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Engineering Victory: How Technology Won The Civil War

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Review

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Army, Thomas F. Jr. *Engineering Victory: How Technology Won the Civil War.* Johns Hopkins, $49.95 ISBN 9781421419374

Victory Improvised

Engineering Victory: How Technology Won the Civil War by Thomas F. Army Jr. is one of several recent studies that examine military engineering in the Civil War. These include Justin Solonick's similarly titled *Engineering Victory: The Union Siege of Vicksburg* (Southern Illinois University Press, 2015), which focuses on the engineering aspects of that siege, and Earl Hess's three works on field fortifications: *Field Armies and Fortifications in the Civil War*, *Trench Warfare under Grant and Lee*, and *In the Trenches at Petersburg* (University of North Carolina Press, 2005, 2007, 2009). In his contribution to this trend, Army maintains that the North won the war because of its advantage in mechanical skills and a culture of innovation which gave Union armies an edge in military engineering that enabled them to maintain lines of supply and communication for operations deep inside Confederate territory.

Army develops this argument in three parts. The first explores the social origins of the sections' differing engineering capabilities. The author contends that the rise of industry in the North prompted common school reforms and a lyceum movement that enhanced literacy, numeracy, and basic knowledge, while industrial development put a premium on technical innovation. As a consequence, northern workers were given free rein to implement improvements that were then shared through mechanics' institutes, fairs and exhibitions, all of which further diffused technical knowledge among the northern public. In the South, however, the influence of slavery led to more limited educational opportunities as elites opposed public education to prevent the spread of ideas that could threaten slavery. Moreover, the few industrial concerns in the South were staffed largely by slaves who were neither encouraged to innovate nor permitted to share ideas. Because of these differences, the northern population

was more amenable to a system of bottom-up technical innovation that enhanced the North's wartime engineering capacity.

Part II of *Engineering Victory* focuses on the establishment, composition, and initial operations of Civil War engineering forces. The Union's one regular Engineer Company was enlarged and supplemented with three new companies to form the Engineer Battalion, but this unit provided only a small portion of the engineering arm for a single Federal army. Union commanders accepted specialized volunteer units to expand their engineering capabilities, and in the west, they also detailed infantry units to serve as pioneers and assist with engineering duties. Because of the northern economy and educational system, the members of the various Union volunteer engineer units and many northern infantrymen had some mechanical aptitude. Lacking similar resources, the Confederacy never had enough engineers. Army buttresses this point by identifying a pattern of Confederate failure and improvisational Union success in early engineering operations. In the west, the Confederacy's insufficiency of engineers led to the poor position of Fort Henry on the Tennessee River, while the ingenuity of northern volunteer engineers was demonstrated when they devised an apparatus to cut trees below the waterline of a bayou in order to open a canal across a bend in the Mississippi and bypass Island No. 10. Similarly, a failure of Confederate mapmakers during the 1862 Peninsula Campaign cost Joseph Johnston an opportunity to benefit from George McClellan's division of his army across the Chickahominy River at the Battle of Seven Pines. James Longstreet's Confederate corps took the wrong road, snarled up Johnston's advance, and deprived the southern attack of much of its intended force. In the same engagement, however, the ingenuity of Union soldiers saved Erasmus Keyes' IV Corps. Before the battle Federal engineers had built several bridges over the river, and two more, Sumner's Upper and Lower bridges, were improvised by volunteer infantry regiments from Edwin Sumner's II Corps. As Army points out, Sumner's Upper Bridge was critical in moving reinforcements from Sumner's corps to shore up the hard-pressed IV Corps during the battle, although the author neglects to mention that Sumner's Lower Bridge collapsed and could not be used. While astute readers will wish that the positions of these two improvised structures had not been reversed on the map Army provides (123), his claim for the significance of one of them still stands.

Army also applies his argument to railroad management. Drawing on northern experiences with larger complex railroads managed by delegating authority to competent subordinates, the Union took control of critical lines in

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1862. The United States Military Railroads under Daniel McCallum provided oversight and minimized the chaos previously caused by the interference of military officers. Appointed to assist McCallum, Herman Haupt laid the foundation for the United States Construction Corps by assigning men from infantry units to maintain and repair the railroad on the basis of their prewar occupations. Without the same antebellum tradition of railroad management or a similar pool of skilled labor, Army argues, the Confederacy could not create an efficient organization to manage its rail lines.

Federal military forces also improved their field engineering organizations in 1862, following the lead of William Rosecrans. When he assumed command of the Army of the Cumberland that fall, Rosecrans had only two regular engineer officers and a handful of volunteer engineer troops. His first innovation was in mapping; Rosecrans assigned non-engineering volunteer officers to collect topographical information and forward it to Captain Nathaniel Michler, the regular topographical engineer on his staff. This expanded Michler's ability to produce maps for field operations. Likewise, Rosecrans had his other regular engineer, Captain James Morton, organize permanent pioneer brigades by detailing soldiers with mechanical skills from each regiment. This allowed the general to quickly augment his engineering force. All of this was possible, according to Army, because northern volunteers had sufficient mechanical knowledge to be rapidly converted into a close approximation of military engineers. This argument, however, could have been further refined by clearly acknowledging Rosecrans's engineering background. Instead, Army implies on page 73 that he was one of many prewar officers who served in non-engineering branches or picked up technical skills during a civilian career when, in fact, Old Rosy served in the antebellum Corps of Engineers for a dozen years. Nevertheless, the author's contention that by the end of 1862 Union military leadership had recognized the engineering potential of their volunteers and established an organization to tap that potential remains valid.

In the final section, the author explores the impact of the Union's engineering capability on the major campaigns from 1863 through 1865. He finds that the previously established pattern continued; the Confederacy could not match Union technical improvisation. For instance, during Lee's withdrawal after Gettysburg, his army was delayed ten days while southern engineers cobbled together a bridge over the Potomac. Lee had earlier refused to combine the pioneer companies of his army's divisions into a dedicated engineer regiment because, Army writes, he "believed it was impracticable to get an engineer

regiment into combat" (217). That is somewhat misleading. Lee was worried that a large engineer regiment would be less efficient in combat, but he also feared that if pioneer companies were removed from their divisions to form a larger unit, his division commanders would draw more men from infantry regiments to create new divisional pioneer companies, reducing the army's fighting force (OR, series 1, vol. 27, pt. 3, 1017). Lee's concerns suggests that it may not necessarily have been a lack of skilled manpower that disadvantaged the Confederacy in engineering operations. Perhaps it was just the disparity in overall manpower that gave northern leaders the opportunity to create dedicated, if improvised, engineering units, an opportunity, as Army clearly demonstrates, of which they took full advantage.

Moreover, additional consideration of the Overland and Petersburg campaigns might have further refined Army's largely negative view of Confederate technical innovation. Instead, his treatment of these operations is limited by his concentration on the logistical consequences of military engineering. His discussion of the Overland Campaign focuses almost exclusively on Grant's movements, even though Earl Hess has concluded in *Trench Warfare under Grant and Lee* that the expanded use of field fortifications in this campaign was first improvised by Confederate officers and men in response to Grant's policy of continuous contact. Similarly, Army neglects most of the engineering-related operations around Petersburg, except for events leading to the Battle of the Crater. In the neglected operations, however, at least one Confederate soldier improvised a method of detecting Federal mining activity. While not critical to the campaign, such action suggests the type of bottom-up innovation that the author finds lacking among Confederate forces (Hess, *In the Trenches at Petersburg*, 112).

Thomas Army Jr. has produced an interesting and thought-provoking study of military engineering in the Civil War with which students of the war, logistics, and technology will have to reckon. While his ultimate conclusion that the Union's engineering advantage was the critical reason for northern victory is still open for debate, he has launched what looks to be a profitable and enjoyable discussion, one that could benefit from a similar analysis of the well-known Confederate naval innovations such as the submarine, torpedo boat, and ironclad.

Mark A. Smith is an associate professor of history at Fort Valley State University in central Georgia. His book, Engineering Security: The Corps of Engineers and Third System Defense Policy, 1815-1861 *(University of Alabama*

Press, 2009), examines the national defense policy developed and implemented by the Corps of Engineers between the War of 1812 and the Civil War. He is currently editing a journal and memoir by a Union engineer soldier.