

# Parallels in Engineering and Humanistic Buddhism

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## ABSTRACT

*Engineering is the creative application of scientific principles used to design and build systems to maintain and improve our daily lives. Humanistic Buddhism, as defined by Venerable Master Hsing Yun, focuses on applying the laws and principles as taught by the Buddha into our daily lives to solve problems of this modern world. This paper discusses the similarities between engineering and Humanistic Buddhism, how they both focus on the application of principles and laws into practice, and how they both attempt to improve human lives.*

## Introduction

Engineering and Humanistic Buddhism are two disciplines that may seem distinct and different, but in fact they are amazingly comparable and have many common characteristics. Humanistic Buddhism, according to Venerable Master Hsing Yun, is the integration of our Buddhist practice into all aspects of our daily lives. He defines six characteristics of Humanistic Buddhism: 1) humanism, 2) emphasis on daily life, 3) altruism, 4) joyfulness, 5) timeliness, and 6) universality.<sup>i</sup> On the other hand, engineering, according to modern interpretation, is the creative application of scientific principles used to design and build systems to maintain and improve our daily lives.<sup>ii</sup> Engineers use their knowledge of science, mathematics, and appropriate experience to find the best solution to a problem.<sup>iii</sup> There are several major characteristics of engineering: 1) using scientific laws and principles, 2) transforming the laws into technologies, 3) finding the optimal solution to a problem in this mundane world for this present time, and 4) designing useful things to meet the needs of humankind.

This paper illustrates the parallels in engineering and Humanistic Buddhism by comparing the primary ideas of Humanistic Buddhism, as described in *The Fundamental Concepts of Humanistic Buddhism* by Venerable Master Hsing Yun, with the four characteristics of engineering cited above. First, I will explain that the law of cause and effect is a key concept in both science and Buddhism, and illustrate how this law helps practitioners in both fields to “foresee the expected.” Next, I will clarify how Humanistic Buddhism’s “emphasis on daily life” and engineering’s “transforming the laws into technologies” both stress the same idea of putting theories to practice. Then, I will link Humanistic Buddhism’s “humanism” and “timeliness” to engineering’s way of finding the optimal solution to problems in this world at this time. Lastly, I will describe how engineering and Humanistic Buddhism both focus on benefiting oneself and others. With the comparisons in these four sections, I will conclude that a Humanistic Buddhist Practitioner is essentially a Buddhist Engineer.

### **Law of Cause and Effect: Foreseeing the Expected**

Both engineering and Humanistic Buddhism place great emphasis on the law of cause and effect as it applies to everything in life and in nature. From the Buddhist perspective, the law of cause and effect originates in the principles of dependent origination and emptiness. All things and events in the universe depend upon "causes" being consigned to "conditions" to produce "effects".<sup>iv</sup> Nothing in the universe can escape from the law of cause and effect; everything exists because of its causes and conditions.

From the scientific point of view, most scientific laws and principles have a cause-condition-effect relationship. For example, Newton's First Law of motion states that "Consider a body on which no force acts. If the body is at rest, then it will remain at rest. If the body is moving with constant velocity, then it will continue to do so."<sup>v</sup> The "if" part is the cause, the "then" part is the effect, and the "consider" part is the condition. In other words, if the body is at rest (cause) and no force acts on it (condition), then it will remain at rest (effect). Another example is the Law of Conservation of Energy, which states that "in an isolated system, energy can be transferred from one type to another, but the total energy of the system remains constant."<sup>vi</sup> A cause-condition-effect relationship of this law is more subtle and implied: if there is an increase in one type of energy (cause) in an isolated system (condition), there is an equal amount of decrease in other type(s) of energy (effect). Indeed, almost every scientific law can be explained with a cause, condition and effect relationship.

In engineering practices, understanding the causes and effects to predict and foresee the outcome is a common practice. In a development cycle, engineers first identify the requirements, specify the design, and perform hazard assessment and risk analysis on the design before they implement, test and validate the design. During the process of identifying hazards and mitigating risks, alternative designs are considered and evaluated. It is with the analysis of the cause-condition-effect relationship in this process that engineers can minimize failures in their products.

In comparison, Buddhists mitigate bad effects by understanding the relationship of cause and effect. In Buddhist scriptures, it is said that "Bodhisattvas fear causes, while sentient beings fear effects."<sup>vii</sup> Bodhisattvas are more concerned with the causes and conditions, while ordinary human beings are more concerned about the effects. Bodhisattvas, with wisdom and compassion, understand what causes and conditions result in what effects. For example, the act of killing (cause) in most circumstances (condition) causes harm to others (effect), therefore the Bodhisattvas avoid harming others by not killing. It is with deep understanding of the cause-condition-effect relationship that the Bodhisattvas foresee the expected results and try to avoid bad causes and conditions. As Humanistic Buddhist practitioners, who are Bodhisattva path practitioners, we also attempt to avoid negative causes and conditions by foreseeing the expected outcomes, just like the practices of engineers.

### Applying Theory to Practice

Humanistic Buddhism and engineering both emphasize applying theories to practices. To better illustrate this important similarity, one must first understand the relationships between science and engineering, and between Buddhist teachings and Humanistic Buddhism. In today's society, science and technology are inseparable from our lives. The advancement of science and technology in various fields such as the medical, transportation, telecommunication and computer have changed our everyday lives. Behind these discoveries and inventions are dedicated scientists who discover the scientific principles and laws, and enthusiastic engineers who apply these laws and turn them into new technologies. However, there are differences between scientists and engineers. According to *Webster's Dictionary*, science is "knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method," whereas engineering is "the *application* of science and mathematics by which the properties of matter and the sources of energy in nature are *made useful to people*."<sup>viii</sup> Scientists are more interested in knowing why a problem arises, and they research to seek an answer to a question. By contrast, engineers are more concerned about how to solve a problem and how to implement that solution. In other words, scientists attempt to explain phenomena, whereas engineers use any available knowledge, including that produced by science, to construct solutions to problems.<sup>ix</sup> Engineers transform the theories into practice, inventions, and new technologies.

Similarly, Humanistic Buddhist practitioners turn Buddhist principles into practice. Just like talking about food does not make one full, merely understanding the teachings of the Buddha is not enough. One must practice His teachings in everyday life in order to truly appreciate His teachings. The following is an interesting story about practicing Buddhism in ordinary daily living. Before learning and practicing Buddhism, a man has an extremely bad temper and yells at his co-workers whenever he is under pressure. After learning Buddhism, he realizes that anger is one of the three poisons, and he tries to cease anger whenever it arises. But after a while, he still cannot control his temper. Just around that time, he is assigned to attend a one-year intensive training abroad. During his training outside the country, he finds himself not in quarrel with people anymore. He is quite satisfied with his actions, thinking that he can finally manage his temper. However, when he gets back to work after the training, he begins to argue with people again whenever he is under stress. He then realizes that practicing out of ordinary everyday living is not a true practice. When he is abroad, due to language barriers, he does not talk much, and hence he has less chance of arguing with other people. But when he is back to his real work in his own country, his intrinsic habit comes back and he understands that he has not reached the level of controlling his temper. One must practice in his or her daily life in order to receive the true benefits of the practice.

One can practice Buddhism in all aspects of life, from standing to walking, from eating to drinking, and from working to sleeping. Humanistic Buddhism is the Buddhism needed in our daily lives. Humanistic Buddhist practitioners bring Buddhism to its fullness by practicing it in everyday life. Humanistic Buddhism is the practical Dharma, and it focuses on applying the teachings of the Buddha into our daily lives to solve problems of this mundane world.

### **Living in Reality**

Just as engineers and Humanistic Buddhist practitioners emphasize putting theories to practice, both groups also understand the importance of working under existing conditions in the present moment. Living on Earth, we are limited to available natural resources. As human beings, we are limited to our physical and mental abilities. We do not live in a perfect world, and thus not everything we encounter is ideal. But the scientific laws and principles are usually described in ideal cases. How do we tie these ideal laws to an imperfect world? Both engineers and Humanistic Buddhist practitioners provide the link between ideal laws and imperfect reality as they practice in this mundane world with constraints and limited resources.

There are many stories in engineering academia that describe the difference between scientists or physicists and engineers, and one of them is as follows: A group of gifted freshman students are admitted into the engineering school of a prestigious university. A professor's job is to determine if these freshmen shall major in engineering or in physics. The professor asks all the freshmen to line up against a wall in a large rectangular room, and explains to them their goal is to reach the other side of the room. The rules are 1) they can walk as many times as they want towards the other side of the room, but 2) each time they can only advance half the distance between themselves and the other side of the room. After explaining the rules, three-quarters of the students proceed to the center of the room, while the others remain standing at their original position against the wall. At that time the professor announces that the students in the center of the room will major in engineering, whereas the people standing at the wall will major in Physics.

All these freshman students know that they can never reach the other side of the room with the rules given. This is because no matter how many times they walk, they would still have an infinitesimal distance from the other side of the room. The physicists think deeply on the problem for a perfect solution and are satisfied knowing there is or is not a solution to the problem without taking any action. But the engineers can work under constraints and are willing to take actions without a perfect solution. Engineers understand that their actions will get them close enough to their goals for all practical purposes.

Even though both groups of students apply mathematical and scientific principles to the same problem, their approaches are considerably different and thus their end results are different. The engineer always seeks the best solution within the available resources.<sup>x</sup> This situation also applies to Buddhism. Devoted Buddhists can learn and understand all of the Buddha's teachings, but if they do not apply the teachings to this real world at this present time, they are like scientists who keep contemplating on the problem in an ideal case without taking actions in reality. The Buddha taught us to understand this world we live in and practice in this world. As the Sixth Patriarch Platform Sutra states, "The Dharma is here in the world; enlightenment is not apart from the world. To search for Bodhi apart from the world is like looking for a rabbit with horns."<sup>xi</sup> As human beings, we must train and cultivate ourselves in our human world in order to achieve Buddhahood.

And as Master Tai Hsu said: "although Buddhism speaks of the past, present, and future, it particularly highlights the universal welfare of the beings of the *present* world; although Buddhism speaks of this world and countless other worlds, it particularly underscores the welfare of the beings of *this world*; and although Buddhism speaks of all beings of the ten dharma-worlds, it reserves the most emphasis for *humans*."<sup>xii</sup> As Humanistic Buddhist practitioners, we practice in this mundane world, accepting imperfections and attempting to solve daily problems with limited resources. And we try to find the optimal solution to problems, in this mundane world instead of an ideal world, and in this present time instead of any other time. It is only by doing so that we can fully utilize Buddhism to the betterment of humankind.

### **Benefiting the Public**

Serving the public welfare is one of the most important duties of an engineer and a Humanistic Buddhism practitioner. In the National Society of Professional Engineers (NSPE) *Code of Ethics for Engineers*, it declares that "engineers shall hold paramount the safety, health, and welfare of the public."<sup>xiii</sup> And in the NSPE *Engineer's Creed*, one of the pledges is "to place service before profit, the honor and standing of the profession before personal advantage and the public welfare above all other considerations."<sup>xiv</sup> It is not adequate for engineers to design any product; they must design things that benefit the public. "Public" refers to anyone other than the engineer him or herself. In other words, an engineer is providing engineering services to the public when the work is done for the benefit of an organization, corporation, government or any other entity.<sup>xv</sup> No matter what field an engineer is in, he or she must work for the development and improvements in that field and to the betterment of humankind.

Humanistic Buddhism, too, serves the same purpose. Humanistic Buddhism places more weight on all sentient beings rather than the individual, on society rather than temples in the mountains and forests, and on benefiting others rather than oneself.<sup>xvi</sup> The teachings of the Buddha must meet the needs of

people and of society in order for it to have great value to the people.

As we apply Buddhist principles in our daily lives, it can automatically benefit oneself and others. Humanistic Buddhism teaches sentient beings how to deal with life today and how to make ourselves more positive individuals for tomorrow. If each one of us makes improvements in ourselves, we improve all of society as a whole. For example, if one upholds the Five Precepts and Ten Wholesome Conducts everyday, there is no room to harm ourselves or others, providing a harmonized society. And in practicing the Six Paramitas and the Four Embracing Means of giving, using amiable speech, performing conduct beneficial to others, and cooperating, we can improve ourselves and influence others to improve themselves, creating an overall positive energy that makes our world a better place to live.<sup>xvii</sup> As we observe closely, it is clear that both practitioners of Humanistic Buddhism and engineering strive to benefit humankind and to put others before themselves.

### A Buddhist Engineer

As described in previous sections, engineers are in many ways comparable to Humanistic Buddhist practitioners. A particular engineer applies laws and principles of a particular field to solve problems and to produce goods in that particular industry. For example, an Agricultural Engineer applies knowledge of engineering technology and science to agriculture, whereas an Environmental Engineer develops solutions to environmental problems using the principles of biology and chemistry.<sup>xviii</sup> A Humanistic Buddhist practitioner applies the laws and principles as taught by the Buddha to solve problems of the modern world. As Humanistic Buddhist practitioners, we are the “engineers of Buddhism,” applying theory to practice, transforming ideas into actions. In these aspects, a Humanistic Buddhist practitioner is essentially an engineer in the field of Buddhism, or a “Buddhist Engineer.”

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<sup>i</sup> Venerable Master Hsing Yun, *The Fundamental Concepts of Humanistic Buddhism*, Buddha's Light Publishing, 2003, p. 3-5.

<sup>ii</sup> National Society of Professional Engineers (NSPE), *Frequently Asked Questions About Engineering*, <http://www.nspe.org/media/mr1-faqs.asp>. Retrieved on 20DEC2006.

<sup>iii</sup> Wikipedia, *Engineer*, 2006, <http://en.wikipedia.org/wiki/Engineer>. Retrieved on 20DEC2006.

<sup>iv</sup> Venerable Master Hsing Yun, *Humanistic Buddhism: A Blueprint for Life*, Buddha's Light Publishing, 2003, p. 67.

<sup>v</sup> David Halliday, Robert Resnick and Jearl Walker, *Fundamentals of Physics*, Fifth Edition, John Wiley & Sons, Inc, 1997, p. 82.

<sup>vi</sup> David Halliday, Robert Resnick and Jearl Walker, *Fundamentals of Physics*, Fifth Edition, John Wiley & Sons, Inc, 1997, p. 168.

<sup>vii</sup> Venerable Master Hsing Yun, *Humanistic Buddhism: A Blueprint for Life*, Buddha's

Light Publishing, 2003, p. 73.

<sup>viii</sup> Merriam-Webster's Collegiate Dictionary, Eleventh Edition, 2004, p. 413, 1112.

<sup>ix</sup> Wikipedia, *Engineering*, 2006, <http://en.wikipedia.org/wiki/Engineering>. Retrieved on 20DEC2006.

<sup>x</sup> Billy Vaughan Koen, *Definition of the Engineering Method*, American Society for Engineering Education, 1985, p. 9.

<sup>xi</sup> *The Sixth Patriarch's Dharma Jewel Platform Sutra*, Buddhist Text Translation Society, 2001, p. 195.

<sup>xii</sup> Venerable Master Hsing Yun, *The Fundamental Concepts of Humanistic Buddhism*, Buddha's Light Publishing, 2003, p. 6-7.

<sup>xiii</sup> National Society of Professional Engineers, *Code of Ethics for Engineers*, 2006.

<sup>xiv</sup> National Society of Professional Engineers, *Engineer's Creed*, 2006.

<sup>xv</sup> The Association of Professional Engineers of Nova Scotia (APENS), *Frequently Asked Questions – Professional Practice*, 2006. Retrieved on 11OCT2006.

<sup>xvi</sup> Venerable Master Hsing Yun, *Humanistic Buddhism: A Blueprint for Life*, Buddha's Light Publishing, 2003, p. xi.

<sup>xvii</sup> Venerable Master Hsing Yun, *The Fundamental Concepts of Humanistic Buddhism*, Buddha's Light Publishing, 2003, p. 15-27.

<sup>xviii</sup> U.S. Department of Labor, *Engineers*, 2006. Retrieved on 20DEC2006.