

WEMES Consulting s.r.l.

**EAF Furnaces Disturbance Mitigation in steelmaking plants
with SVC Systems and other solution**

*Consulting & Engineering Supplies for SVC Systems
up to 250Mvar, in MV distribution up to 36kV*



WEMES Consulting s.r.l.

TEAM PRESENTATION

WEMES is a team which plans and realizes the PFC Systems (Power Factor Correction) for steel making plants.

This team supports the Customer in order to define the detailed engineering for SVC Systems (Static Var Compensator) knowing technology of furnace working, including disturbances compensation on electrical networks).

According to several international rules and standards, we use to work in a coordinated team which satisfies Customer's requirements from both economical and technical point of view.

WEMES Consulting specialized in SVC Systems calculation and dimensioning, Electrical Networks Analysis

specialized in installation engineering planning

WEMES Consulting s.r.l.

This company is represented by Dr. Alberto Fragiaco, graduated in Physics.

He deeply knows the theoretical criteria of an SVC system and gives a support with measures to improve and optimize the system.

He has a significant experience in High voltage/Medium voltage/ PFC and SVC systems planning having experience of detailed engineering and tests/measurements, and commissioning regarding these kind of plants.

References & Work Experience:

Networks Analysis :

- Power flows
- Short circuit currents
- Harmonic currents flow
- Power systems & protections
- Transient stability:
 - Electromechanical
 - Electromagnetic
- Electric circuits transients analysis
- Electric arc
- Power transformers
- Power generators

Measurements & Tests after SVC system installation

- Power, energy
- Electrical disturbances:
 - Conducted and radiated
 - Harmonics, flicker
 - Voltage fluctuations

Design of:

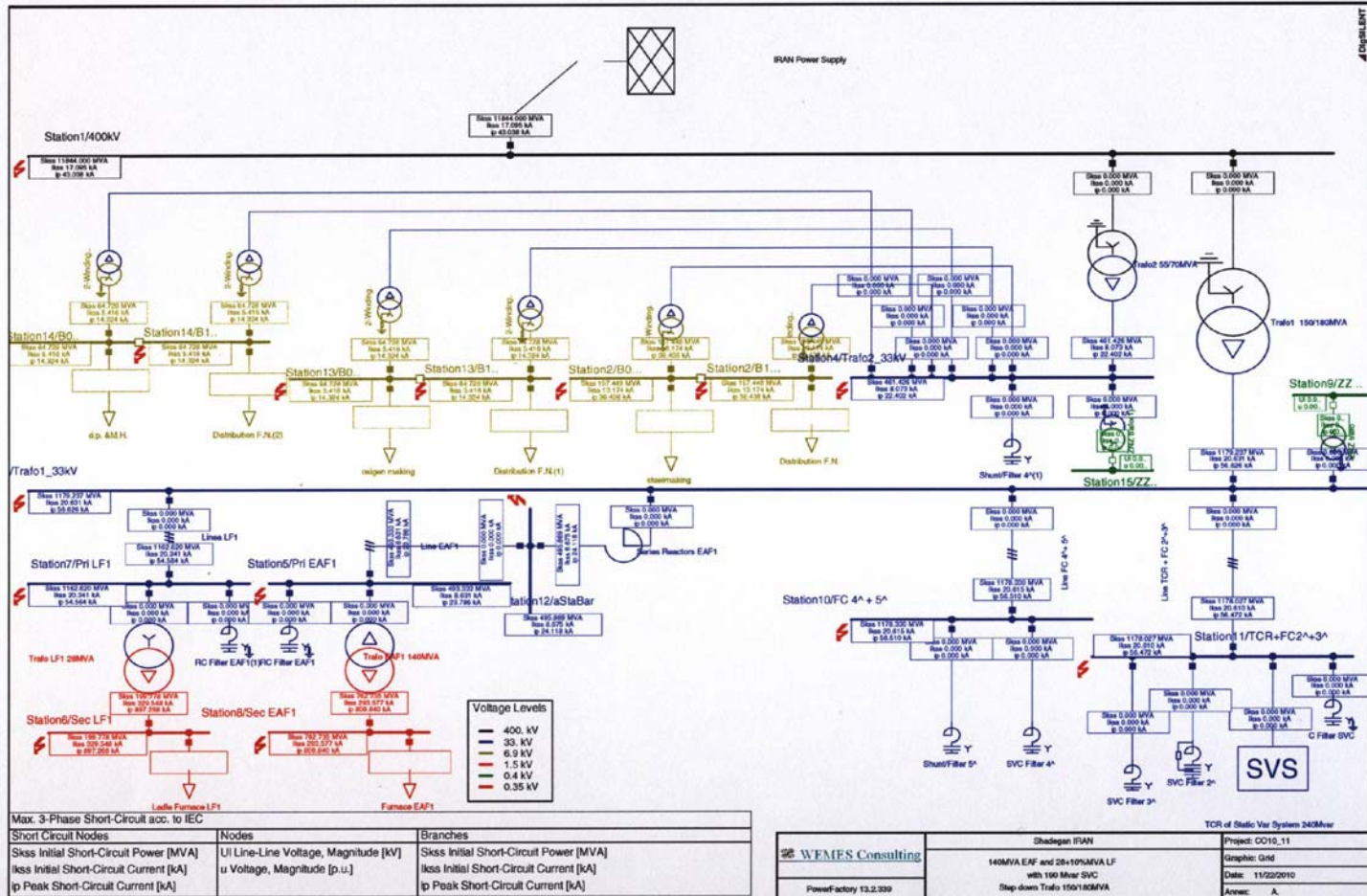
- Calculation and technical specifications starting from furnace basic data
- Static var compensators
- Power compensation harmonic filters:
 - Reactive power
 - Capacitors bank
 - Tuning reactors
 - Damping resistor
 - RC surge protections with arresters filters for circuit breakers and medium voltage
- Single line diagram of SVC and drawing in steelmaking plants
- SVC light/STATCOM with VSC power if necessary for better disturbances compensation

Experience in design regarding:

- Optimization of EAF/LF furnaces working with:
 - SVC & SVC light Saturable reactor
 - DC arc furnaces
 - Synchronous machine for power generation

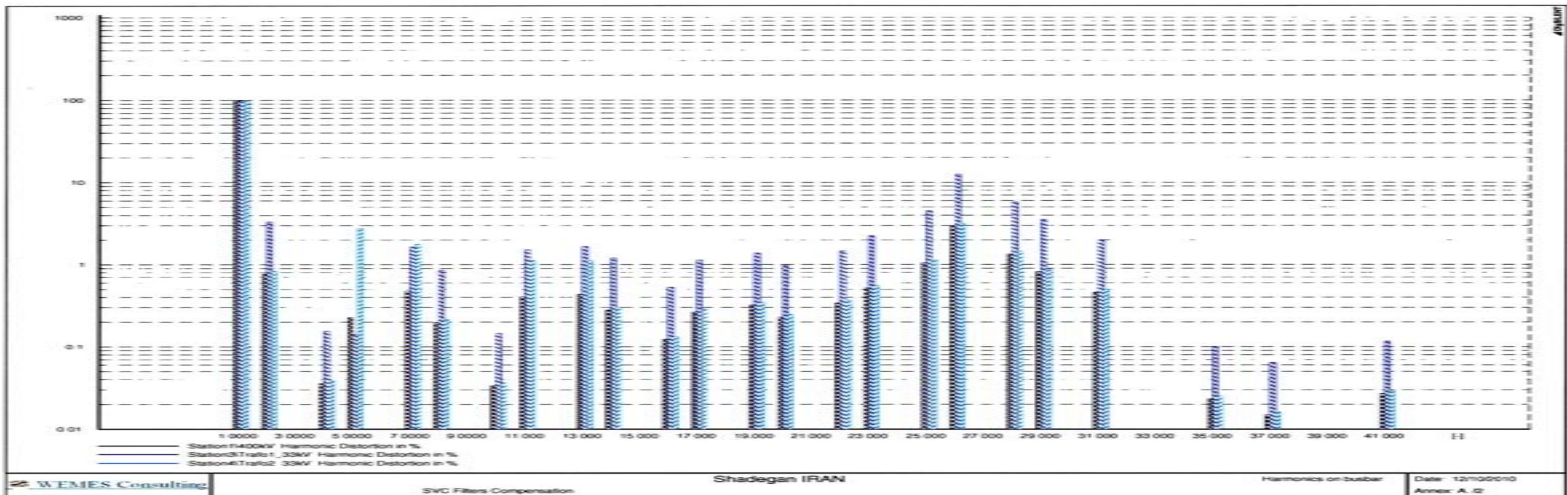
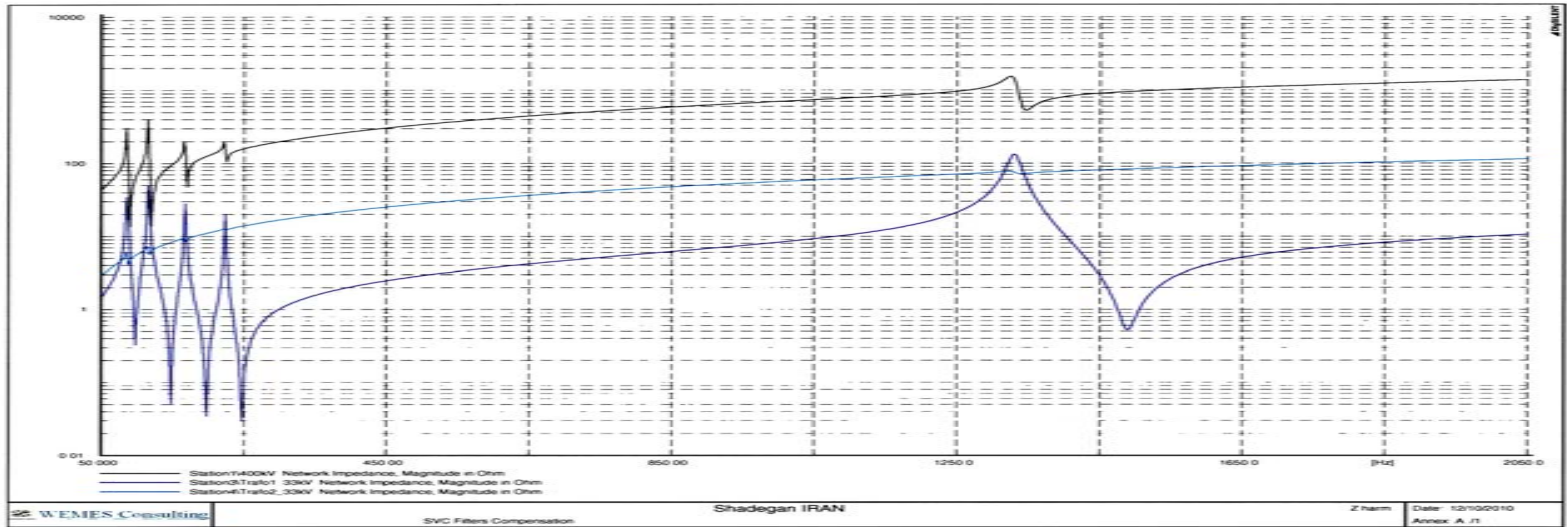
WEMES Consulting s.r.l.

Example of load flow and short circuit current calculation resulting from our software



WEMES Consulting s.r.l.

Example of filters design performance calculation resulting from our software

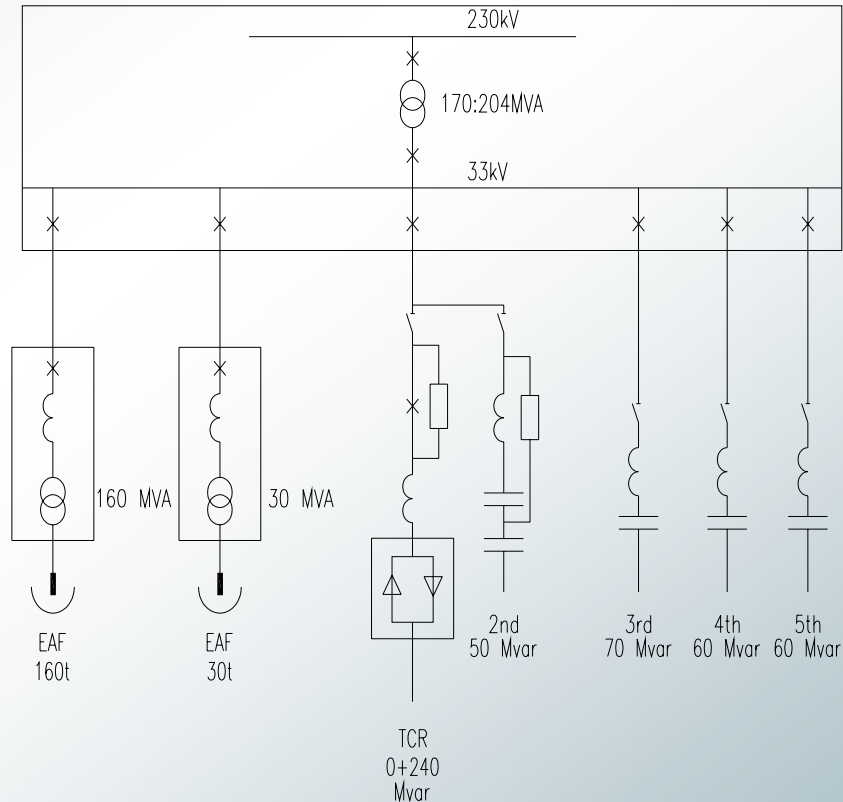


WEMES Consulting s.r.l.

References & Work Experience:

SVC Calculation, Design, Test and Commissioning for Main Customers:

- **CONCAST**
- **DANIELI & C.**
- **FUCHS**
- **SMS SIEMAG**
- **TENOVA**
- **TECHINT**
- **VAI - Voest Alpine**
- **ABB**



Design works in progress:

SIDERPOTENZA Italy	SVC and measurements 105Mvar
DUFERCO Italy	SVC and measurements 175Mvar
FERALPI Italy	SVC 165Mvar
RUGUI Spain	SVC 65Mvar
CHADORMALU Iran	SVC 240Mvar or SVC-Light 115Mvar
RUGUI Spain	SVC 50Mvar or STATCOM 18Mvar

WEMES Consulting s.r.l.

WEMES is a group of technicians who, uniting their experience and skills, provide technical and professional services to develop both basic and detailed engineering design, in order to help your technical office in electrical, mechanical and civil engineering works. WEMES working team has the potentiality and flexibility to offer a wide collaboration with your technical, commercial and purchase departments in order to activate and manage a job complementary parts, that are:

- 1) Collaboration with project managers to estimate the engineering various parts, with the possibility of being present during technical meetings with final customer to give assistance and help
- 2) Assistance to designers and job responsible personnel in order to choose and define the best technical and economical solutions for machines or plant complementary parts
- 3) Assistance to the purchase offices by drawing up the documentation for inquiry request, checking and analysing the offer
- 4) Drawing up of all the engineering documentation for plant building
- 5) Co-operation during the assembly and erection, start up and testing of the plant

For the best time and energies management, our company's praxis is to assign the works technical management to one of our collaborators who acts as a connection with your personnel. He co-operate with your staff, choosing our most skilled and appropriate personnel for every work that has to be carried out.

As a general and not restrictive rule, our structure is able to offer the above services with the following specializations:

➤ **Electric and automation installation works**

HV-MV-LV apparatus and plant design
Basic and executive installation engineering
Use and maintenance manuals
Civil and tertiary plant engineering
Industrial/steel plant engineering
Assistance to erection and start-up on site



Mechanical and piping works

Pneumatic, hydraulic and water engineering design
Carpentry and other structure design
Development of machine and plant piping with executive project



Civil works

Basic design
Feasibility studies
Plant layout

To carry-out the documentation, WEMES uses the most sophisticated technical means on the market, suitable to the requirements/standardization of the Customer.

WEMES Consulting s.r.l.

Activities and studies supplied for SVC systems and EAF furnaces engineering activities, for a collaboration with suppliers:

- Step down transformer
- Series reactor
- Vacuum circuit breaker
- Furnace transformer
- PFC: fixed harmonic filters, SVC

For the above mentioned activities we define:

- Apparatus technical specifications and dimensioning
- Testing and commissioning in local suppliers' factories
- Installation engineering with basic and detail design
- Supervision to the installation works
- Testing and commissioning after start up as listed in
**“Systems check up on EAF and LF after SVC System installation”
schedule**
- Technical specifications for construction and enquiry

In order to Supply SVC Systems in Steelmaking plants, we supply technical specifications and detailed designs.

WEMES Consulting s.r.l.

Check up of the Systems on EAF and LF Post SVC System installation

Check of furnace operation

- Installation of a measurement system for arc furnace analysing and operation reporting
- Check of typical heat performance in terms of heat profile, power input, current level, refractory balance, electrode consumption and further key factors for melting
- Setup of circle diagrams and operating tables
- Substation Supervision, Disturbances and Energy Control

Check of electrode regulation

- Check and calibration of current and voltage measurement
- • Check of closed-loop control for electrode regulation system
- • Hydraulic speed tests to analyse valve characteristic, accuracy, wear, mast roller performance.
- • Dip tests to establish high current system data
- • Discussion for improving hydraulic and control system

Check of electrical protection system

- Analysing VCB-breaker trips during opening (RC-Filter design with surge arresters)
- Read-out and check relay settings for EAF-breaker and back-up breakers
- Analysing necessary protection level for transformer and switchgear, relay settings and coordination

Improvements operations

- Implementation of modified Heat power profiles
- Testing of new transformer/reactor taps and current levels (impedance set points) for different main melting phases
- Electrical balancing of furnace operation in order to symmetrise and to lower refractory wear index

WEMES Consulting s.r.l.

WEMES Consulting s.r.l.

Via G. Rossini, 31/a

I-30171 Mestre-Venezia ITALY

Tel. +39 041 8020015

Fax +39 02 30132890

Mob. +39 347 2618940

wemes@wemes.it

www.wemes.it