The Engineer is Professionally a Person of Faith: 
A Theological-Historical Perspective

TON MEIJKNECHT

Motiv, Delft University of Technology, The Netherlands

Abstract

The professional engineer exists, thanks to his own particular form of faith. Without this faith, his professional group cannot exist, as is the case with other professions: doctors, nurses, teachers and lawyers. This article restricts itself to members of this one specific professional group. It describes the genesis and the development of their living conditions, a spirituality of their own. The problem this article focuses on is the lack of linguistic skills among engineers. In expressing themselves, they prefer mathematical or physical formulations. That is their forte. But existential motives can rarely be embodied in that language, whereas those are indeed at the core of their profession. With a few exceptions, engineers depend on others to make their inner motivations more explicit. In this article, a theologian dares to probe these motives.

Keywords

technology, profession, faith, expression, revelation

Positioning

It was 1955 and I was eleven years old, when my mother took me to the cinema to see the movie The Dam Busters.¹ For her, it was a chance to momentarily escape the drudgery of the household. After all, raising ten children is no small matter. For me, it was a happy surprise that I could go. Maybe I was her cover. I never asked her. But it turned out to be a crucial moment in my life.

The movie had just been released. It tells the story of a raid by the Royal Air Force on dams in the river Ruhr during World War II. In May 1943,

¹ The Dam Busters, 1955, movie directed by Michael Anderson, starring Richard Todd and Michael Redgrave, based on the novel by Paul Brickhill with the same title.

© Equinox Publishing Ltd. 2014, Office 415, The Workstation, 15 Paternoster Row, Sheffield, S1 2BX
a squadron of Lancaster bombers launches a perilous night attack on three
dams in the Ruhr, supplying this industrial area with water and electricity.
Two of the three dams are broken. The raid was a success, and it delivered
a heavy blow to the German war industry.

The script has two main characters, Guy Gibson, the squadron com-
mander, and Barnes Wallis, the engineer. About three-quarters of the film
revolves around Gibson and his men, around their heroic deed; it shows
beautiful images of airplanes in the sky and thrilling action scenes set dur-
ing the raid. Yet those were not the aspects of the film that moved me.
I was particularly struck by the engineer, Wallis. The first quarter of the
film is about his voyage of discovery; a lonely path. He is an engineer at the
aircraft factory of Vickers, and invents a special type of bomb that is able
to break through the thick concrete of a dam. Initially, nobody takes his
discovery seriously. They think him a nuisance. In the middle of the war,
resources are scarce, and there is little room for experimentation. People
have other things to worry about. At the moment when, despite all the
adversity he encounters, he manages to solve the technical problems of his
design, he is told that the project has been cancelled.

This moment deeply affected me. After he has been rejected, he arrives
home. His wife sits on the couch with some needlework and asks him how
everything went that day. He proceeds to tell her the bad news. And what
did you do, she asks. I resigned, he says with restrained grief and anger.

Why, she asks, your work at the factory can still proceed, can it not? And
then he utters that crucial sentence, sitting down with her on the arm of
the couch, “Sweetheart, when you believe in a thing as much as I have
believed in this, there really is not any other work until you have seen it
through.” He is shocked to the core, to the bottom of his existence. It is not
just a dream, not just a job, but life itself that is at stake for him.

For Wallis, as it turned out, it wasn't all over yet. “Downing Street” had
suddenly become enthusiastic about the project, and had given it the green
light after all. Still, that does not take away from this scene’s significance. It
lays bare the foundation: the basis of an engineer’s work is a manifestation of
faith. That may be faith in the beauty of a solution, in the utility of a design,
or in the need for a change. Each of them are forms of faith, nothing more,
nothing less. The foundation of his profession does not consist of scientific
knowledge, however important that may be, but rather of a form of faith.

That was what I became convinced of at that moment. Not that I fully
realized that sixty years ago. What I experienced was not much more than
a shiver down my spine. Still, I did at that moment receive an implicit pro-
gram for my own life. And I have been blessed to be able to spend my life unfolding this program. I recently saw the movie *The Dam Busters* again, not in a movie theater, but at home, on DVD. That is how the memory of that scene came back to me.

I have become interested in the identity of engineers, and have built a career on that interest, for thirty-five years as a theologian with a church mission within the team of MoTiv, at the Delft University of Technology. Over the years, it has become apparent to me that engineers indeed simply resemble engineers, present and past. They exhibit certain behaviours, certain preferences, certain modes of expression, certain patterns of responding and certain convictions, that can fairly swiftly be recognized by others as typical. Like other professions, they have their own identity. Doctors, lawyers, teachers, nurses: they each have a set of values, a certain orientation in common, which at the same time distinguishes them from other professional groups. This is not due to some sharp-eyed selection at the gate of the training. At the gates of our universities and colleges, young women and men appear with a curriculum for their final exam that points to a specific interest and a specific development. But that does not equal their identity. They do not receive their identity until they join their professional group. Their training can be viewed as an initiation period, at the end of which they are incorporated into the guild.

This essay is the result of my quest. The working method I chose is an historical approach. How does that identity come into being? How have engineers become the engineers we know today? There has been little historical research into the pattern of their behaviour, into their attitudes and beliefs. The following is my attempt to record the birth of their typical spirituality.

**The grandfather of the engineer is a monk**

The first developments of the profession of engineer coincide with early developments within Western Europe, when, about the year 1000, from the scraps of ancient civilizations, a new world began to be built. The American author Lynn White Jr. is authoritative here. He has described

---

2. This work has—under the name Motiv—acquired a fixed place at the Delft University of Technology and at the Haagse Hogeschool, location Delft. Borgman (2006) and Meijknecht (2014) both tell the story behind this work. They describe the theological connection, how the team works, as well as their cooperation with others.

the history of artifacts that have had great influence on developments within Western Europe: the stirrup, which gave the Frankish cavalry military preponderance over the Moors; the regiment, with its horse traction, that enabled wheat to be cultivated north of the Alps; and the watermill, which introduced mechanical energy. With this account, White almost introduced a new genre into historiography, the history of technology. That is his lasting merit, although in scientific literature, parts of his work are criticized. And this is not all he has done. In a posthumously published article from 1988, he also made important points about the spiritual roots of the engineering profession. He defines those roots theologically.

In the twelfth century, wastelands in Western Europe were cultivated on a large scale; forests, swamps and marshes. They were transformed into suitable lands for the production of food, which the growing population needed. Cistercian and Norbertine monks played an important role in these works. The abbot of the Norbertines of Middelburg led the reclamation of Walcheren, and acted as dike reeve for this island. His monks, and Cistercian monks from Flanders, established monasteries and outposts from which the reclamation and cultivation of this island was coordinated. These monks transformed indistinct marshes into fertile clay soils.

From this observation, it is only a logical step to asking oneself what it was these engineer monks believed in. What led them to finding their vocation in these works? The spiritual leader of the monastic movement, Bernard of Clairvaux, was known for his mystical writings, exhibiting both great beauty and stunning depth. With his unyielding passion, he is undoubtedly a spiritual father of Western Europe. He was surrounded by ranks of grey choir monks, standing and singing psalms in Gregorian setting, or bent over their desks with quill in hand, engaged in copying a folio.

But our question is not what choir monks’ convictions were, but rather what it was that inspired the *fratres conversi*, the “blue-collar” monks who performed the hard work outdoors. Monks as well, they were not unfamiliar with social ranking. What drove the craftsmen who, with their wooden shovels and leather buckets, and no power source other than their own body, attacked the tide? Can you assume that they had the same beliefs as Bernard, just because he occasionally shared in their heavy mechanical work?

It is White’s merit that he words their conviction. In his article, for the first time, a theology of technology is created. Technical progress is seen as the expression of God’s love for his creatures. Benedictines and Cistercians

---

show us in their manual work that the time and labor-saving inventions of technology contribute to the salvation of souls.\(^5\) Their work is to pray, just as praying is their work. They extend and improve the duration of human life, and thereby increase the soul’s chance of repenting. In the eyes of these monks, technique is part of God’s command to have compassion on humanity. They consider themselves to be co-creators in a divine order that is installed under the assumption that people live along the lines of the virtuous life, that they seize the opportunity to devote their lives to God.

**His father is a soldier**

I do not know of any attempts in literature to describe the inner life of the engineer in the Renaissance or early modern times. The dedication of Filippo Brunelleschi to the roofing of the cathedral in Florence in the first half of the fifteenth century, is evident to anyone who enters the building and attempts to imagine the problems this designer encountered and overcame. But this devotion itself has, as far as I know, never been the subject of research. It all remains implicit: everyone senses it and no one says it out loud. Around the year 1600, the same applies to men like Simon Stevin and Jan Leeghwater. They accomplished great technical breakthroughs. Without Leeghwater’s windmills, no polders could have been reclaimed. And without Stevin, Prince Maurice would not have survived the years from 1588 to 1598, the critical years of the revolt against King Philip II of Spain. As a military adviser, he worked in various positions: he built strongholds and designed strategies to besiege other fortresses. He was the technical man behind the military successes of the prince. Being the mathematician that he was, he worked on a theoretical way of reinforcing fortresses so as to enable them to withstand the power of modern firearms. He documented his experiences in *De Stercktenbouwing* (The Construction of Fortresses, 1594).

Stevin was one of the first to practice his occupation in a scientific manner, thereby guiding the profession into the new era. He earned himself the nickname of “The Engineer,” short and sweet.\(^6\) This honorary nickname

---

5. White (1988, 663): By using time well, to serve God and our neighbours, we achieve our final reward, in Abraham’s bosom. It follows that every new means of speeding travel or production, or of increasing the output of a worker in a given time, has a spiritual implication. Saving time and labour helps save souls, as Benedictines and Cistercians have told us by their actions.

6. Davis (1998, 10) traces back the term engineer to France under Louis XIV and his “corps du genie,” founded in 1676. However, Stevin uses this title as much as two generations before that.
made him the first bearer of the title, even though it is not explained what the implicit meaning is. It is characteristic of him that his deeper conviction remains hidden behind his actions. The Delft Faculty of Civil Engineering is located on a street that bears his name. He lives on in the minds of his distant successors as their great example. But exactly how he lives on there, is never made explicit. It remains a mystery: the contribution he has made, and continues to make, to the spiritual formation of engineers.

The birth of the modern engineer

The history of engineers’ dedication in the eighteenth century also remains a grey area. It was not until the nineteenth century that traces emerge of their inner motivations. The years 1850 to 1950 are considered the golden age of technology. Every technological innovation in this period was by definition an improvement. Harry Lintsen, himself a physical engineer, has studied in his thesis the social positioning of engineers during this epoch. On the waves of their successes, they strove for social recognition and power. With his study, he has lifted the genre of technical history in the Netherlands to an academic level.

He describes this development in three stages. First and foremost, there is the traditional or artisan phase. Around the year 1800, only certain branches of military technique, such as the engineers and artillery, are organized on a scientific basis. The other branches are practiced on the basis of experience and tradition: mechanical engineering or civil engineering.

At the beginning of the new century, the second phase starts to develop, the phase of a military influence on the training and the design of the occupation of engineer. At this stage, the civil engineer succeeds in developing and elevating himself socially. It is primarily governmental functions that are open to this new engineer, in the construction of waterworks and (later on) railroads.

Towards the end of the nineteenth century, a new, third phase enters, that of the societal engineer. New branches of technology develop in the different sectors of industry, such as the chemical industry, mechanical engineering, and electrical engineering. Engineers skilled in these disciplines are held in high regard.

At the same time, Lintsen outlines a process of ongoing fragmentation. It is no longer a matter of just one technical profession, but the existence of many technical professions simultaneously. These different branches are embedded in society to such a degree that he starts to wonder whether
there is still such a thing as the technical profession, and if it might not be better to speak of a range of professions, each with their own tradition. The civil engineer, the chemical engineer, the mining engineer, the mechanical engineer, and the electrical engineer, come to stand side by side.

At the end of the nineteenth century, Lintsen observes a growing sensitivity towards the emerging social issues, particularly among the social engineers, arising from this most recent professional development phase. It is these engineers who respond enthusiastically to the first proposals for social legislation. It is these engineers who, in the footsteps of J.C. van Marken, implement improvements in the working conditions of labourers. They are the driving force behind the construction of sewers and water pipes, a contribution to the improvement of public health that should not be underestimated.

What drives an engineer to devote himself to this process? In his book, Lintsen addresses the motives behind this sensitivity only briefly. In addition to participating in a broad social sensitivity to such issues, which can also be observed within other professional groups, such as among lawyers, Lintsen suggests a second motive, namely the professional group as such, using this process in an attempt to gain recognition and power. This coincides with the “improvement of their own social position or the promotion of their own interests.” This response fits well within the design of his research, which—after all—deals with social position. Still, this does not exclude a different, spiritual motif. He quotes the entrepreneurial engineer J. C. van Marken, who states that the social engineer ought to be “of sincere and warm belief in his vocation.” Unfortunately Lintsen does not elaborate on this motif.

Other authors do dwell on this inner drive. Michael Davis wrote about the principles of professional codes of conduct for American engineers. With the title of his book, Thinking like an Engineer, he wants to demonstrate the engineer’s distinct way of thinking and unique accountability. Davis contends that engineers have traditionally pursued human well-being. Their work is focused on human progress. Or, as a generally accepted code says, engineers use their knowledge and skills for “the enhancement of human welfare.” Such rules of professional conduct are directions of

9. Davis (1998, 15). Winner (1986, 4) appears sceptical regarding such interpretations, but gives no references, just a generalisation: Engineers have shown little interest in filling this void [philosophical questions about technology]. Except for airy
morally permissible behaviour to which members of a professional group want to hold each other, even if that means that they themselves would be held to these codes as well. In this formal sense, engineers from the United States have had to abide by codes of conduct since the beginning of the last century.

In these codes, old values are reformulated as standards to which the members of the profession can and should hold each other. From that moment on, the generally accepted value can also be enforced. “While engineers generally seem to have valued human welfare since early in the history of engineering, failing to treat the public welfare as paramount in their work could not be unethical...until engineers adopted a standard of conduct requiring them to treat the public welfare as paramount.” 10 Van Marken’s humanistic motive was not only his personal conviction. There is a long history of experiencing values, eventually resulting in legal phrasing. In the United States, that moment of expression takes place earlier in history than in our country at least. But the moral undercurrent is the same. The modern engineer is (in the European, if not American, sense) a humanist.

The engineer is maturing

In the Golden Age of technology, recognition of the old spiritual foundation was considerably easier than it was in the subsequent period. 11 The second half of the twentieth century was a period of much social reproach of technology as a whole, and of consequent inner doubt among engineers. Technology brings, indeed, both blessings and curses. Experiences from the two world wars, with their large-scale technological killing machines, are certainly partly to blame for this shift in perception.

This is the period during which Samuel Florman documents his own experience as an engineer, in bundles with programmatic titles such as The Existential Pleasures of Engineering and The Introspective Engineer. Florman is a civil engineer and director of a construction company in New Jersey. In addition, he has earned a master’s degree in English language and literature. This somewhat unusual combination makes him an appropriate fig-

pronouncements in yearly presidential addresses at various engineering societies, typically ones that celebrate the contributions of a particular technical vocation to the betterment of humankind, engineers appear unaware of any philosophical questions their work might entail.


© Equinox Publishing Ltd. 2014
ure to enter as an author into the field of an engineer’s personal experience. Highly consistent with his own time, he opts for an existential approach to the phenomenon of professional pride. The following extensive quotation from his 1976 collection of essays is worth printing here:

Engineers are proud of their profession, anxious to sing its praises. But they cannot seem to get beyond perfunctory and nonpersonal expressions of the satisfactions they derive from their work. Many of them are “turned on” by what they do. But they are unwilling or unable to reveal their inner emotions to an audience. The fact that engineers are inarticulate does not signify that engineering does not evoke strong emotions. The fact that engineers lack poetic flair does not prove—not by any means—that engineering has no soul.12

He himself is the exception to this rule. He most certainly possesses “poetic flair.” However, that does not alter the rule. Engineers make little use of language to voice their loyalty to their profession. Their articulation is more often expressed in numbers, images and sketches. Language is not their preferred means of communication.13

It may require an outsider to render the appropriate linguistic articulation to the engineers’ motivation. That is what Michael Davis has done in the book already mentioned. Davis is a professor of Philosophy and Ethics at the Illinois Institute of Technology in Chicago. The core of the book consists of empirical research into the engineer’s mindset. He drafted two questionnaires, presenting one of them to twenty-nine engineers, and the other one to thirty-one managers. Using these questionnaires, he explores the interconnections between the two professions. A striking example of the method he uses is the last question he poses. He asks the engineers: “What questions should a manager ask you to get the information he needs to make the right decision? Which, if any, of these questions is a manager least likely to ask?” The same question, though mirrored, he presents to managers: “What questions should an engineer ask you to get the information he needs to make the right decision? Which, if any, of these questions is an engineer least likely to ask?”

He has compared the responses of both groups. Based on his research, he concludes that managers expect engineers to put a strong emphasis on safety and quality, while reversely, engineers expect managers to give priority to cost and time aspects. Usually these opposing expectations do not lead to major problems, as the two groups can easily negotiate these issues.

The innovative aspect of Davis’ study is that he goes beyond this sociological conclusion. After all, he is a philosopher. He introduces the concept of professional autonomy. He distinguishes, in the emphasis that engineers put on safety and quality, a professional attitude that goes beyond the individual. An engineer becoming a manager takes on the attitude of a manager, and devotes more attention to the cost aspect than he would have done before, when still working as an engineer. During that time, safety and quality were his main priorities. It is not his individual autonomy, but his professional autonomy that is at stake. And companies would be wise to respect this autonomy, that is, if they wish to continue to benefit from the indispensable services and full commitment of the members of this occupational group.

Davis then goes on to describe this professional autonomy as a voluntary submission to the moral standards of the profession. This standard is not arbitrary, but designed “to serve the moral ideal to which the profession is committed.”¹⁴ This is what distinguishes a member from a non-member. Members of the profession have joined the profession precisely because they want to serve this ideal. Above the statutory standards that apply for each individual—such as, Do not steal or murder—specific standards apply to the members of a profession that do not apply to others. Engineers bear a moral duty that they would not have had, had they not been an engineer. Then, Davis concludes his argument with the following pithy statement: “To be a ‘true professional’ is to act as the employer orders insofar as the orders are consistent with the profession’s standards.”¹⁵ In most cases, the professional correlation is directive, but there are cases in which this connection can and ought to be broken. If the professional standard is at stake, this weighs heavier than loyalty to the employer. The professional conscience is the deciding factor.

The engineer is held to a standard that defends a broader interest than the interest of the company he works for. This standard is a moral standard, which does not have its foundation in the law, nor can it be reviewed by a judge. The strength of this standard lies in the voluntariness with which it is accepted. The engineer himself is not the designer of this standard. It is not his individual choice whether he performs certain acts or refuses to perform them. The group he joins is the designer and maintainer of the standard. He fits his professional life into a moral body of ancient date. In short, he joins a professional community of values.


© Equinox Publishing Ltd. 2014
An outsider, in this case a philosopher, is required to clarify the significance of this step. What implicitly happens when an engineer enters into his profession has now been unraveled for everyone to see. Michael Davis reveals what had been hidden.

Revelation

Back to the movie *The Dam Busters*. After their night-time raid, the bombers land back at their base. Tired men step out of their aircraft. They can look back on a clearly successful mission. Two of the three dams on the target list are broken. The energy and water supply of the Ruhr area are severely affected. But this success comes at a very high price: eight of the nineteen Lancaster bombers did not return from their mission. Fifty-six men were killed, forty per cent of the troupe. Wallis, the engineer, is utterly devastated. In the early morning sunshine he runs into Gibson, the squadron commander. He tells Gibson he would never have started the project, had he known that this was going to come of it. No, Gibson says: “You must not think that way. If all these fellers had known from the beginning that they would not be coming back to the ground, there is not a single one of them that would have dropped out.” So, if it bothers you, ask the doctor for a sleeping pill.

Is this “tough guy” talk?, Fifties movie romance? Certainly. The reality of a war is not unambiguous. Doubts about the ultimate utility of what an engineer does cannot be lulled to sleep with a pill. The engineer of today has thorough knowledge of the dark side of his profession. And still, this response contains part of the truth, as well. It is Gibson revealing the significance of the work; it is Gibson who, in spite of everything, continues to believe. Wallis on his own is just not capable of doing that.

It required an outsider’s effort and perspective to reveal the spiritual history of the engineering profession. They discovered a thousand-year-long process of development, from the theology of the Middle Ages, through the humanism of the Modern era, to the existential and moral of the Late Modern era. It becomes apparent that a long and arduous road has been travelled to create the engineer we know today. A monk invented him long ago. He was fathered by a soldier. As a child, he experienced a golden era, during which nothing seemed to stand in his way. And now he has come of age and lives in a world of nuance and complexity.

In the course of this long development, I would like to identify two constants.
The first constant is, in accordance with the last words from the quotation from Florman’s *The Existential Pleasures of Engineering*, that engineers possess something one might refer to as a professional soul. Expression thereof in the course of time is often problematically absent. Yet, the presence of a deeply-felt motivation turns out to be a remarkable constant over the centuries.

The second constant is—as of yet—less clear. What is apparent however, is that the inspiration of an engineer is a phased process with stages that do not flow into one another seamlessly. Scarcity of good sources and innovative studies are definitely to blame. Yet it seems that the relation of engineers *vis-à-vis* their profession is comparable to that of other professionals. From theological through humanistic to moral and existential, the entire history of Western lay spirituality passes in review. It appears that for engineers, faith in the significance of their work has always been necessary to carry out that work. They profess their faith as professionals. Otherwise, they cannot be who they want to be: they are unable to practice their profession.

Having concluded this, I have answered my research question and described the genesis of this typical spirituality. I have determined that an engineer has faith and analysed how that faith has evolved over time. To the best of my belief this has never been done before. Nor, to my knowledge, has the spiritual dimension of this profession been studied in a historical perspective. Based on existing literature, I have conducted a theological-historical study, and set forth my interpretation. But in the strict sense, that does not equal a theological interpretation. I have not yet determined what it is the engineer has faith in. The next challenge, as a theologian, will be to also describe the engineer’s spirituality. What characterizes today’s engineer—beyond his awareness of social responsibility, beyond Florman’s “existential pleasures” and Davis’ professional autonomy? Why am I explicitly referring to the engineer as a “person of faith,” and not as an idealist or an existentialist?

This question came up within the MoTiv team. Evidently, it requires an answer, and it is clear that answering this question will be no easy matter. Involving more than a concluding paragraph, this question requires a separate treatment. (A second part of this article is still in the making.) Together with members of my team from Delft, I plan to write a sequel: The engineer is a professional person of faith, Part 2. In it, we will submit a theological reflection on this “implicit religion.” “To be continued,” therefore.

© Equinox Publishing Ltd. 2014
References


