, to 1979 when the British Navy left Malta.

Thursday's touring began with the **Pembroke Reverse Osmosis (RO) Plant**. RO of seawater supplies about 60% of Malta's potable water, the rest being groundwater or collected rainwater. About 54,000 cubic meters (14.3 million gallons) of seawater per day comes to the plant from wells at the edge of the sea. The primary filtration occurs in the porous rocks that the water must pass through even before it reaches the plant. At the RO Plant, pumps raise the pressure to 69 bar (about 1000 psi), and feed it into hundreds of seven-stage RO cartridges around 40 ft. long. The pressure drives fresh water through semipermeable membranes into a central collection tube, while increasingly salty residual water remains outside the tube. The residual water is still



The workshops at the Vincenzo Bugeja Conservatory are complete to their original 1907 layout. The conservatory trained boys in the industrial arts.



The cylindrical horizontal steel tanks at Has Saptan are connected to a series of underground tunnels housing the pipes connecting the tanks to Malta's ports.



The Xemxija underground flour mill is one of eight such deeply buried mills built in the 1950s as part of improving Malta's ability to survive a war.

under high pressure, about 62 bar, and there is an energy recovery system using Pelton wheels (impulse water turbines) to recover this energy. The water makes its way to a central reservoir where it is blended with groundwater and finally treated with chlorine prior to distribution. Pembroke is one of three similar plants on the island; some hotels and businesses, such as Farsons (below), have private RO plants.

Continuing the water theme, we visited an inactive groundwater pumping station at Wied il-Ghasel (translated as Honey Valley; Malta honey has been prized since Roman times). The pump, built in 1937, was powered by a four-cylinder horizontally opposed diesel engine driving a generator. There are plans to restore the engine, but work has not yet started. Along the way to a former technical school for boys at the Vincenzo Bugeja Conservatory, which included a line-shaft-driven machine shop and wood shop dating to 1907, we made a brief stop at the Parabolic Wall, an ingenious sound amplifying and listening system that was designed to give early warning (6 min.) of incom-

ing air attacks. Built in 1935, the wall was superseded a few years later by the development of radar.

Much of Malta's built environment is constructed from limestone, dating back for hundreds, if not thousands, of years. **Limestone Heritage**, housed in a former quarry, is a small museum and a series of outdoor displays tracing the history of limestone production. Modern quarrying techniques have left a lovely abstract pattern of slits in the walls. Our very busy day ended at the ancient capital city of **Mdina**, an extremely impressive, high-walled bastion with only two gates. It sits on a hill and is extremely impressive, even if quite small, with narrow streets weaving through this preserved medieval delight. From the bastion walls, one can see much of Malta in all four directions.

It wouldn't be an SIA Tour without a brewery! On Friday we visited **Farsons**, Malta's largest beverage producer. Established in 1928 as a brewery, Farsons has come to dominate the beverage industry in Malta through a series of mergers, acquisitions, and collaborative agreements to package other company's products. They have also branched out as an importer and distributor of wine and spirits. In addition to brewing a variety of beers, they make Kinnie, an orange and herb flavored soft drink, and bottle San Michel water. Farsons is transitioning to new facilities with significantly increased capacity, and will be freeing up its 1950 Art Deco-style facilities to adaptive reuse.

Another Cold War relic, the **Xemxija** ("shemshiha") **Underground Flour Mill** was built at about the same time as the fuel storage facilities mentioned earlier. This blast-resistant facility consists of a two-cylinder diesel engine and five mill stands. Malta had almost run out of food at the end of WWII, so Cold War planners created a series of underground bunkers for food storage and production. A group of dedicated volunteers rediscovered this mill (it was widely thought to be an uninteresting bomb shelter), and through tremendous effort they have restored the engine to operation. It was impressive to see the line shafts turning (the mill stands appear to be too rusted to actually mill grain). This

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SIA's Malta Study Tour participants prepare to go underground at the Has Saptan underground fuel depot.



The Marsa Power Station was built in the 1950s with aid from the Marshall Plan.



Volunteers recently restored to operating condition the engine at the 1935 Wied il-Ghasel pumping station.



The copper brew kettles at Farsons Brewery.

was a secret site so its exhaust was vented out a long vertical shaft leading to the top of a hill.

After stopping by a small agro-tourism project selling tasty strawberries and other fruits and vegetables, we ended up at an active restoration project, the **Ximenes Redoubt**, a 16th-century fortification built to protect the **Salina Salt Pans**. Albert Stebbings, a Maltese restoration contractor, is leading this year-long project involving about eight workers. The redoubt will be a visitor center when completed. It was very interesting to hear that government regulations prohibit the use of electric tools, and even prohibit the use of wire brushes to clean stones.

Our final day of touring on Saturday began at the **Marsa "B" Power Station** ("A" was an underground station on the same site, opened in 1953 and closed in 1994). Malta didn't convert from an older single-phase 100 Hz grid to the European standard three-phase, 50 Hz power grid until 1954-58. The station has eight steam turbine generators and one gas turbine, installed at various times between 1966 and 1990, as Malta's energy needs grew. The plant is powered by oil, although it was originally coal and much of the coal-handling equipment is still in place. Marsa "B" is being phased out because it does not meet current EU pollution standards and is not as efficient as more modern plants. A new station at Delimara came on line in 1990. An underwater power cable connecting Malta to the European grid via Sicily is scheduled to come on line in 2013 and a second cable is scheduled for 2015.

We had lunch in the fishing village of **M'Xlokk** ("em-shlok") filled with traditionally painted small fishing boats (each village has its own bright color scheme). The village is near the Free Port at M'Xlokk, a major container port and transshipment point for destinations all over the Mediterranean.

The last stop was **Ft. Rinella**, one of two primary batteries that once defended the Grand Harbour (the other one

has been demolished). Our visit began with a demonstration firing of a moderate-sized muzzle-loading howitzer, with the interpretation emphasizing the importance of drill and practice to fire the weapon safely and rapidly. After a brief video, we were introduced to the monster **Armstrong 100-Ton Gun** and the elaborate system that loaded it. In 1874, the Italian Navy embarked on an ambitious program to build two massively armored battleships. This was directly threatening to Malta, so the British were alarmed, even more so by the fact that these ships were to be equipped with four rifled, muzzle-loading cannons with 45-cm bores that would allow the Italians to bombard and destroy the fortifications at Malta while staying well beyond the range of the land-based artillery. To counter the Italian battleships, the British ordered the 100-Ton Gun from the Armstrong Ltd. works in Newcastle, England. To load this massive weapon, a steam/hydraulic ram forced the 450 lbs. of gunpowder and the 1,000 lb. projectile into the barrel, which was rotated and depressed into a loading position. The gun could be fired every four to six minutes, but needed re-rifling only after a hundred or so shots. It had a range of about 6,600 yds. and was very accurate. The British decided to arm both Malta and Gibraltar with two each of the weapons. As it turned out, the guns were never fired in anger, and two were damaged beyond repair in test firings. Furthermore, these massive weapons were soon made obsolete by advancing technology.

The Study Tour's final farewell was a traditional Maltese dinner featuring rabbit, fish, and other dishes. This was definitely a unique tour. The SIA would like to thank the co-leaders of the tour, Mary Durfee and Roberto Ghirlando, and all of the warm, friendly people of Malta who showed great hospitality and patience in answering our numerous questions. *Grazzi hafna!*

Jay McCauley