TRAINING on LV / MV Switchgear Design & Tests (IEC 61439 & IEC 62271)

Creating impactful innovations with SwitchgearDesign

Learn how to design electric panels / switchgear to be approved in the tests
(internal arc, temperature rise, short circuit strength, seismic & dielectrics)

http://www.cognitor.com.br/trainingENG.pdf (English)   http://www.cognitor.com.br/trainingPOR.pdf (Portuguese) ** November,6- 2025

Training program: switchgear and other substations equipment

Main

1. • DEFINITIONS for design, testing & technical standards
2. • TEMPERATURE RISE – Design & Tests. IEC61439 + IEC 62271 + IEC60943 + IEC60890
3. • ELECTRODYNAMIC FORCES of short circuit: IEC 61117, IEC TR 60865.)
4. • INTERNAL ARC TESTS - IEC 62271-200 /IEC 62271-307 (MV), IEC TR 61641 (L.V.)
   • USE OF SWITCHGEARDESIGN SOFTWARE

Complementary

5. • Studies to define currents and voltages (normal/ abnormal conditions)
   • Overvoltages and Insulation Coordination (dielectric tests)
6. • Technical Specifications, Tests and BIDs required by users and buyers.
7. • Low voltage switchgear - Technical standards (IEC 61439 , IEC TR 61641)
   • High voltage switchgear (IEC 62271-1 and 200, IEC 62271-307 (saving tests)
   • Magnetic and Electric Fields and their Effects (concepts and mapping)

SEISMIC TESTS in SWITCHGEAR
www.cognitor.com.br
Read article by Sergio Feitoza about principles and technical standards

Linkedin post – **84.000+ views**
Click the link here (MOVIE)
https://www.linkedin.com/posts/sergiofeitozacosta_iec62271-iec61439-designreview-activity-7050949746093375488-fXg-7utm_source=share&utm_medium=member_desktop

LinkedIn post **18.000+ views**
Click link here (MOVIE)
https://www.linkedin.com/posts/sergiofeitozacosta_internalarc-iec62271-iec61641-activity-7049709470930616320-9mDI?utm_source=share&utm_medium=member_desktop

LinkedIn post **29.000+ views**
Click link here (MOVIE)
https://www.linkedin.com/posts/sergiofeitozacosta_internalarc-iec62271-iec61641-activity-7049011517358247936-fUNj?utm_source=share&utm_medium=member_deskto
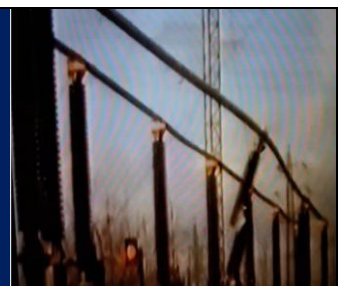
Short circuit forces
LinkedIn post **3.000+ views**
Click link here (MOVIE)
https://www.linkedin.com/posts/sergiofeitozacosta_cognitor-training-r-7048632545990615040-sttX7utm_source=share&utm_medium=memb

Brazil- South America
Cigre Workspot 2018 Foz do Iguaçu
Training in Manilla - Asia – Cigrè events

SwitchgearDesign Web Training
www.cognitor.com.br by Sergio Feitoza Costa
sergiofeitozacosta@gmail.com
Consultancy work for equipment design & tests

Angola
Cambambe power plant
The best in the market invest in training.
Training in Angola Africa - Cambambe hidro-power plant

Sergio Feitoza applying a training in China and U.K.
Trainings in China, North America, Europe, Mena & more

ARTCCLE: METAL FOAM IN SWITCHGEAR: Why I didn't think of this before other panel manufacturers ?
Article: https://lnkd.in/dDDyK-j4
METAL FOAM in SWITCHGEAR, switchboards & bus ducts:
Why didn't I think of this ... before other panel manufacturers?
Patent by Sergio – Metal Foam in switchgear – Linkedin post

Trainings in Colombia, Argentina, Guatemala
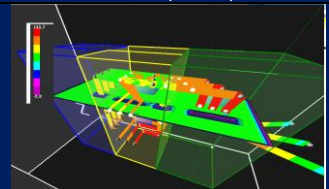
Author of SwitchgeaDesign

Temperature rise & Design of High Power Testing laboratories

Index

1. How to get a more competitive & lower cost design by predicting test results with SwitchgearDesign?
2. Training lecturer
3. About testing simulations to avoid expensive development tests.
4. Training program

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1. GET MORE COMPETITIVE & LOWER COST DESIGN, BY PREDICTING TEST RESULTS with   SwitchgearDesign

In the trainings and consultancy work, I give to switchgear manufacturers and certifiers, all over the world, I hear, from designers, good ideas, innovations, and design improvements that are easy to implement, but have never been tried just because some laboratory tests would be necessary.

Tests in labs are expensive because testing labs are expensive installations. More than this, nowadays few manufacturers have at least a small laboratory in the factory to do fast verifications. However, this is no longer a problem because software tools such as SwitchgearDesign exists, are easy to obtain, are validated, and need 2 to 3 days of learning time from an average designer.
The cost to implement a training and tool is like the cost of 1 day of use of high-power testing lab. The user will save many-many expenses with testing labs for the rest of life.

A tool like SwitchgearDesign enables simulating the most expensive tests, giving the same results as laboratory tests. Along the last 15 years, investments in training made by manufacturers and large users of electrical products have dropped to unbelievable levels. That's why many companies don't even know that testing simulation tools exist.

SwitchgearDesign is easy to use and, for example replace in much higher level, those old tables used for busbars dimensioning, found in engineering manuals. Those tables are useful only to get an initial order of magnitude of the busbars to use. As these tables do not consider the main hotspot resistances like circuit breakers, fuses and switches they are a source of errors of over dimensioning or under dimensioning. The few companies that generate innovations and patents are exactly the ones that invest some resources in training.

> This training and software are designed to enable designers and product developers, in approximately 15 to 20 hours, to master the essential engineering concepts required to design a switchgear panel that passes major certification tests, without oversizing and with the minimum use of materials.
>
> This means a commercially more competitive lower cost product.
>
> We cover from low to high voltage power equipment used in substations and industries in general. Out training starts with this text so read it with attention. The training program is detailed in Section 4 below.

2. TRAINING LECTURER

Sergio Feitoza Costa (me) is the author of the tool SwitchgearDesign. Sergio worked for 25 years designing, operating, and coordinating the CEPEL's Brazilian testing laboratories (High Power, High Voltage, EMC, Ex & others). He is co-author of IEC TR62271-307 and IEC 60282-2. In the late 1980s, was Chair of the IEC Technical Committee 32 (Fuses). He is also co-author of the brochure CIGRE 602/2014-Simulation of Internal Arc Effects and the document "Proposal of IEC Guidelines for the Use of Simulations and Calculations to Replace Testing in IEC Standards", referred to in this brochure. Is also coauthor of the brochures Cigrè 740 (2018) Solutions for low-cost substations and Cigrè 830 (2021) Simulations for calculating temperature rise. Recently registered a patent for the use of metallic foams in switchgear, switchboards, and busbar systems. Please check the details in the links.

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- THINGS I HELPED TO DO: https://www.cognitor.com.br/HelpedToDo.pdf
- CV: http://www.cognitor.com.br/Curriculum.html
- Downloads area on the website (free articles and books)   https://www.cognitor.com.br/Downloads1.html

3. **ABOUT TESTING SIMULATIONS TO AVOID EXPENSIVE DEVELOPMENT TESTS.** The power of A.I. to collaborate in the design of innovations.

A medium (MV) or low voltage (LV) panel column costs something like $20,000 to $45,000 US dollars. A single day of high-power testing in a laboratory costs 2000 to 6000 US dollars, not including transport to the lab and cost of the prototype. To succeed in this competitive field, it is necessary to invest in training and tools. You need to know, at least, the main design concepts for *temperature rise aspects, internal arc a, short circuit forces, dielectric aspects and even things like seismic tests.*

The 3 most expensive requirements in the design of LV and MV switchgear like cubicles, panels and busducts are:

• **the temperatures** which shall not be over passed during normal operation to avoid premature ageing,
• The supportability to the **overpressures caused by internal arcs** with risks to persons and installations.
• The supportability to the **forces on insulators and conductors** produced by short circuit currents.

The designer goal is to find the optimum point considering the objectives to reach (cheaper, safer, specific requirements of buyer etc...). To do it with real tests is very expensive but, to do it with the software SwitchgearDesign, is a question of few hours, for trained designers.

To find the optimal design, several technical and economic variables shall be considered. When manufacturers develop a product, they know that, at least at the end of the process, they will need to do onerous high-power tests at a testing laboratory. Manufacturers frequently oversize the design to avoid the risk of failures in the tests. This can be easily avoided with SwitchgearDesign.

Laboratory type testing, as specified in product standards, is the traditional way to verify if a certain product attends the technical standards specifications. IEC and IEEE standards ignore that it is necessary to save the planet's resources. They do not include any advantage to products that use less materials . Unfortunately, from the point of view of these standards, in switchgear manufacturing, two panels with the same voltage, rated current, and short-circuit ratings have the same importance, even if one uses 80 kg of materials and another uses 300 kg — as long as both pass the required tests.

Here is a fantastic opportunity for small and medium-size manufacturers. You manufacture a more efficient and lower costa product and do marketing to make the big buyers know this. Testing simulation techniques can predict results of main type tests and enable us to obtain more complete information than the information obtained in a real laboratory test.

Simulations are used in situations like:
- to avoid switchgear tests in equipment with characteristics near to another one already tested (IEC62271-307 and partially in IEC61439)
- to extrapolate the results of an already done
- laboratory test to others, with similarities, untested equipment.

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- To avoid duplication of testing on product certification processes when small changes are made to an already certified product.
- To replace SF6 with air in internal arc tests.
- To convert projects that use copper bars to use aluminum bars.
- To convince (skilled) clients that some specific tests – in some situations- can be replaced by testing simulations.

The idea is, at first, to type the main design data like geometries, currents, voltages, ventilation, materials, busbar covering, etc…(INPUT DATA SCREEN) .

After you click a button to see the results and to compare the technical standards limits (RESULTS SCREEN).

If the results indicate that you will not pass the test you change the input data and recalculate in minutes. Easy like this . Check the final part of this video to understand   https://youtu.be/3expB4wHiCM

TYPES OF TESTS FOR WHICH RESULTS CAN BE SIMULATED / PREDICTED:

The user can simulate the tests and adjust the design, reducing the probability of not passing to almost zero:

- Short-time and crest withstand currents test, the short-circuit electrodynamic and thermal stresses in insulators and conductors are calculated by comparing them with the limits of materials and insulators. presented in IEC TR61117
- Temperature rise test. The rises of the conductive and insulating parts are calculated and will be compared to the maximum limits allowed in table 12 of IEC 62271-1 and Table 6 of IEC61439-1
- Internal Arc Test: Calculate overpressures and other arc effects and compare against the acceptable limits for the maximum overpressure peak and integral of the curve of overpressure x time.
- Mapping of electric and magnetic fields inside equipment and in complete substations.

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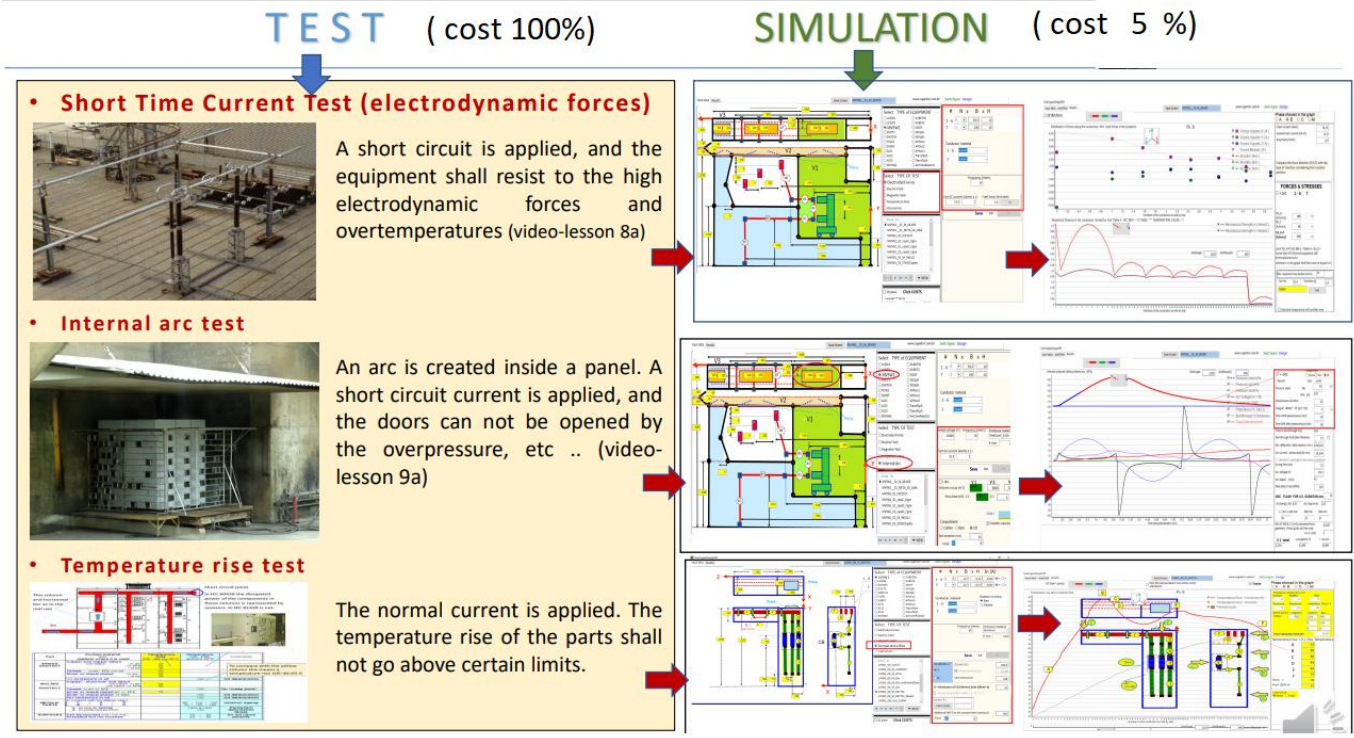
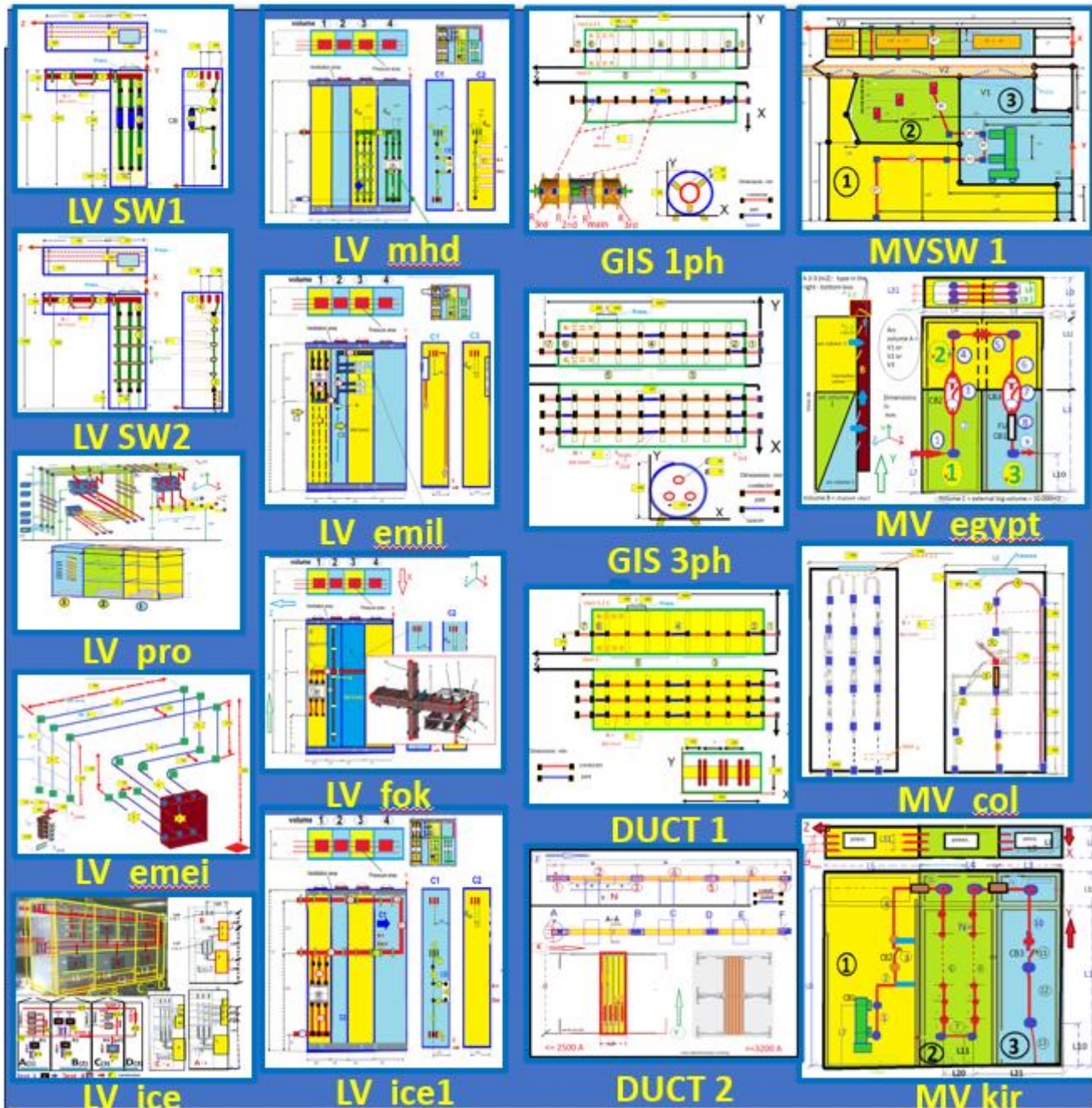TYPES OF EQUIPMENT THAT CAN BE SIMULATED   (this figure may not be updated):

The types are shown in Figure 1. In Figure 2 there is an input data screen for one of them (ACI2). The names in the central part of the screen are:

• LVSW_1 and LVSW2 -: Low voltage panel with circuit breaker, switches, and drawer compartments
• MVSW_1; Medium Voltage Panel - AIS
• DUCT_1: GIS_1ph, GIS_3ph - Ducts
• SubstISI, Subst_2 – Substation Arrangements (under request only)

 Figure 1 (not updated because some types are removed from time to time due to small use)

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LV SW1

LV mhd

GIS 1ph

MVSW 1

LV SW2

GIS 3ph

MV egypt

LV pro

LV fok

DUCT 1

MV col

LV emei

LV ice1

DUCT 2

MV kir

LV ice

LV emil

A frequent question is "What to do if my equipment does not fit these pictures well?".

The figures have evolved over 15+ years to cover the cases most needed by more than a hundred of our clients. Having been trained in the engineering concepts, it is possible to fit your situation into one of these figures.

If necessary, for a specific reason, Sergio Feitoza Costa can create a new custom model, – provided that – the customer already has a report of temperature rise tests usable to validate the model.

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The result of the simulations shall be close to the real test, and it is only possible to confirm this by comparing - once - the result of a real test with a simulation. The creation of a new model takes 15 to 30 working days and is not covered by the price of the training.

Figure 2 next page

SwitchgearDesign was developed by Sergio Feitoza, a high-power testing lab expert.

sergiofeitozacosta@gmail.com   www.cognitor.com.br
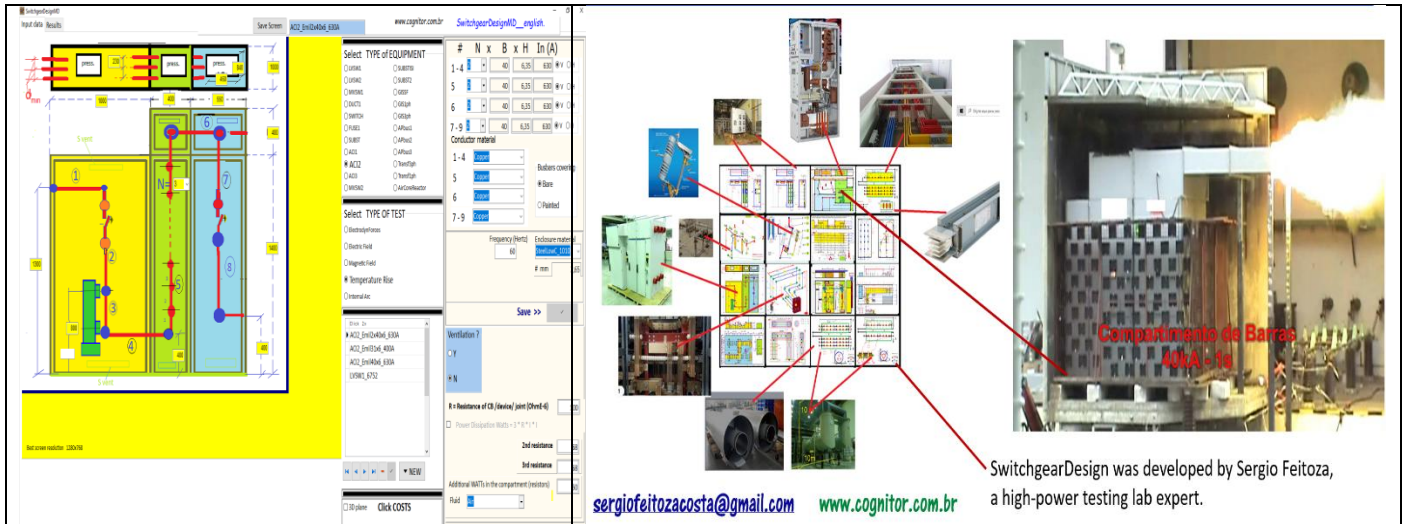
In the free videos "Training for SwitchgearDesign" (link below) you may see the main screens, applications, input and output results and other information. The software requires reduced study and training time. Just for information, at this link https://www.cognitor.com.br/proposal.pdf you find a typical description of consultancy services which comprise 2 products. The first is a "Design Review" of one of your equipment projects. The 2nd one is this training including a copy of SwitchgearDesign. Our experience showed us that this is the faster way of learning.

Easy to do the calculations and to analyze the results.

There are only two screens. In the first one, you type the INPUT DATA of the project. Right after, click on the RESULTS tab and a new screen will open, showing the RESULTS to know whether the equipment will perform well in the real test.
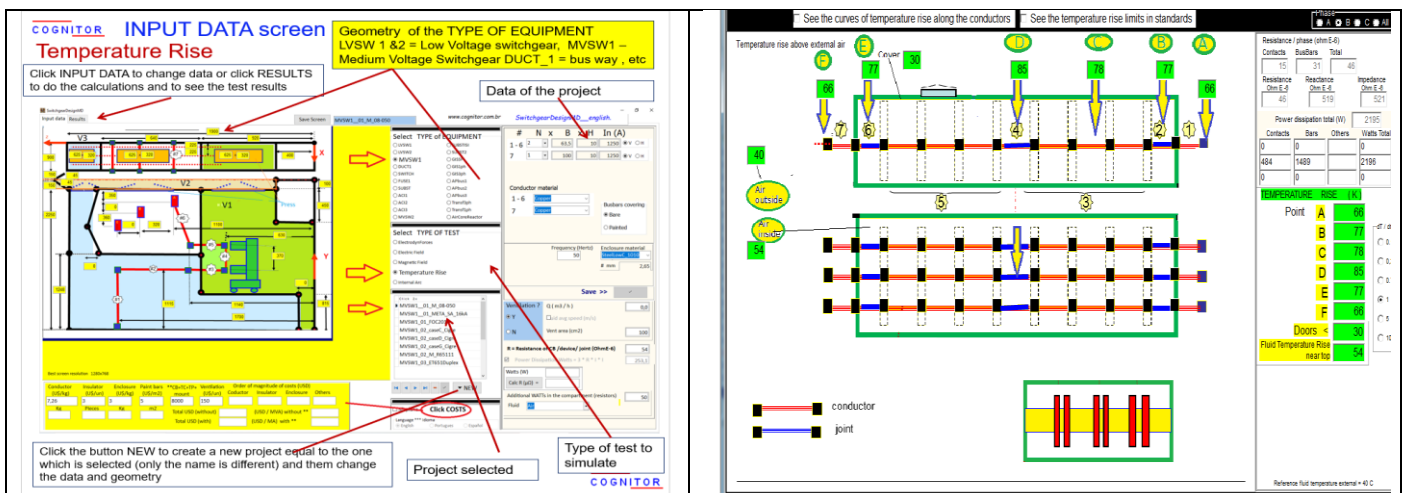
COGNITOR– – Design of testing laboratories and substation equipment.

Phone. 55-21-988874600   . SKIPE: sergiofeitoza1   E-mail sergiofeitozacosta@gmail.com ** Site http://www.cognitor.com.br

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The designer's experience allows us to know if a result calculated with so many input variables is reasonably correct. SwitchgearDesign is not a tool to make it easy for the user not to think. If you enter the correct data, you can analyze and improve a project in minutes. Check some of the screens in these links

- http://www.cognitor.com.br/switchgeardesignscreens.pdf
- https://www.cognitor.com.br/TR_150_ENG_ValidationSwitchgearDesignSWD.pdf

4. TRAINING PROGRAM   (main training + additional)

The idea is that you learn or review the concepts behind each of the high power / high voltage tests and specifications of the technical standards. Knowing these concepts means to be well above the average designers knowledge. Learning this, your mind will be more open for challenging tasks like developing innovations and new solutions. An important point is that you may choose the points which will be given more emphasis and points that are not of your immediate interest. In the "standard" training the focus is on which we call "main training" below. If the participant sends questions in advance, the time use is much better. **The training includes:**

(a) if presential, 2 days composed of 4 sessions of 3.5 hours with Sergio Feitoza presenting
(b) access to videos with durations from 20 to 50 minutes and
(c) receiving the installer of the "computer version" of the SwitchgearDesign software.

Table 1 –MAIN TRAINING

	VIDEO	PDF
(Video 3)	**Introduction of training (public)** Complete video: https://youtu.be/3expB4wHiCM Reduced 5 min video https://youtu.be/qPSRTf1bCus	----
(Video 7)	**TEMPERATURE RISE – Design concepts and tests. (IEC61439 + IEC 62271)** Complete video (private) : ▮▮▮▮▮▮▮▮▮▮ Reduced 5 min.s free video https://youtu.be/R28GXw1V9ZY	(private) ▮▮▮▮▮▮▮▮▮▮
(video 8)	**SHORT CIRCUIT ELECTRODYNAMIC FORCES: Concepts, IEC 61117, IEC TR 60865.** Complete version (private) : ▮▮▮▮▮▮▮▮ Reduced video https://youtu.be/CRPopRlyjPc PDF (private) : ▮▮▮▮▮▮▮▮	
(video 9)	**INTERNAL ARC TESTS -** Concepts, IEC 62271-200 e 307 (medium voltage), IEC TR 61641 (low voltage). Some (free) minutes of the complete video https://youtu.be/mTpPBkCBAQ8	

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	Complete version (private) ██████████████████ :	
	PDF (private) : ████████████████████	

COMPLEMENTARY TRAINING

The "Main Training" covers the most direct points of interest for using SwitchgearDesign software (temperature rise, internal arc, and short circuit forces tests).For those who need a more complete training information there is an additional set of contents available. It is covered by the lecturer if previously asked by the company. In any case the material is available for the participant to study alone. If the participant wants to clarify doubts about these additional topics, write and send doubts in advance. In this case the lecturer will cover the requested points within the duration of the main training.

Table 2 – Complementary training i

	Participant watches this video
(videos 5 and 6)	Video 5 – Specification of Currents and Voltages in New Substations. Video ███████████████ PDF (private) : ████████████████ Video 6 - Overvoltages and Insulation Coordination Video ████████████████ PDF (private) : ████████████████
(videos 10 and 11)	Video 10 - Magnetic and Electric Fields and Their Effects (Concepts and Mapping) Video ██████████████ PDF (private) : ████████████████ Video 11 - Technical Specifications and Tests ("Bids" of Circuit Breakers, Disconnectors, Arresters). Video ████████████████ PDF (private) : ████████████████
(videos 12, 13 and 14)	Video 12 - IEC STANDARDS for Low Voltage Switchgear (IEC 61439 and IEC TR 61641) Video ████████████████ PDF (private) : ████████████████

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	Video 13 – IEC STANDARDS for medium voltage switchgear (IEC 62271-200) and IEC 62271-307
	Video ███████████████████████
	PDF (private) : ███████████████████
	Video 14 - IEC 890 and IEC 62208: ENCLOSURE FOR PANELS
	Video ████████████████████
	PDF (private) : ██████████████████

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5.   COMMON DOUBTS FOR SWITCHGEARDESIGN BEGINNERS.

QUESTION 1) WHAT TO DO IF THE SOFTWARE FIGURES ARE NOT EXACTLY SAME AS YOUR EQUIPMENT

The software has geometric arrangements of some types of equipment that are most frequently used. In the following example, a user mentioned that the figure does not adequately represent the circuit breakers they use.

7. Software	8. Real design
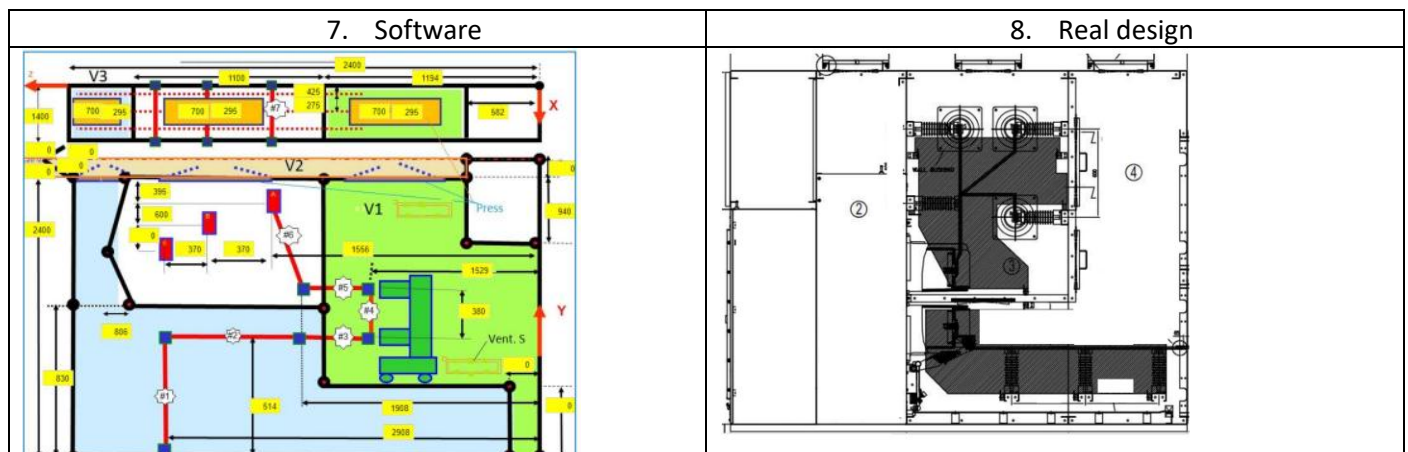
ANSWER 1) In the last 15 years, I have created around 50 different models of panels and busbars, for dozens of clients. After simulations followed by real tests, I learned that several design factors I considered in these many models had little impact on the results. I've learned from use that the fewer dimensions we put into the model, the easier it is to identify the importance of what really matters. This led to simplifications of the figures below to show just what is influencing the results. The results are very close to real tests. They are around 20 models as presented above.

In the case above, from the figure shown by the user, using the dimensions of the MVSW1 model, the simulation can be done properly. In the free web version, there are only the most frequent models, including this one.

QUESTION 2) HOW TO ENTER THE BUS PHASING INTO THE SOFTWARE?
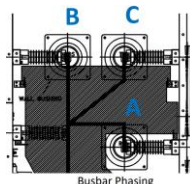
ANSWER 2)
Place a focus - only - to put phase B (center) in the correct position among the 3 alternatives. For the calculations done here, it's okay if you change from A to C or C to A

QUESTION 3) THE BUS END OF OUR MEDIUM VOLTAGE PANEL EXTENDS 2 METERS OUTSIDE THE PANEL CABINET AND IS SHORT. HOW TO CONSIDER IT?

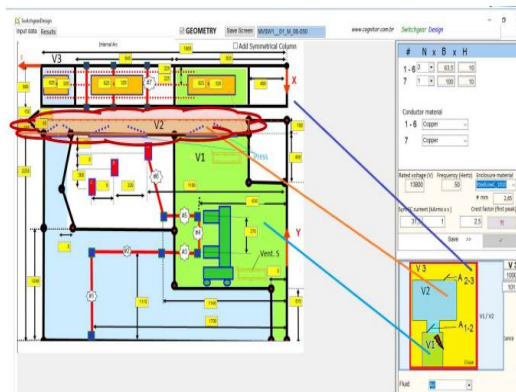**Creating impactful innovations with SwitchgearDesign**

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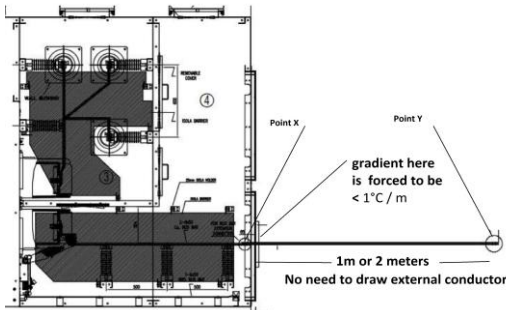
ANSWER 3) This comment is valid for temperature rise tests and is not relevant for others. The reason for the 2 meters outside is to ensure that heat is not injected or removed from the equipment under test. The rule in the technical standard is that the difference between the internal (initial) point and the external point at 1 or 2 meters must not be greater than 1 °C. Instead of drawing an external conductor, we simply insert the boundary condition into the equation that the temperature gradient over the distance is less than 1 °C / m

QUESTION 4) IN FIGURE, ARE THE LINE AND LOAD SIDES OF THE CIRCUIT BREAKER SHORT-CIRCUITED?

ANSWER 4) The representation only serves to give an idea of the current path, in the case of calculating electrodynamic forces. If it increases or decreases, say, about 100 mm the impact is very low in forces. Enter the approximate distances assuming current flows inside (and not across) the circuit breaker. Incidentally, there may also be a fuse or a switch in this position. Related to temperature rise tests, the software calculates the total Watts dissipated in conductors, connections, and contacts. The main impact factor of the project is the "resistance seen from the terminals" by phase, the size of the ventilation openings (net area knocking down barriers), bare or painted bars and fans, if any.

QUESTION 5) ONLY THE "BARE" AND" PAINTED" OPTIONS ARE AVAILABLE FOR BUS COVERING. HOW TO CONSIDER MEDIUM VOLTAGE BUS THERMOPLASTIC INSULATION.

ANSWER 5) : Use the "PAINTED" option

QUESTION 6) HOW TO ENTER THE ENCLOSURE THICKNESS? OUR PANEL HAS VARIOUS VALUES. CABINET BODY - 2.3 MM BACK COVER - 3.0 MM BACK COVER 1.6 MM PRESSURE RELIEF COVER
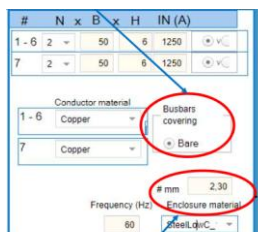
ANSWER 6) The only reason to include the plate thickness in the input data is for some calculations related to the supportability of the plates for overpressures. These calculations are complex to explain here. The concept is that when overpressure occurs, if you exceed a certain mechanical stress limit, you get a permanent deformation that cannot exceed a certain value, for example 100 mm. Therefore, forget about the thickness of the depressurization plates and ONLY consider the minimum thickness value of the main doors and walls. In the case above I would use the value of the casing body (2.3mm). Also read the answer to question 7

QUESTION 7) DISTANCE FROM WHICH SCREWS? THE BACK COVER? SIDE COVER SCREWS ?.

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ANSWER 7) The distance between screws is intended to estimate the supportability of the plates for overpressures. If the space between screws is large, it allows gases to escape (test failed). An approximate value for "side cover screws" on air insulated panels (MVSW1) is 20 cm. The most reliable parameter to consider is the overpressure peak. The second is the integral of the overpressure curve over time. When we wrote the brochure CIGRE 602/2014 - Simulation of Internal Arc Effects in Switchgear T&D (I am a co-author) I proposed to include my values but the WG understood that they weren't mature enough. Read the "Proposed IEC Guidelines for the Use of Simulations and Calculations to Replace some Tests Specified in International Standards" at https://www.cognitor.com.br/Downloads1.html

QUESTION 8). ABOUT INTERNAL ARC. THE PANEL DOES NOT HAVE VOLUME 2. ENTERING THE VALUE 0 IN V2 WILL RESULT IN AN ERROR MESSAGE IN THE SOFTWARE. WHY ?

ANSWER 8) As I explain in detail in training, whenever you wish, use only volumes 1 and 2.
Put a large value on volume 2 (the free space) such as 10,000m3. On volume 3 repeat the same value as volume 2. Thus, volume 3 will be like an extension of volume 2

QUESTION 9). DISTANCE FROM THE PHASE OF THE BUS NEAREST TO THE TOP COVER (PHASE B AND C).
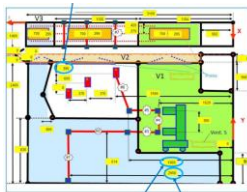
ANSWER 9) With the 3 vertical dimensions and the 3 horizontal dimensions, you can make many combinations. As explained in question 2, fix the first phase B (middle) and choose any name for A and C. Using the figure, do your best to represent your panel.

 In these more than 15 years using these models, I haven't identified any problems with this. If your design experience says something is wrong, try another approach. The designer's experience is more important than any software.

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6. **SOFTWARE INSTALLATION INSTRUCTIONS (VERSION "DESKTOP")**

Step 0) Download the SwitchgearDesign installer in the link informed by Cognitor.

Step 1) Before installing the "desktop" version of SwitchgearDesign you must have the MySQL database manager on your computer. If you don't have MySql you can download the free version of "MYSQL COMMUNITY" which is on the following link.

If the computer you are using already has MySql, this installation will not be necessary. The database will keep current data and future data that may be included by the user.
Link to download the free version of MySql Community: https://dev.mysql.com/downloads/

If installing MySQL for the first time use the following settings if prompted at installation
Host >>>> 127.0.0.1
User >>>>   root
Password >>>>   AVPsfc39ab7sfcA

STEP 1: Install MySQL

This is the only part that might be more difficult. **If you have any trouble, talk to the IT support staff. It's an operation that must be done step by step without skipping any stages**.

☐ Search for "MySQL" in your internet browser:

☐ Click on Download:

MySQL
MySQL Cluster enables users to meet the database challenges of next generation web, cloud, and communications services with uncompromising scalability, uptime ...

| Resultados de mysql.com | 🔍 |

Downloads
MySQL Documentation - Database - MySQL Installer 8.0.36 - 中文

✓   Move the bar and "Click on the MySQL Community (GPL) link":

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MySQL Enterprise Edition

MySQL Enterprise Edition includes the most comprehens

Learn More »
Customer Download from My Oracle Support (MOS) »
Trial Download from Oracle edelivery »
Developer Download from Oracle OTN »

MySQL NDB Cluster CGE

MySQL NDB Cluster is a real-time open source transactic

- MySQL NDB Cluster
- MySQL NDB Cluster Manager
- Plus, everything in MySQL Enterprise Edition

Learn More »
Customer Download from My Oracle Support (MOS) »
Trial Download from Oracle edelivery »

MySQL Community (GPL) Downloads »

✓ Click in the link "MySQL installer for Windows":

⊕ **MySQL Community Downloads**

- MySQL Yum Repository
- MySQL APT Repository
- MySQL SUSE Repository

- MySQL Community Server
- MySQL NDB Cluster
- MySQL Router
- MySQL Shell
- MySQL Operator
- MySQL NDB Operator
- MySQL Workbench

- MySQL Installer for Windows

- C API (libmysqlclient)
- Connector/C++
- Connector/J
- Connector/NET
- Connector/Node.js
- Connector/ODBC
- Connector/Python
- MySQL Native Driver for PHP

- MySQL Benchmark Tool
- Time zone description tables
- Download Archives

✓ Download the MSI Installer (285.3M):

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✓ Click in "No thanks, just start my download".

☐ After downloading, run the program:

☐ On the first screen, select "Full" and click Next:

✓

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✓
✓ In "Paths Conflicts" Click **Next:**
✓ In "Check Requirements" Click **Execute** then Next:

✓ ☐

	For Product	Requirement	Status
✓	MySQL Server 8.0.36	Microsoft Visual C++ 2019 Redistrib...	INSTL DONE
✓	MySQL Workbench 8.0.36	Microsoft Visual C++ 2019 Redistrib...	INSTL DONE
✓	MySQL Shell 8.0.36	Microsoft Visual C++ 2019 Redistrib...	INSTL DONE
✓	MySQL Router 8.0.36	Microsoft Visual C++ 2019 Redistrib...	INSTL DONE

✓ In "Installation" Click *Execute and Next:*

	Product	Arch	Status
✓	MySQL Server 8.0.36	X64	Complete
✓	MySQL Workbench 8.0.36	X64	Complete
✓	MySQL Shell 8.0.36	X64	Complete
✓	MySQL Router 8.0.36	X64	Complete
✓	MySQL Documentation 8.0.36	X86	Complete
✓	Samples and Examples 8.0.36	X86	Complete

✓ In "Product Configuration" Click *Next:*

STEP 2: Configure the MySQL server

✓ In the first screen select "Development Computer" Click *Next:*

MySQL. Installer
MySQL Server 8.0.36

Type and Networking
Authentication Method
Accounts and Roles
Windows Service
Server File Permissions
Apply Configuration

Type and Networking

Server Configuration Type

Choose the correct server configuration type for this MySQL Server installation. This setting will define how much system resources are assigned to the MySQL Server instance.

Config Type: Development Computer

Connectivity

Use the following controls to select how you would like to connect to this server.

☑ TCP/IP   Port: 3306   X Protocol Port: 33060
  ☑ Open Windows Firewall ports for network access
☐ Named Pipe   Pipe Name: MYSQL
☐ Shared Memory   Memory Name: MYSQL

Advanced Configuration

Select the check box below to get additional configuration pages where you can set advanced and logging options for this server instance.
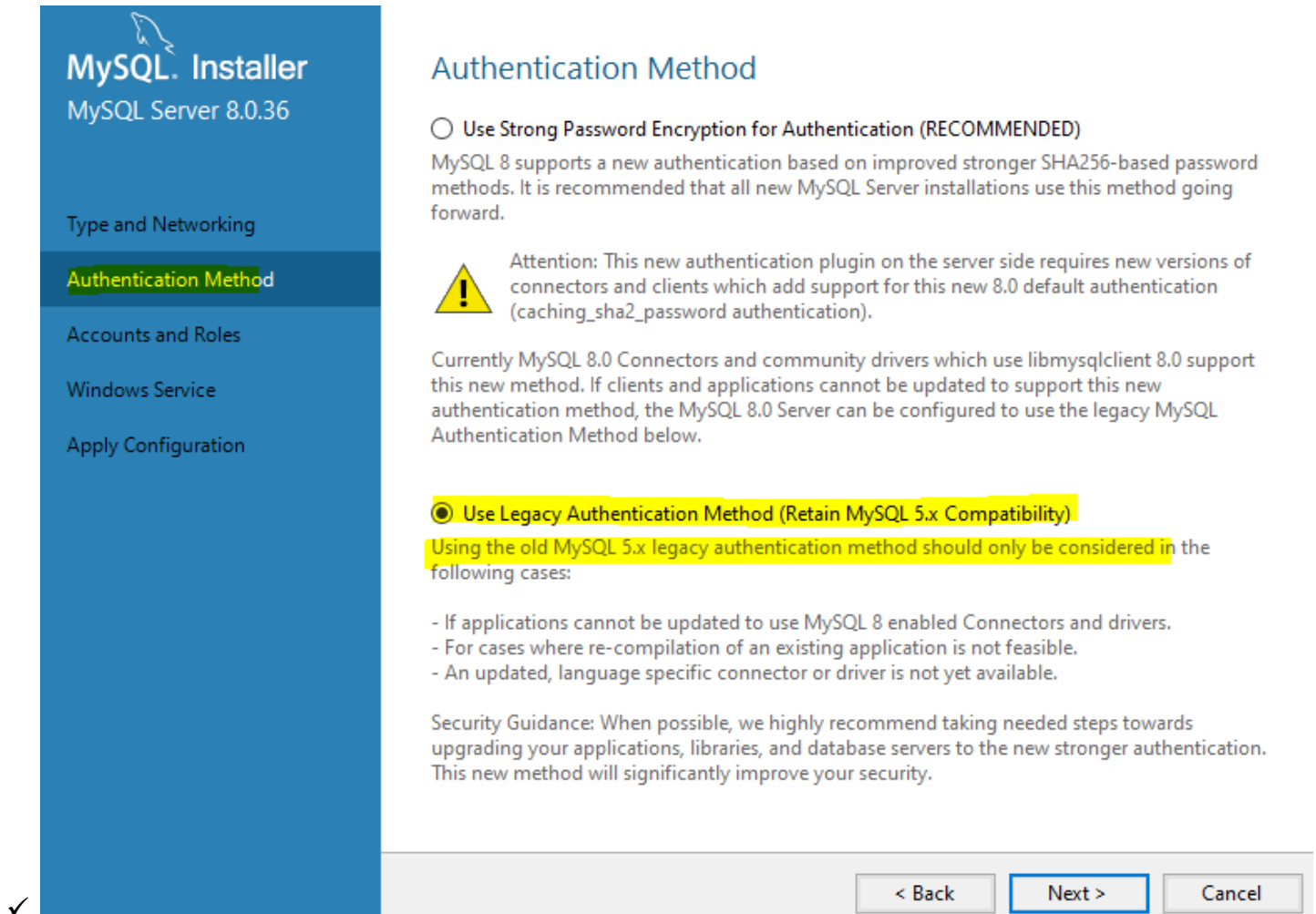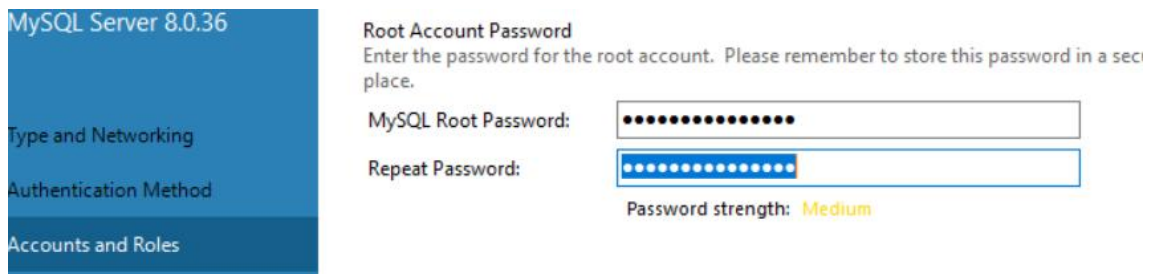
☐ Show Advanced and Logging Options

✓ In **"Authentication Method"** select **"Use Legacy Authentication Method"**

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✓ In "Accounts and Roles" type the password (**AVPsfc39ab7sfcA**   ):

In the same screen Click in "**Add User" . Insert again the password** (**AVPsfc39ab7sfcA**   ) and set the name of a "Username" . Here is an example.

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Please specify the user name, password, and database role.

User Name:	Samsung
Host:	<All Hosts (%)>
Role:	DB Admin
Authentication:	⦿ MySQL

MySQL user credentials

Password:	••••••••••••••
Confirm Password:	••••••••••••••
Password strength:	Medium

- ✓ In the "Windows Service" Click in **Next:**
- ✓ In "Service File Permissions" Click in **Next:**
- ✓ In "Apply Configuration" Click in **Execute** and after Click **Finish**
- ✓

Type and Networking	✓ Writing configuration file
Authentication Method	✓ Updating Windows Firewall rules
Accounts and Roles	✓ Adjusting Windows service
Windows Service	✓ Initializing database (may take a long time)
Server File Permissions	✓ Updating permissions for the data folder and related server files
Apply Configuration	✓ Starting the server
	✓ Applying security settings
	✓ Creating user accounts
	✓ Updating the Start menu link
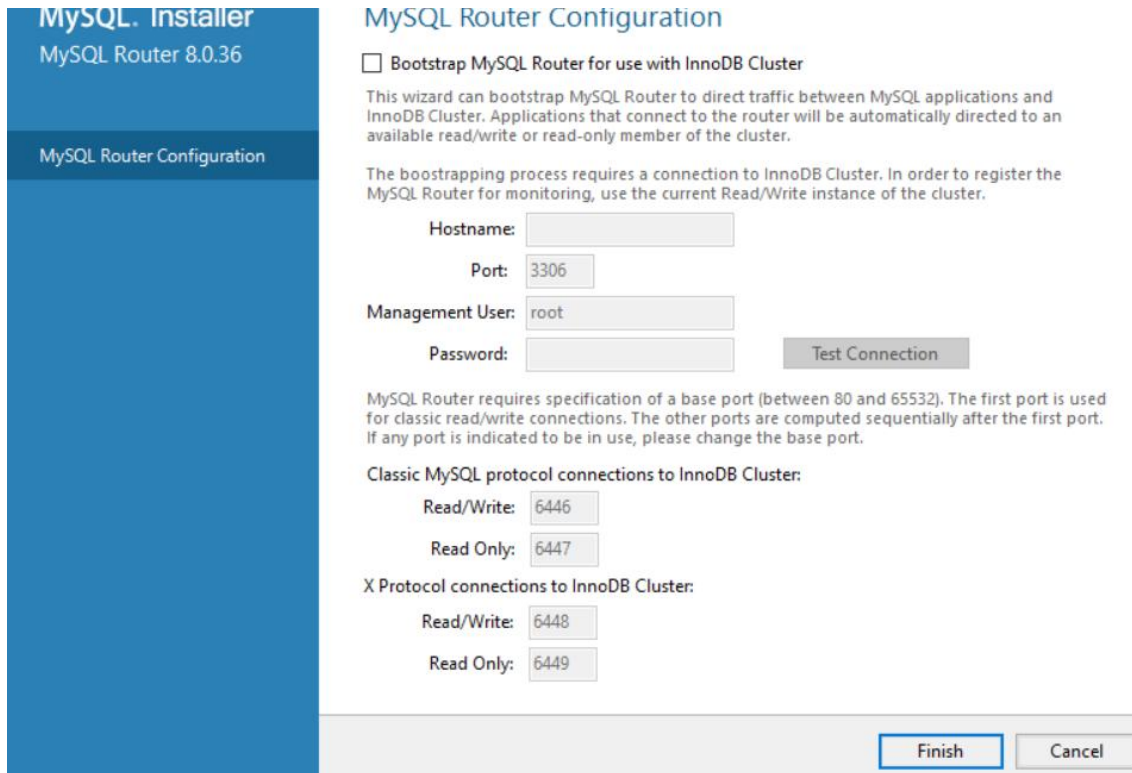
STEP 3: Configure Router MySQL

Check Requirements	MySQL Server 8.0.36	Configuration complete.
Installation	MySQL Router 8.0.36	Ready to configure
Product Configuration	Samples and Examples 8.0.36	Ready to configure
Installation Complete		

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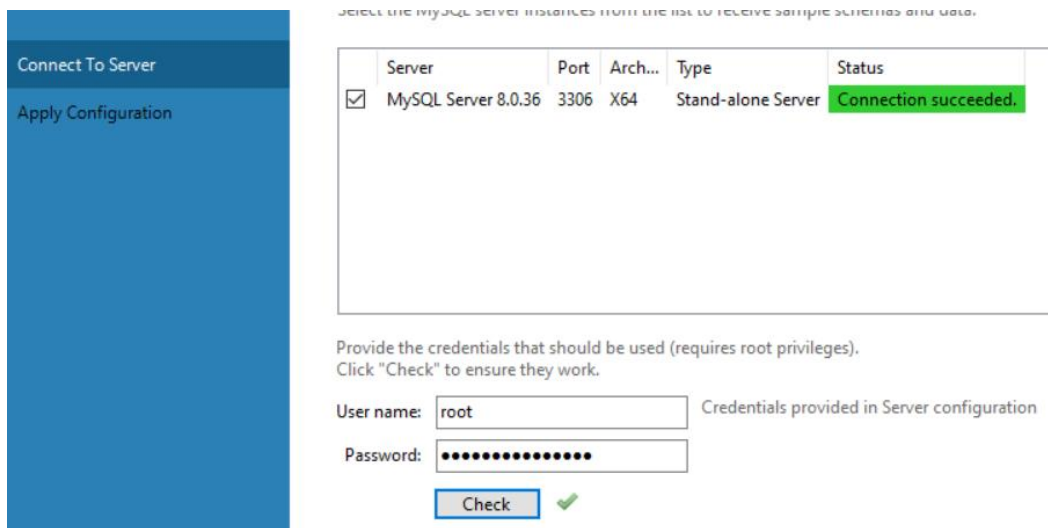✓ In the first screen Click in Next and after Finish:

STEP 4: Configure the Connection MySQL

✓ In the first screen Click in Next and after insert the password (AVPsfc39ab7sfcA   ):
✓

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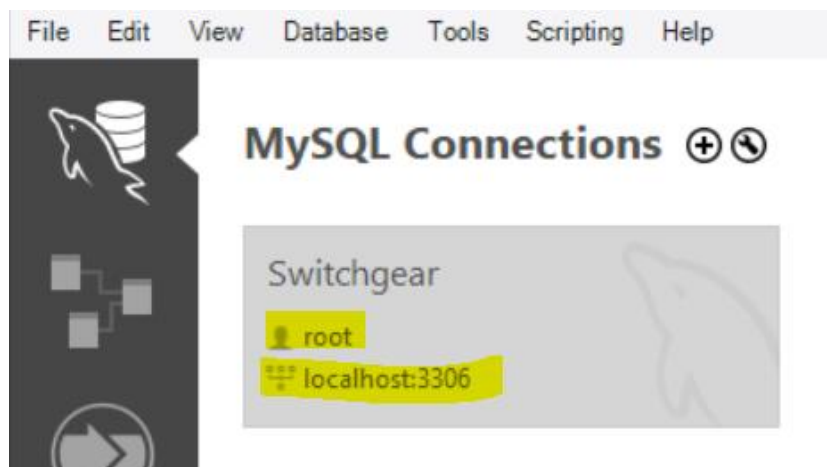**(internal arc, temperature rise, short circuit strength, seismic & dielectrics)**

✓ Click in **Check** to verify the status of the connection:
✓ If it is working well Click in **Next**:
✓ Then, **"Apply Configuration" Execute** and **Finalize**.

In **"Product Configuration" Execute** and **Finalize**.

STEP 5: Import and configure the data base MYSQL Where the data tables will be

✓

✓ Click to connect to the server:

✓ **Click to create a "Schema"** e and name it as "**hplswd**" . Do not change the name.
✓
✓ Click in **"Apply"** and after, **"Apply"** again and **"Finish".**

✓ **Create a folder** in the disk C with the name **"SwitchgearDesignSWD"**
  (C://SwitchgearDesign) . Copy and paste inside this folder the file **"hplswd.sql"** which is in
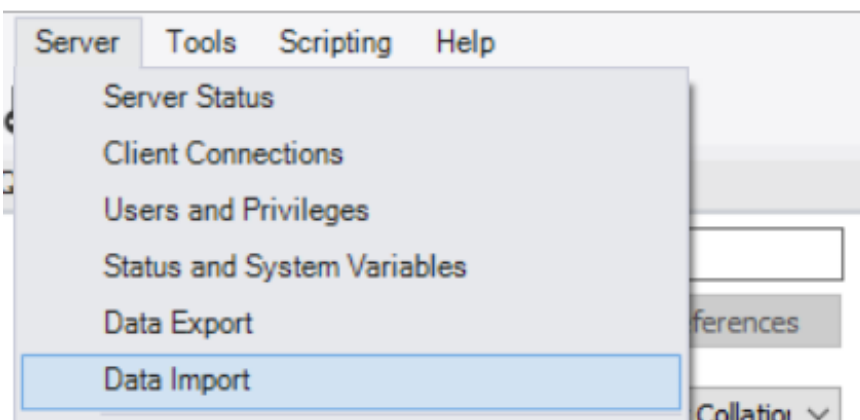 the installer file.

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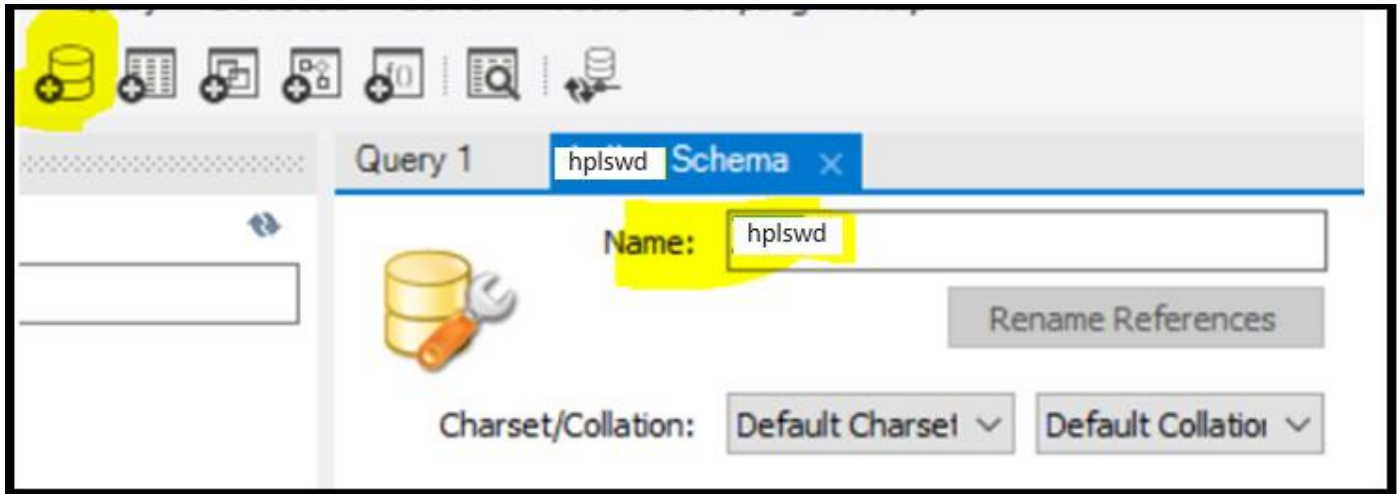
✓ Go to the tab **"Server"** and select **"Data Import"**:
✓

✓ Find the created folder **hplswd** and click in "**Start Import**":

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✓ If everything goes right you will see the server hplswd (on) in green and without import errors (see next figure).

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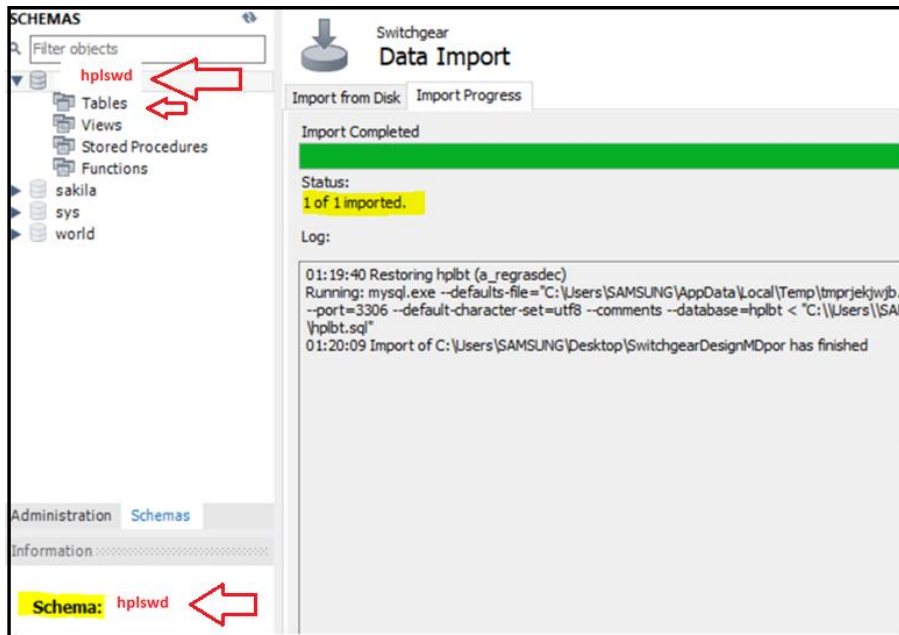
✓ After importing the data click , with the right button in the folder "Table" and Click in "Refresh All".

✓

✓ **You are almost ready**
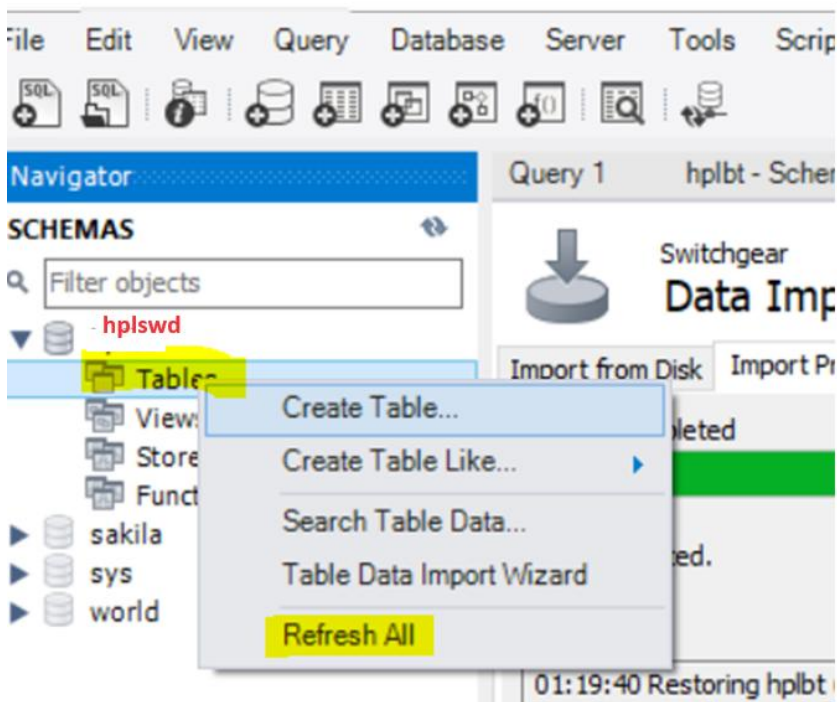
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STEP 6: Install the program Switchgaer design with the installer **SwitchgearDesignSWD eng.**

• About the installation, after downloading or copying the SetUpSwitchgearDesignpor.zip installation file (approximately 9 MB), save it to a directory on your computer.

• To install, unzip the ZIP file and right-click on the unzipped file, then left-click on "Run as administrator".

• Click OK to everything and, when prompted, enter the installer password (13 digits) *************
(sent separately)

• After installation, a software icon will be created on the "desktop" and in the list of programs in the START button. If it is not created automatically, you can create a shortcut on the desktop to the file C:\SwitchgearDesignSWD\SwitchgearDesignSWD.exe (or the other name of your version)

• On your computer, ONLY one directory called C:\SwitchgearDesignSWD will be created where all the necessary files will be located.

• The SwitchgearDesignSWD.exe file and all other files will be installed in this directory and its subdirectories. Nothing will be installed outside of this directory.

• This is an installer designed to allow the software to function well on all computers and operating systems.

• Although I have already installed it on many different computers, sometimes, when installed on another PC, it may (rarely) be necessary to add some auxiliary files.

• Therefore, if an error occurs during installation, please note the error message or take a screenshot and send it to me at sergiofeitozacosta@gmail.com

• A typical message is... "This file is missing."

STEP 7: You are ready to start using

The software is for exclusive use within the company and may not be passed on to third parties without written authorization from Cognitor.

The terms of use are "USE AT YOUR OWN RISK". The software author and Cognitor are not responsible for any results or use made of the results.

In the "Publications" section of the Cognitor website, there are many free documents, including case studies validating the software. IF YOU HAVE NOT RECEIVED TRAINING, IT'S BEST NOT TO USE IT.

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To better understand the context read this article https://www.cognitor.com.br/transformersfiresexplosions.pdf

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http://www.cognitor.com.br/suggestionnewiecstandardtransformersfiresandexplosions.pdf

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http://www.cognitor.com.br/EnvironmentalEfficiencyCertificate.pdf
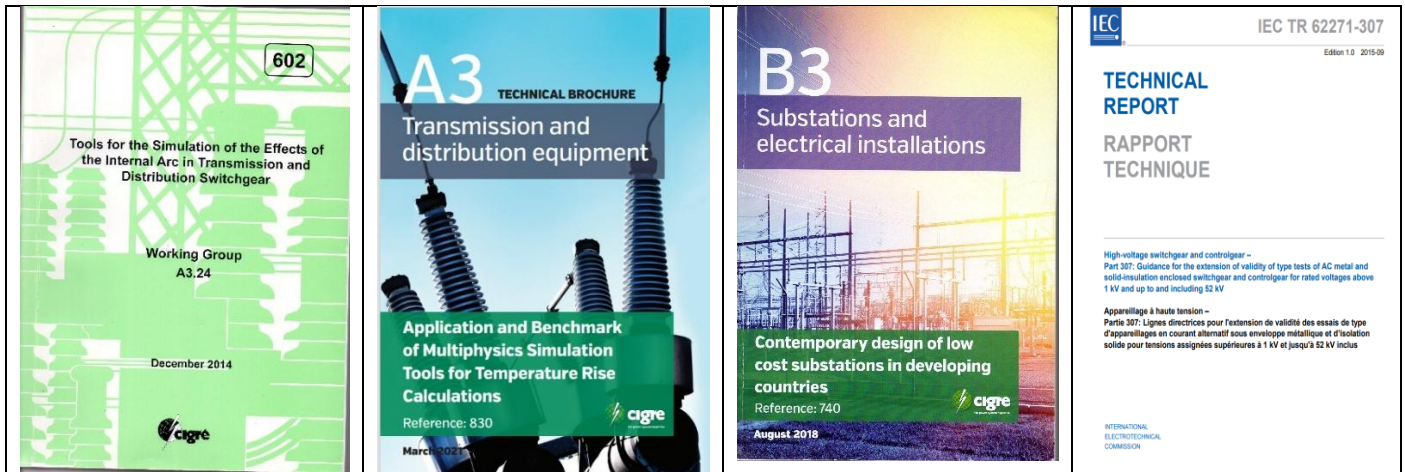
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Site: http://www.cognitor.com.br

CV of Sergio Feitoza Costa; https://www.cognitor.com.br/Curriculum.html

https://www.cognitor.com.br/cvenglishplus.pdf

Publications by Sergio Feitoza:

https://www.cognitor.com.br/Downloads1.html

Patent by Sergio Feitoza Costa
Article and movie in http://www.cognitor.com.br/SwitchgearMetalFoam.pdf