Super Guns – Part 1
Most formidable guns the modern world has seen

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Focus of this briefing is to review ‘super’ guns that were actually made and actually fired.

- A number of ‘super’ guns have been thought of, but never actually built – we will address only those that exist in reality.
- Importance is to gain a context of what it took to:
  - Make these guns
  - Fire these guns
  - Meet their objectives
  - What real impact they had

For each weapon – we will look at:
- Background
- What set this weapon apart
- Fabrication/Construction
- Data
- Actual Firing
- Objective
- Impact (was objective met)
- Technical Significance
• Definition of a “super” gun: A launch device that was a clear and separate departure from the current state-of-the-art and carried a superlative characteristic for its time.

• Part 1
  – 16” Seacoast Cannon 1901 USA
  – Paris Kanone 1918 Germany
  – Schwerer Gustav 1935 Germany

• Part 2
  – V-3 Vergeltungswaffen 1943 Germany
  – M65 Atomic Cannon 1954 USA
  – HARP 1973 USA/Canada

• Part 3
  – Babylon 1991 Iraq
  – SHARP 1993 USA
  – Xianfeng 2000 (?) China
The Endicott Board report in 1886 found the coastal defenses of the US wholly inadequate and recommended a major upgrade.

In 1888 Congress created the Board of Ordnance and Fortification to implement the new program and test the new weapons.

The 16” gun model of 1895 was to be the ultimate weapon in this new system.
Several other major countries had built 15-18” guns by this time, with limited success, but this gun would be the first to accurately fire a high pressure charge, with a large projectile and attain a long range capability with the destructive power to take out a major warship.

Actual contracts for new equipment were let as early as 1893 – including new shrink pit furnaces.

An entirely new manufacturing process, new buildings and skill sets were developed to fabricate this weapon – which took 7 years from start of fabrication to first firing.

An entirely new corps was formed to support the program - the Seacoast Artillery Corps.
• Use of built up tubular sections heat shrunk together was well known and in use in both the US and Europe for some time. The M1895 16” gun was based on this type of construction.

• The M1895 set itself apart from these other weapons by using the shrink fit process to pre-stress the inner liner, allowing the cannon to be fired at a much higher pressure.
16” M1895 Seacoast Cannon (USA)
Fabrication/Construction
The key development in this program was understanding and applying the heat shrink to create a substantial pre-stress in the gun – allowing a much higher charge pressure to be used.
• Additionally, this new design generation of guns introduced a replaceable liner as a design feature. Until chromium plating appeared after WW1, the expected wear life of these cannons was between 250 – 500 rounds.

• The successor to the M1895 – the M1919 utilized wire winding to develop the pre-stress
16” M1895 Seacoast Cannon (USA)

Data (M1895):
- Bore: 16” (406 mm)
- Length: 826.8” (50 caliber)
  - Projectile Travel: 705.6”
- Outer Diameter: 60” (breech) 28” (muzzle)
- Rifling: 144 lands and grooves 1-32 constant twist
- Weight: 385,847 pounds
- Chamber: 40,000 cu in
- Range: 54,000 yards (49 km)
- Projectile Weight: 2,340 lbs
- Muzzle Velocity: 2,700 fps
- Max Pressure (Chamber):
  - 38,000 psi
16” M1895 Seacoast Cannon (USA)
Actual Firing

- Proofed: 1902 – Sandy Hook Proving Grounds, NJ
- Installed in fortifications in Puerto Rico – overhauled at Watervliet and re-lined in 1917
- It was eventually mounted on a disappearing carriage in Fort Grant, Panama Canal Zone, where it served until scrapped in 1943.
Objective: To strengthen seacoast defenses, to increase range and armor penetration capability, to firmly establish claims to territorial waters of the US shorelines

Impact (was objective met): YES
- With the widely publicized capability, With the relatively easy victory of the Spanish American war, and the capabilities of the new 12” guns, the need for further 16” guns went away until World War 1 -
- A new model M1919 16” gun was developed (greater range) and increasing numbers these guns for seacoast defense were acquired
- The M1895/M1919 gun itself firmly established a claim to the territorial waters of the US, however, it is difficult to assess the deterrence factor
16” M1895 Seacoast Cannon (USA)
Technical Significance

• Leap ahead technology(s)
  – prestress technologies (shrink fit and wire winding)
  – replaceable liner –
• Size and range capability in seacoast defense
  – showed the European powers that US could match their expertise
  – Deterrence factor
• Spin off technologies spurred growth in other industries:
  – steam turbines
  – hydroelectric turbines

16 in M1895 Seacoast Cannon on new lathe
Watervliet Arsenal, NY
New York Times, 1898
• New manufacturing processes and plant prepared the US for the coming conflicts.

• Machinery and Processes of the M1895 16” system led to 3rd generation of 16” guns for shipboard use that was capable of dominating the future World War 2 naval battles.
Another key development was a new type of shell specifically designed for armor penetration – with a hardened shaped nose – protected by a windscreen.
Paris Kanone (aka Paris Gun)
Background

- Background: In March 1918, Germany began a bombardment of Paris with a new weapon.
- Modern world - first real war experience with a super gun.
- At first – no one believed that this was gunfire
Paris Kanone (aka Paris Gun)  
Background

- Citizens were encouraged to recover shell fragments for authorities
- Objective: With the exit of Russia from the war - German authorities believed that the panic in the French population would hasten peace talks and give it more favorable terms
- Gun was officially named the Kaiser Wilhelm Geschütz
Paris Gun
What set this weapon apart:

• Extreme Range:
  – Other weapons of the day: 20-30 km
  – Paris Gun: 70+ kms
Paris Gun
Fabrication/Construction

- Gun:
  - Outer ‘sleeve’ 38 cm (15”) L45 bored out
  - Two (2) section inner tube 210 mm (bore) tube
    - chamber 3m
    - rifling 18m (total about 98’ long) -
    - heat shrunk into sleeve.

- Mount:
  - Modified 210 mm railway gun carriage
  - In a fixed concrete barbette
• Projectiles used were also a feat of engineering.
  – 40 in long projectile was supplied with dual copper alloy rotating bands – total weight about 250 lbs
  – Chamber/bore wear measured for each round and powder weight adjusted
Paris Gun
What set this weapon apart:

- **Data:**
  - **Bore:** 21 cm
  - **Length:**
    - 30 m (rifled) + 6 m (smooth)
  - **Outer Diameter:**
  - **Rifling:** 210 mm (8.27”)
  - **Weight:** Gun + Carriage 400 mts
  - **Chamber:** varied by wear
  - **Range:** 112 km (67 – 72 mi)
  - **Projectile Weight:** 103 kg (228 lb)
  - **Muzzle Velocity:** 1600 m/s
    (5,260 fps)
  - **Max Pressure (Chamber):** 53,000 psi
• 7 cannons and 2 carriages were built
• Fired on Paris from March to August 1918
• 1 gun exploded killing crew
• Extremely manpower intensive – hydraulic hoists and special ammo carriages required.
- Objective: to terrorize the French and prompt the peace talks
- Impact (was objective met): NO
  - Once the inaccuracy was well known – the French population as a whole ignored it – couldn’t create a widespread panic
• Engineering:
  – First weapon to account for Coriolis effect (spin of the earth)
  – Firing solution calculated the drag reduction in the upper atmosphere
  – Earth’s curvature also entered the calculations

• Experience with this gun gave Germany the knowledge to create a new generation of extended range armaments starting in 1934.
  – German 28 cm K5 (E)
  – 42 cm railway gun, (Anzio Annie) (shown here)
  – 80 cm railway gun (Dora)
  – precursor to the 88 mm anti-aircraft gun (most successful weapon of WW2)
Schwerer Gustav (Dora) Background

- Development started in 1934 by Krupp without a contract
- Purpose - destroying heavy fortifications, specifically those in the French Maginot Line.
- German Government let contract in 1939
  - D1 Schwerer Gustav (Heavy Gustav):
  - D2 Schwerer Langer Gustav (Heavy Long Gustav)
  - D3 Langer Gustav (Long Gustav)
Schwerer Gustav (Dora)

Background

- **Not ready** for action when the Wehrmacht outflanked the Maginot line during the Battle of France.
- **Gustav was used** in the Soviet Union at the siege of Sevastopol during Operation Barbarossa.
Schwerer Gustav (Dora)
What set this weapon apart

• Sheer size –
  – Largest bore
  – Most powerful
• Cost - 7 million Reichsmark
Schwerer Gustav (Dora) Fabrication/Construction
Schwerer Gustav (Dora) Fabrication/Construction
• Crew 250 to assemble the gun in 3 days (54 hours), 2,500 to lay track and dig embankments. 2 Flak battalions to protect the gun from air attack.
• Produced 1941
• Number built 1 (2 cannon tubes)
• Data - 80 cm Schwerer Gustav:
  – Bore: 800 mm (31.5”)
  – Length: 32.4 m (40 caliber)
    • Projectile Travel: 24.4 m
  – Rifling: twist unknown 10 mm deep
  – Weight: 2,976,241 lbs (1350 mt)
    – Cannon Only 400 mt
  – Chamber: unknown
  – Range: 42,650 yards (39 km)
    48 km (HE); 38 km (AC)
  – Projectile Weight:
    – 4800 kg (HE) (10,500 lbs)
    – 7100 kg (anti concrete)
  – Muzzle Velocity: 820 m/s (HE)
    720 m/s (AC)
  – Max Pressure (Chamber): 38,000
• February 1942 Heavy Artillery Unit (E) 672 and went on the march to the Crimea.

• Train carrying the gun was 25 cars long, a total length of 1.6 km. The gun reached the Perekop isthmus in early March 1942, where it was held until early April.

• Special railway spur was built to the Simferopol-Sevastopol railway 10 miles (16 km) north of the target, at the end of which four semi-circular tracks were built specially for the Gustav.

• 5 June 1942 the gun was ready to fire.

• Fired 48 rounds until 17 June 1942 – Sevastapol fell.
Schwerer Gustav (Dora)

Actual Firing

• Gun and crew moved to the northern part of the eastern front, where an attack was planned on Leningrad.

• Gun was placed some 30 km from the city near the railway station of Taizy.

• Gun was fully operational in late September when the attack was cancelled.

• Gun then spent the winter of 1942/43 near Leningrad.

• When the German retreat began the gun was moved back to the west where it fired 30 rounds into the Warsaw Ghetto during the 1944 uprising.

• Gun then appears to have been destroyed to prevent its capture sometime before April 22nd 1945, when its ruins were discovered in a forest 15 km (9 miles) north of Auerbach about 50 km (31 miles) southwest of Chemnitz.

• Parts for the gun were constructed – but never completed.

• Concepts for a self-propelled version were developed, but not built.
Schwerer Gustav (Dora)
Actual Firing

• D1 Gun Destroyed - Grafenwoehr
Objective: To destroy heavy fortifications & psychological impact
Impact (was objective met): Yes, but . . .
- Relative cost and logistics trains involved were far higher than the three (3) smaller K5 railway guns (280 mm) combined.
Summary

• These guns represented a departure from the norms of weapon design, and each had superlatives to it – first (16” Seacoast), longest range (Paris Cannon), heaviest (Schwerer Gustav – that last to this day.

• These guns had only limited or no proven combat effectiveness:
  – 16” Seacoast Gun was never fired at an enemy warship
  – Paris Cannon – not intended for firing at a military target, but at civilians
  – Schwerer Gustav – fired a total of 48 rounds in battle

• Planned for Part 2 – Super Guns
  – V-3 Vergeltungswaffen 1943 Germany
  – M65 Atomic Cannon 1954 USA
  – HARP 1973 USA/Canada
1. The 16” seacoast cannon used tubular segments built up utilizing a ______________ process.
2. T/F The 16” M1895 cannon was the only 16” gun made.
3. The Paris Kannone accounted for ______________ and ______________ in ballistic calculations.
4. T/F Paris Kanone was intended to bombard Allied Airfields
5. T/F Paris Kanone had pin point accuracy
6. T/F The Paris Kanone utilized a cable suspension to counteract tube droop
7. The Schwerer Gustave moved by
   a) Railway
   b) Canal Boat
   c) Tracked Chassis
   d) All of the above
8. In addition to the D1 Schwerer Gustav - __________ additional designs were planned.
9. T/F Over 10 Schwerer Gustav Guns systems were deployed
10. The Schwere Gustav had a tube life of roughly __________ rounds.