STANDARDISATION OF SHIP AND SHORE-BASED POWER SUPPLY (COLD IRONING)

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AKA: AMP, OPS, HVSC

History

- The Navy, which traditionally spends a long time at sea followed by long periods in port, has used shore power for decades at ports *where the voltage and frequency match and there is shore power infrastructure support.*
- The proper voltage, frequency and infrastructure have been generally available only in Navy ports of their home country.

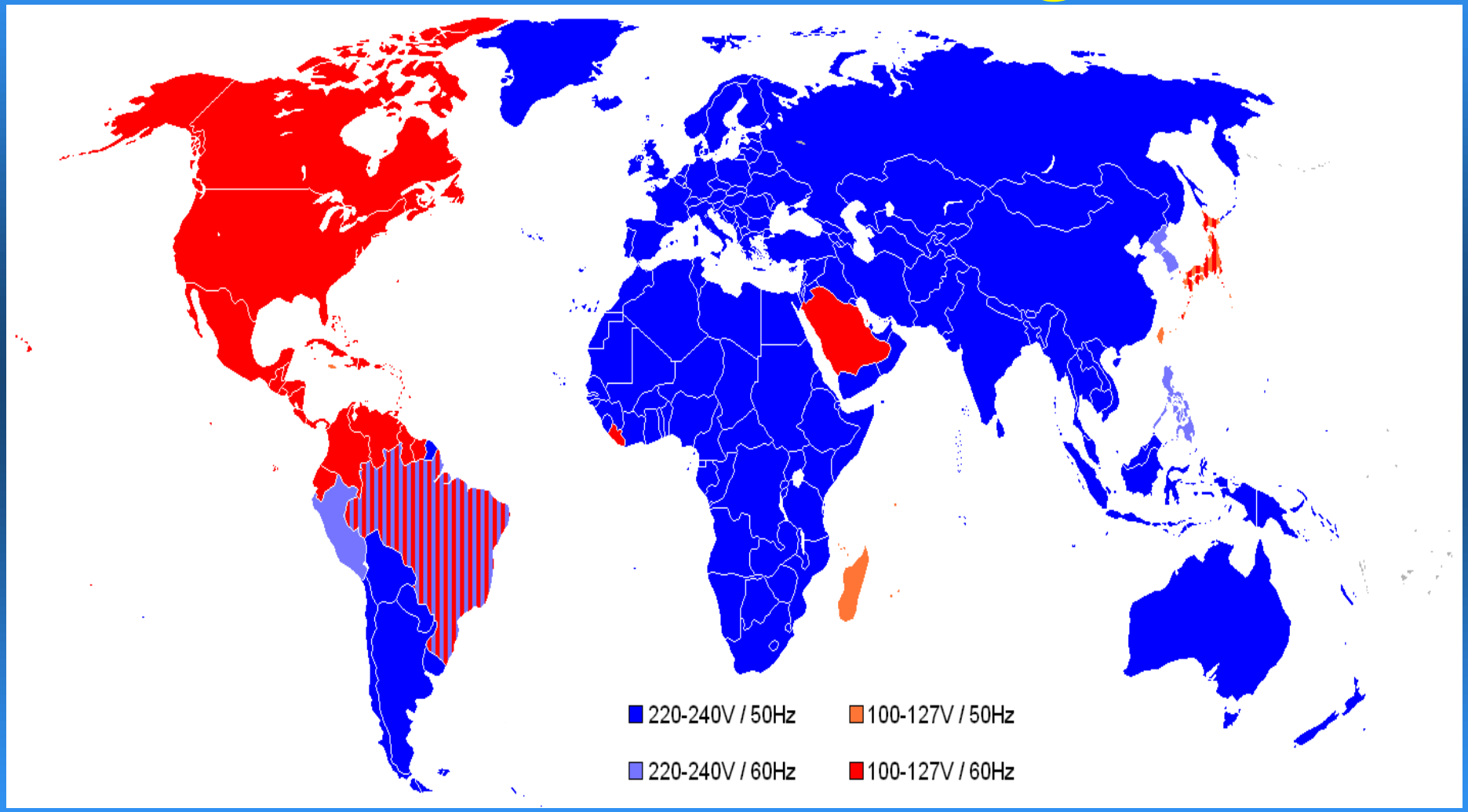
History (cont.)

- With long in-port periods and low power demands, shore power (cold ironing) is cost effective for navies.
- Commercially, cold ironing has been in place and used successfully for merchant vessels in Juneau, Alaska (2001), Göteborg (2000), and Los Angeles (2004) for many years.
- Seattle, Long Beach, Tacoma, other ports in Europe now have shore power

What are the Benefits?

- Virtually all emissions from the vessel, including NO_x, SO_x, CO_2, are eliminated from the port area when the engines are secured and the ship receives power from shore side. PRIMARY BENEFIT
- The cost of energy may be favorable compared to ship's fuel cost. SECONDARY
- Less frequent bunkering and correspondingly less watch standing requirements. Maintenance can be performed with engines secured. SECONDARY

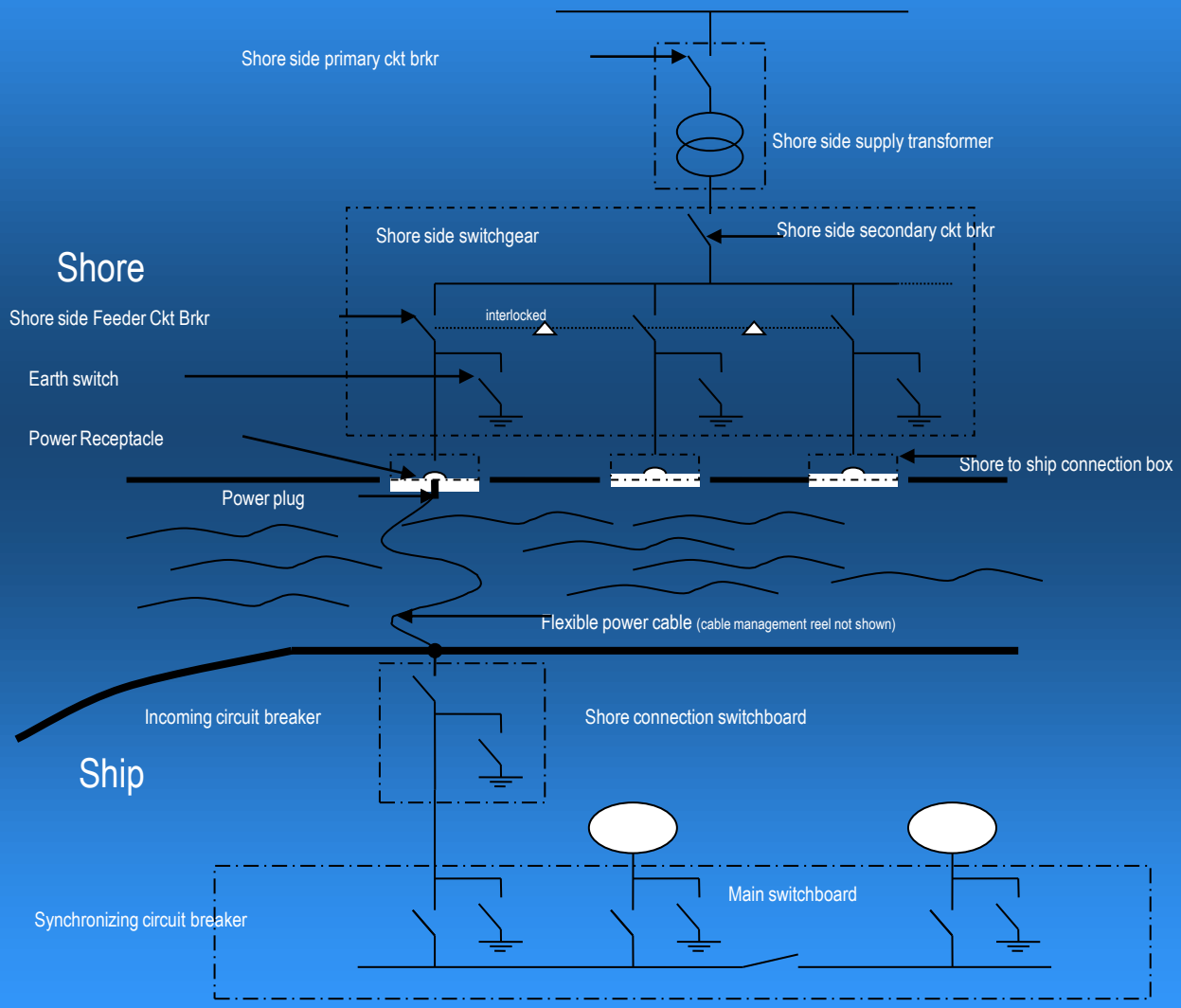
What are the challenges?



Voltage, Frequency

- The voltage and frequency (V and f) must ultimately match the ship's design V and f for the ship to receive shore power.
- This may require a transformer to adjust the volts (V), a frequency converter to adjust the hertz (f), or both (worst case).
- More equipment requires more infrastructure (cost).
- A 2 Megawatt load at 6.6 kilovolts requires only one cable. The same 2 Megawatt load at 450 volts requires 9 cables.

Cable, plugs and switches



Cable, plugs and switches (cont.)

- The power cable, plugs and switches can, and have been, capable of transferring the large voltages and loads involved with cold ironing.
- For vessels to efficiently connect to shore power at different ports of call, it is critical that standardized dimensions of components be established.

Cable, plugs and switches (cont.)

- Most ships (about 90 percent) are still 450 volt electrical systems.
- The 450 volt vessels will likely require an additional transformer to step down the shore voltage to 450 volts.
- Trends for higher voltage systems on new ships, particularly passenger ships with high power requirements, may benefit cold ironing as an alternative.

Safety concerns

- When working with high voltages, safety is paramount.
- Important to build safeguards into the system design through standardization of procedures and equipment.
- Proper training of personnel, and well-developed and understood plans for connection, are also essential.

Safety concerns (cont.)

- Proper grounding of faults
- Opening of circuit breakers on ship and shore when faults occur.
- Efficient disconnect during emergencies for weather or excessive ship movement relative to pier.
- Proper handling of heavy power cables, and efficient communications between ship and shore personnel.

Many stakeholders

- Ports
- Vessel owners and operators
- National and international maritime agencies and other legal regulatory bodies
- Local electrical utilities
- Funding sources for ports (cities, states, countries)
- Environmental protection agencies and groups

Standardisation efforts

- ISO, IEC and IEEE are jointly developing a standard for onshore power supply (cold ironing) for ships – IEC/ISO 60092-510. This document focuses on general and vessel–specific requirements.
- An IEC/ISO publicly available specification (PAS) was published in 2009. Working group meetings 2009-2010 have included significant participation from ports, ship owners, utilities, class societies, and manufacturers.
- Goal for 2010-2011 is to finalize international standard (IS).

http://www.onshorepowersupply.org/