

TeTech

**M.H. Trompstraat 6
3601 HT Maarssen
The Netherlands**
Tel: + 31 (0) 346 284004
Fax: + 31 (0) 346 283691
Email: info@totech.nl
Web: www.totech.nl
CoC: 30169033
VAT: NL1731.97.863.B.01

Meeting TeTech.

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This document contains a brief description of TeTech's business activities in the English Language. It will help you to decide whether TeTech is the Right Business Partner to work with.

Introduction.

Welcome to "Meeting TeTech"

At this moment, both the general and technical information on the TeTech Website (<http://www.totech.nl/>) is in Dutch. This has been done because most of TeTech's current and potential clients live within The Netherlands and Belgium. The majority of the clients prefer Dutch. As of 3 September 2008, an English page dedicated to Standard Courses is present, accessible via the "courses" link as several courses are available in English.

If you are not fluent in Dutch, this document will give you a good idea of TeTech's capabilities. "Meeting TeTech" contains a summary of the general pages of the website. For updates, visit <http://www.totech.nl/TetechSummUK.pdf> (if you cannot click the link, please paste the link into the title bar of your browser).

Although most of the website is in Dutch, TeTech does speak English. All documentation (written and verbal communication, reports, scratch pad, etc) that belongs to an agreement can be in English. When English has been agreed, all source documentation is written in English, saving you from inaccurate translations from originally Dutch source documents.

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1. What is TeTech?

TeTech is an independent privately-owned small company (Sole Proprietorship, "Eenmanszaak" under Dutch Legislation) in the field of Electronics, Antennas and Mechatronics.

TeTech has been established in 2000. The name *TeTech* has been derived from a part of the last name of the owner (Telkamp) and the Dutch word for Technique (Techniek). The next sections will give you a better picture of TeTech. It will help you to determine whether TeTech can be your partner.

1.1. Area of Expertise.

The Areas of Expertise include:

- **Analog Electronics:** All types of electronic functions like: Amplifiers, Filters, Mixers and Modulators, non-linear functions, oscillators, etc, RF & Microwave functions: lumped and PCB matching networks, filters, transmission lines, LNA, etc, System Level Modeling,
- **Radio wave Propagation:** Link budget calculation for VHF, UHF, Inductive power transfer, EAS, RF & UHF RFID.
- **Antennas:** Antenna specification, selection, how to use them and antenna design itself, examples: Inductive antennas (often electrically small) for EAS, RF & UHF RFID, detection, Electrically large Antennas like Array's, Traveling Wave, yagi's, Wide Band, etc.
- **Power Electronics:** Linear and Switching Converters, Linear and Switching (RF) Power Amplifiers, Inductive Energy transfer, Electromechanical components. All based on BJT, MOSFET, IGBT, or Thyristor.
- **Electro-Magnetic Compatibility:** Corrective and Preventive, at System level, during the EMC tests in house or at an EMC test house, and Board Layout Level.

TeTech's expertise is frequently used in situations where electromagnetic phenomena dominate (sub)system behavior.

We do not have facilities for series production of electronic or mechanical products.

1.2. TeTech's position within the "Idea to Product" chain.

The Expertise within TeTech is made available through: Consultancy, Design (development) and Education. In the next chapter, the activities will be discussed in more detail.

TeTech has clients within both the Public and Private sector. Some examples are:

- Telecommunication Administrations (spectrum surveillance department) and other establishments within the government sector
- Large and Small Companies that are in Electronic Product Development
- Design Houses
- Educational Institutes
- System Integrators
- (EMC) Test Houses
- Equipment Manufacturers

TeTech's expertise is helpful in almost all phases of product development. In addition to the Core Expertise, there is a high level of general technical knowledge. This adds to the value of TeTech's services, especially during antenna design (material selection) and system modelling.

The duration of the work can vary between several hours to months. Services can be provided in both full-time and part-time, and outside The Netherlands.

Whether you are looking for straightforward or innovative solutions, consider TeTech to be your partner.

2. TeTech's Services.

The services include: Consultancy, Design (Development) and Education. In many cases, there is an overlap between the three activities. To give you a better idea whether it is worth to contact TeTech, the activities are explained in more detail below.

2.1. Consultancy.

Many people think: "we can do everything without help". However, systems are becoming increasingly complex. Relying on external knowledge at the right time will often result in cost-reduction and shorter time to market.

The list below gives some examples of consultancy:

- **Feasibility studies.** These can have a theoretical physical and/or a practical approach, depending on the required result. The study may include other disciplines (e.g. Mechanical System Modeling in case of a transducer). The result is often a report.
- **Link budget calculations (EM wave propagation).** TeTech can carry out link budget calculations for: EAS (Electronic Article Surveillance), LF, HF and UHF RFID (Radio Frequency Identification), LPD (Low Power Device), inductive or capacitive data transmission or power transfer, (microwave) radio links (fixed & mobile), etc.
- **Electronic design support.** Here designers can rely on TeTech's expertise in the field of electronic design. Examples: all basic analog signal processing functions (filters, amplifiers, components, oscillators, etc), Board layout (reducing EMC problems), selection of components, transducers, etc.
- **Problem Solving.** This is related to existing systems, devices or production related problems. Most problems that were treated by TeTech are in the field of: EMC, electrical or thermal overload, out of band problems (AC or DC instability), inter-system crosstalk, measurement problems, obsolete components, etc. The advice of TeTech has been used several times as a second opinion during disputes.
- **Antennas (aerials).** For many Engineers, Antennas are mysterious. TeTech can remove the mysteriousness. System Integrators and RF Engineers can rely on TeTech's expertise on antennas. The support can be in the field of: what type of antenna should be used, how to use it, technical and physical limitations, selection of actual antennas from several suppliers, Antenna Measurement, etc.

Although TeTech does not offer software services, TeTech is fully aware of the possibilities and limitations in today's microcontrollers as can be found in more and more products nowadays.

2.2. Design, Development.

Besides Consultancy, TeTech is able to design analog electronic circuits and components. Below is list of examples to give an idea of TeTech's capabilities.

- **Circuit Design.** A variety of basic electronic circuits can be designed. They are the building blocks of electronic systems, some examples: Amplifiers (RF, LF, DC, instrumentation, small- & large-signal, linear & switching), oscillators (RF, LC, RC, high & low power), VCO's, filters (BPF, LPF, etc, passive & active), mixers (RF, instrumentation), power supply circuits (linear & switching), high efficiency DC to AC conversion (class E and DE [ZVS] circuits), analog control systems (systems with feed back), photo diode amplifiers, inrush current limiters for hot swap applications.
- **Inductive Components.** TeTech has a tradition in the design of components that heavily rely on the magnetic field, examples: transformers (RF, LF small-signal & power, leakage transformer), current sensors, energy storage coils for switch mode converters, inductive antennas, calibrated field sensors, etc.
- **Antenna design.** The capabilities include design of: electrically small antennas (magnetic loop or capacitive antennas), electrically large antennas (patch, multiple patch, array, traveling wave, wire, etc), antennas for UHF RFID (433, 868, 2450 MHz), antennas for MF & RF RFID, inductive antennas for sensing and EAS, antennas for RFID labels, directional antennas, passive or active receive antennas, microstrip devices, Inverted F, linear & circular polarized, etc.

The result of a design activity can be: a proof of concept (with test results), documented circuit diagram (with simulated test results), documented mechanical drawing, etc.

TeTech has both circuit simulation software and EM field solving software. This greatly enhances efficiency and reduces prototyping time.

Often the design is done together with other disciplines (mechanical, metallurgical, chemical, software, etc). For example antennas are mechanical devices often subjected to an unfriendly environment. Therefore large part of antenna design is mechanically oriented instead of electronically.

2.3. Education.

A well-designed Course increases the effectiveness of your personnel!

TeTech is specialist in transferring knowledge to other people. Courses are offered independently of consultancy and/or design, but often as part of consultancy or design.

When training is at the right level, given by enthusiast instructors and at the right time, the benefits for your company will be best. TeTech offers:

- Custom Designed Courses
- Standard Courses
- Combination Courses
- On the job training and private lessons

Custom Courses. These are developed in close cooperation with the client (and often the Course Attendees). This guarantees a good match between the course level and the attendees. Courses may vary from a one-day lecture to arrangements where knowledge is transferred slowly but surely. Custom Courses can be very effective, but they are relatively expensive.

TeTech's educational expertise can also be used to set up your own internal course.

Standard Courses. TeTech has a range of "Standard" Courses in the field of Telecommunication Engineering and Analog Design (antennas, propagation, frequency spectrum and noise, stability in electronic circuits). They are given on-site. The courses are frequently updated with the latest developments. The schedule is determined in cooperation with the client. This is to guarantee that knowledge is transferred at the right time.

These "standard" courses fill the gap between the (Post) University Courses and Courses at secondary vocational level (NL: Middelbaar Technisch Onderwijs). Most courses can be given to persons with and without differential calculus. If required basic principles of Mathematics, Physics, Mechanics, Complex Calculus, Steady State Analysis, etc can be added.

As of September 2008, three courses on antenna measurement and antenna design are available in English, all with English course material.
(<http://www.tetech.nl/courses.htm>).

If you are interested in the standard courses, please contact TeTech
(info@tetech.nl).

Combination Courses. Experience showed that many clients prefer a mix of several standard courses. At TeTech, you are at the right place. TeTech will make you an almost custom course for an almost standard price.

On the job training. This is often done during design or consultancy. It guarantees that knowledge stays within your company, also when TeTech has left. Knowledge comes at the right time and can be applied immediately.

Certificates.

All attendees receive a Personalized unique Certificate. Examination is possible (in Dutch, English or Spanish language). Data is stored in an electronic administrative system. This is to enable replacement of Certificates and to prevent and identify fraud only.

Free presentations.

As a service to the technical community, TeTech provides free lectures to hobbyist groups (like HAM clubs, SW DX'ing clubs, etc).

3. Why should you choose TeTech?

Choosing a Business Partner is a challenging job. In many cases, you are looking for something, that you don't have within your company. Therefore, it is difficult to find out whether a company can offer you the expertise required to meet your goal. In addition, just technical expertise is no guarantee for success:

- Does their approach match your approach?
- What about the communication skills, in particular to people in other disciplines and/or or with other working level?
- What about integrity, attitude, objectivity and independence?

This section will help you to make the right decision.

The owner of TeTech has a proven record of accomplishment in product development and knowledge transfer, ranging from feasibility studies to component level hardware design. The activities took place both in an open and confidential environment.

Within TeTech, there is a good understanding of EM-field theory, analogies with other disciplines and how to apply them. This, together with experience in the electronics field and an open mind, enables TeTech to offer you solutions for many challenges. If you require, TeTech can provide you with relevant references.

The TeTech approach features:

- Clear communication to you, not just during the acquisition phase,
- Keeping your final goal in mind throughout the project or activity,
- Well-balanced mix between theory and practice,
- Good performance in multi-disciplinary teams through good understanding of general physical processes,
- Good communication skills and respect for other people and their culture,
- Last but not least, a competitive price.

TeTech's Expertise is maintained and enhanced through challenging projects, permanent study and internal research activities. TeTech has at her disposal a growing internal knowledge database to enable efficient reuse of knowledge.

If this sounds well to you, let TeTech help you make your goals come true.

For further information, please contact TeTech, free of any obligation.

Wim Telkamp
Manager