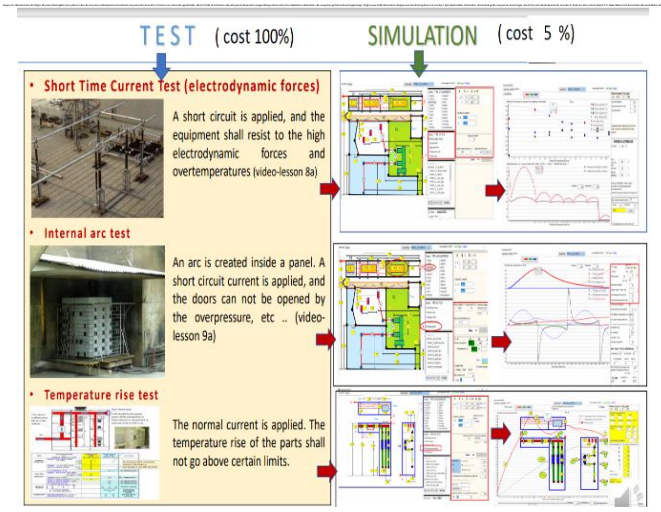
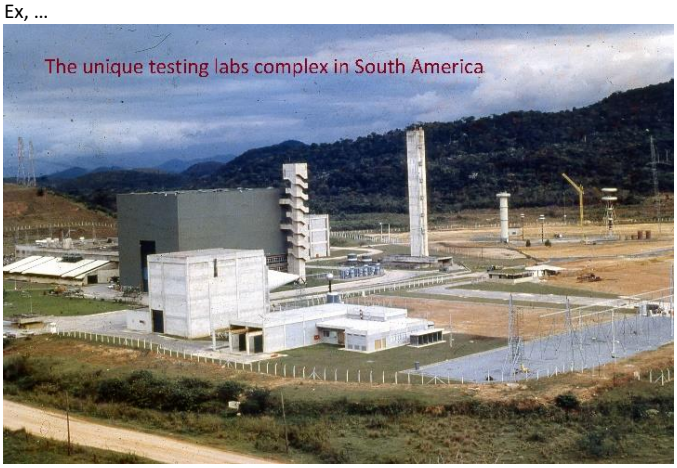
Demo. Project 2: High Power (small size) Testing Laboratory with R&D services focused on lower kG/MVA products

By Sergio Feitoza Costa



Sergio Feitoza, author of this article, helped to design, construct operate and to manage this set of 14 testing labs. including High-Power, High voltage, EMC, Ex, …



1. REASONING FOR THE DEMO PROJECT #2.

The "kG /MVA: Research Centre on Environmental Efficiency of Electric Products" is a concept under implementation. The initial goal is to finance and carry out 7 short-duration demonstration projects to show to the world that designing higher efficiency equipment using less materials is easy and depend more on serious attitudes and intelligence than of significant investments. The fundaments are explained in the article in the first line of Table 1. This testing lab is the project number #2 .

Table 1 – The 7 demonstration projects scope

Demonstration project (Details in the links)	Name	Scope and monitoring of results
#1 http://www.cognitor.com.br/demo1certificate.pdf	Environmental efficiency certificate of electrical products (kG/MVA): technical standard & demo projects management	To disseminate the idea, to monitor the level of interest through the number of Linkedin followers, to create the guidelines for the implementation and to act within major technical standards organizations to discuss and prepare the standard.
#2 http://www.cognitor.com.br/demo2Lab.pdf	High Power (small size): Testing Laboratory with R&D services focused on lower kG/MVA products	Design and implementation of 3 units in) in three regions like South America (possibly Brazil), Africa and Asia (possibly in Malaysia ou Singapore or Thailand).
#3 http://www.cognitor.com.br/demo3SwitchgearEfficiency.pdf	Three examples of more efficient switchgear (30% less kg/MVA) using thinner bars, small ventilation, and different materials Cu / Al profiles and coatings	Design, testing results & comparisons of kg/MVA between traditional techniques and (a) using several thin bars, per phase, (b) small (auto) ventilation resources , (c) different coatings of the busbar connections and (d) parts of components using metal foam
#4 http://www.cognitor.com.br/demo4HighRiseBuildings.pdf	Designing triaxial busways for high rise buildings (lower kg/MVA & impedance for IEC62271 – IEC 61439)	Design and testing comparing the traditional busways with a triaxial busway with higher rated and short circuit current ratings (lower kg/MVA) using proved concepts used in measuring coaxial cables
#5 http://www.cognitor.com.br/demo5SuperEnclosures.pdf	A Super Enclosure for high current switchgear and controlgear (IEC62271 – IEC 61439)	To be disclosed soon
#6 http://www.cognitor.com.br/demo6EconoCosts.pdf	Decidix for kg/MVA – a tool to assess the efficiency of high electric power products	A tool for technical-economic evaluations easy to use by equipment developers with little knowledge of cost calculations. Allows you to compare the attractiveness of projects of different natures
#7 http://www.cognitor.com.br/demo7MHD.pdf	MHD for a water transportation vessel based on electrodynamic forces and coaxial structures	To be disclosed soon

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2. DIFFERENCE BETWEEN THE LAB OF THIS PROJECT #2 and EXISTING TRADITIONAL TESTING LABS.

The need of to do expensive tests in high power testing laboratories is the main barrier to the development of more efficient products that use less materials and resources of the planet. The reason is that medium-large high power test laboratories (HPL) are facilities that require an investment between 20 to 100 million euros. The market for testing is good, but from an investor's point of view, there are much better ROI options to put the money in. The consequence is that there are few laboratories around the world and the price of just 1 day of testing ranges from 2,000 to 20,000 Euros, depending on the size of the equipment to be tested and the test power.

The IEC, IEEE and national standards are only focused on type testing and do not even mention greater efficiency and material savings. Manufacturers, at least in the end of a product's development, need to go to the testing lab to obtain a test report to be used for commercialization. They go to the laboratory with the concern that, if the equipment does not pass, they will have more expenses with repetitions. For this reason, they design the prototypes with safety margins higher than necessary. This is the opposite of the concept of higher efficiency and lower costs.

> By this reason, instead of seeking to develop more efficient projects, manufacturers prefer to copy old, already tested projects, developed in the past by the large international manufacturers. At that time, greater efficiency and using less materials to save Earth's resources were not even discussed. It would be easy for big manufacturers to develop more efficient versions of their old designs. However, they will not step out of their comfort zone in something they have been doing successfully for over 50 years. Especially because the macro concept of “high efficiency” is not well visible and understood by most purchasers, governments, and institutions in the electrical industry.

I state this consciously. At 68, I've spent 25 years designing, building, operating, and managing the largest testing labs in South America. After that, for the past 23 years I've developed and used simulation software to review the design before manufacturers go to the lab for actual testing. I review and correct their projects with almost 100% success.

A point to notice is that developing a growing medium-size electrical industry - higher efficiency based is not difficult and produces impacting results in development, employment & income. I had a rare opportunity to witness an entire process of enlarging Brazilian electric industry, participating intensively in the 80’s to 90’s. Nowadays, could be done better and faster, for example in parts of Africa, Asia, and Latin America. The results in Brazil were very good, visible, and easily verifiable via web, just comparing the size and profile of the electric industry in the 70’s and now.

The incipient electric industry of the 70’s growed and became solid and competitive generating employment and development.

The world changed and to do something with similar effect today we should think about a smaller scale testing lab, using less investment but adding more innovative ideas like to mix this with the approach of testing simulations. This would create a sustainable enterprise, not possible only investing in the traditional testing lab activities.

> The path of the stones is to create a “small” electrical testing laboratory including a team focused on R&D to develop innovations in substation equipment (60% testing team + 40% R&D team). The focus would be to get more efficient equipment with lower Kg/MVA (articles at the end). The strategy would also involve systematic action in technical standardization bodies to disseminate the knowledge acquired. Following this line of action, in some 7 years the results will appear.

3. WHO ARE THE MAIN SPONSORS / INVESTORS OF THE TESTING LAB?

Most existing research centers and testing laboratories were built, around the world, in the 50s to 80s. Many were state companies’ investments and had the vision of motivating regional development. Several large-medium ones were closed in the last 2 decades because, from the point of view of private investors, they are not the best investment for amounts like 20 to 100 million Euros. Some others were closed because already fulfilled their original mission or did not percept the World changes.

The vision in this project is of a private investment having as background the creation of a market for "higher efficiency saving resources equipment" supported by a CERTIFICATE. Read in Ref. [1] the draft of an international technical standard. This "Certificate" is an action to signalize that higher efficiency via a lower kg/MVA is good for the environment. The idea involves implementing a marketing strategy to convince the big public that manufacturing products with lower kG/MVA and $/MVA is good and improve the company's environmental image.

Big buyers that need to take care of the environmental image, will prefer to buy products with lower values. The first ones which obtain the Certificate can do campaigns to disclose who buys and who does not buy more efficient products. Declarations about the relevancy of kg/MVA in product standards of entities really committed to the environmental issue, would accelerate the process.

The envisaged step to follow is to implement the Demo Project 2 (Small lab) in three regions like South America (possibly Brazil), Africa and Asia (possibly in Malaysia ou Singapore or Thailand).

The idea is to implement the construction of a small - medium-sized 3rd part laboratory. In addition to the conventional testing services the R&D team will provide support to manufacturers of equipment for substations and lines. It is expected that a well-dimensioned laboratory, managed from the perspective of private companies, will immediately get a big market. The reasons are: (a) there is low availability of labs (b) it create conditions for a new attractive market and growth of the electric industry (c) the growth of the renewable energy market (d) big buyers as the sponsors, needing to take care of the environmental image, will prefer to buy products with lower kg/MVA

4. WHAT and HOW TO DO IT?

The construction of a 3rd part laboratory goes beyond test services, providing support to manufacturers for development of power products. The team and installations will be dimensioned to be a self-sustaining enterprise with the sale of testing services and R&D services. The key for the success is to help the power industry to develop or improve products.

Most of the existing labs I know, all over the world, still have an extremely conservative view that "everything should be tested" and furthermore, that a third-party lab should not act to help manufacturers to develop products because would be conflicting with the interest of "doing neutral tests". The world has changed and doesn't care about this.

The important new is the use of low-cost testing simulations to develop products. The big world-wide manufacturers use them intensively. However, the others, which would be the big beneficiaries – rarely know they exist. There are recent CIGRE brochures demonstrating applications and validations like CIGRE 602 (Internal Arc), 740 (Low-Cost Substations) and 830 (Temperature Rise). In IEC the openings for testing simulations were finally created as in IEC TR 62271-307. I am co-author of these Cigrè and IEC documents and participated of the WGs. The main big manufacturers were there working actively.

Nowadays, almost always, manufacturers go to testing labs to have a test report in hand to show to product buyers. What matters is having the lowest expenses and passing in the tests. The concept with our idea is to make the developments using design experience and test simulations and go to the labs only in the final stage of development, to carry out the type tests. More than this, the objective is also to develop higher efficiency + less materials products.

5. "TESTING LABORATORY + R&D SERVICES" IMPLEMENTATION

The idea is implementing a commercial venture with an acceptable return on investment for investors. In the feasibility study we considered that the return on investment involve revenues from the sale of tests, patents, and other R&D consequences as improvement of system quality indexes. The enterprise will have two lines of action:

- A small - medium sized laboratory to carry out the high - power tests and,
- A parallel activity of "Support for development of equipment for substations" with worldwide operations, including lower-cost solutions to amplify the use of renewable energy. This market is not still explored and may bring incomes even higher than the tests sales.

Direct business revenue will come from

- conducting conventional tests like in the list to follow,
- to provide, to manufacturers, technical support for the development of more efficient products,
- testing simulations and training to reduce development costs and
- neutral lectures, on behalf of manufacturers, on products and technical standards that - clearly - help to improve energy efficiency.

The "Testing Laboratory" will allow remote viewing (as F.A.T.). The main tests to be performed will be:

- Tests of medium voltage, low voltage equipment and even some up to class 550 kV.
- Tests of short time current withstand and crest (short-circuit) up to 200 kArms - 1s
- Temperature rises to 20,000 A permanent.
- Low voltage internal arc (and some for MV)
- Dielectric tests up to medium voltage equipment.

For companies that show interest in the idea we can provide information and expertise like:

- Economic technical feasibility studies and business plan
- Detailed market study
- Estimated implementation costs and future revenues
- Team size (less than 25-30 people)

CV of the author https://www.cognitor.com.br/Curriculum.html

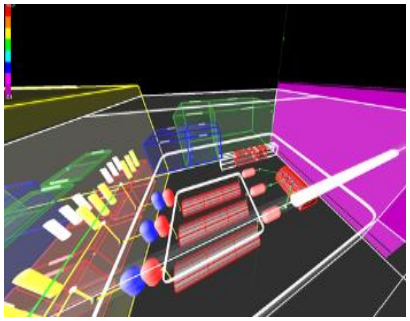
REFERENCES:

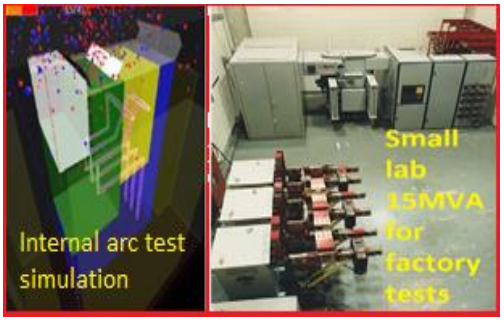
[1] Demo 1 project: Environmental efficiency certificate of electrical products (kG/MVA): technical standard & demo projects management) http://www.cognitor.com.br/demo1certificate.pdf

[2] Lower kg/MVA: http://www.cognitor.com.br/EnvironmentalEfficiencyCertificate.pdf

[3] Improvement of quality of electric system indexes: https://www.cognitor.com.br/IEC602822sugestionstosc32afrombrazil.pdf

[4]Project Save Rio in 10 years : https://www.cognitor.com.br/saverioENG.pdf





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