

Journal of Conventional Weapons Destruction

Volume 17
Issue 2 *The Journal of ERW and Mine Action*

Article 11

July 2013

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Recommended Citation

Christ, Gary (2013) "From Church Mission to Invention," *The Journal of ERW and Mine Action* : Vol. 17 : Iss. 2 , Article 11.

Available at: <https://commons.lib.jmu.edu/cisr-journal/vol17/iss2/11>

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From Church Mission to Invention

After a mission trip to improve the sanitation needs of orphanages in Cambodia, Gary Christ recognized the great need for a better demining machine and developed the "Peacehammer."

by Gary Christ



The Peacehammer assembly consists of 70 individual weights. The hammer is attached by tires to absorb the shock of an anti-tank mine.

All photos courtesy of the author.

During my first five-week mission trip to Cambodia, I did not focus on helping landmine survivors. Rather, I accompanied my pastor to survey sanitation needs of orphanages. Licensed to install septic systems, I used my expertise to design a wastewater treatment system to prevent the children from getting sick. My first impression of the sanitation problems in Cambodia drove me to innovate and implement a new type of septic system. However, every time I tried to purchase septic supplies, I heard a common Khmer phrase, "*ot mien*," which translates to "have not." Supplies were

inadequate; shovels, gloves, washed septic stone, septic tanks and backhoes were either insufficient or unavailable.

Challenges help us to grow, which I did. Quickly learning to use the Asian-style hoe to dig a trench, I made septic tanks from well rings and formed concrete chambers, a gravel-free method of draining wastewater. On my next trip, I shipped a container-load of higher quality shovels, plastic septic chambers and other supplies that enabled our team of Cambodian orphans and American missionaries to install a dozen septic systems at orphanages throughout Cambodia.



Sem Sovantha, director of the Angkor Association for the Disabled, sits on the Peacehammer.

While installing the 13th septic system, the installation team unexpectedly encountered an unexploded landmine. Thankfully, the Cambodian Mine Action Centre (CMAC) removed it before anyone was injured. At that moment, I had an epiphany: “Could landmines be safely detonated by weights dropped from a crane?”

Taking an Idea to Invention

Shortly before the mine incident occurred in 2005, I met retired Captain Sem Sovantha, a landmine survivor and founder of the nongovernmental organization (NGO) Angkor Association for the Disabled (AAD). Although a Khmer Rouge landmine tore off both of his legs in 1990, he survived. After eight months in a military hospital, Sovantha was forced to beg on the streets of Phnom Penh to provide food for his family. In 2004, he started AAD to provide shelter for other landmine victims

and give them an opportunity to learn a trade. Sovantha has helped countless other persons with disabilities and their families. In my opinion, he is a Cambodian hero.

Interested in inventing a new type of demining machine, I continued to ponder how best to eliminate the landmine threat. When I expressed my interest in creating a new landmine machine to Sovantha, he referred me to everyone he knew who might help. At that time, several NGOs used a variety of techniques and machines to meet Cambodia’s goal of being free from landmines and unexploded ordnance (UXO) by 2010; this date has now extended to 2020.¹

I learned much from Aki Ra, founder of the Cambodian Landmine Museum and Relief Facility and Cambodian Self Help Demining; H.E. Heng Ratana, Director General of CMAC; and from MAG (Mines Advisory Group) and the Development Technology Work-

shop, which co-developed the Tempest machine with U.S. Humanitarian Demining Research and Development Program. Although I had zero experience with landmines, Sovantha’s contacts were very respectful. They recognized that Sovantha and I wanted to help make Cambodia a safer place.

The Peacehammer

By speaking with deminers and engineers, I learned that demining machines need to be thoroughly developed. My concepts were good, but prototypes were needed. After returning home to the U.S., I dedicated my free time to modifying obsolete machines and my 1947 tractor to make a simple crane with a heavy hammer. Thanks to a team at Hydraulic Services & Repairs and Eric Hammerstead and Dave Hammerstead of Mobile Lift Sales & Service, who helped fabricate the “Peacehammer,” and philanthropist Margaret Dawbarn,

a greatly improved prototype is being tested in Phnom Penh.

The Peacehammer is an assembly of 70 steel weights, each about 20 lbs (9 kg). These are attached separately by an individual chain, which provides equal compression of the ground. The chain is attached to a robust, track-mounted frame that lifts the 1-ton hammer and releases it so as to impact the ground with 10 times the force of a human foot-step. This machine will be remotely controlled to provide increased safety for the operator. An optional brush cutter could be mounted, but the vegetation would need to be cleared before the device could be used.

Though many types of demining machines exist, in my opinion, a gravity-activated reciprocating hammer is more efficient and less costly to manufacture, use and repair than hydraulically powered rotating flails or tillers.² My observation is that a reciprocating hammer could impact the soil with less than 20 percent of the energy required from a rotating flail. If the Peacehammer can be built in Cambodia, the manufacture cost would be around US\$20,000 per unit, which is much less than the manufacture cost of flails or tillers.³ The low-tech design means it can be manufactured in Cambodia, ideally by landmine survivors.

The machine awaits the installation of the final drive system in Phnom Penh at a tractor factory. The current drive system is underpowered and the remote-control system needs improvement. For details or to offer advice on how to solve the problems, contact Gary Christ at helpgaryhelp@yahoo.com. 

Endnotes

1. On 28 July 1999, Cambodia ratified the *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines and on Their Destruction* (Anti-personnel Mine Ban Convention or APMBC). On 1 January 2000, Cambodia became a state party and received a time frame of 10 years to become landmine- and UXO-free. On 4 December 2009, this deadline was extended to 1 January 2020. <http://bit.ly/116MKag>.
2. The author cannot provide accurate statistics to support this claim at this time.
3. Miniature and medium-sized flail machines generally cost between US\$220,000 and \$300,000, and the Tempest multi-tools cost between US\$200,000 and \$425,000. Tiller machines can cost around \$1,500,000. <http://bit.ly/ZVX1ov>.



Gary Christ (pronounced Krist) is 55 years old and was raised on a family farm. He has a 26-year-old daughter and has served as a volunteer in many ways since 1989, mostly helping the homeless before his invitation to Cambodia in 2001 to install septic systems at orphanages. After a landmine was discovered at an orphanage in Cambodia, he desired to develop a simple method of exploding these devices without complex machinery or time-consuming hand removal.

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