



## Milton Emílio Vivan

Birth: July 13, 1947  
Nationality: Brazilian  
Phones: (55 11) 3865 2458 Site: [www.vivan.com.br](http://www.vivan.com.br)  
(55 11) 3872 4051 E-mail: [vivan@vivan.com.br](mailto:vivan@vivan.com.br)

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### 1. Education

Civil Engineer in 1971 by São Carlos Engineering School of São Paulo University  
CREA 0600 36 45 83

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### 2. Professional history

since March 1995	Vivan Engenharia S/C Ltda Director ➤ activity developed for Vivan Engenharia
since June 1992	Civil Engineering Consultant Technical consultancy for construction and design companies on structural engineering and dams engineering areas ➤ activity developed as Consultant
April/99 up to June/2002	Technical Director of Alga Brasil Eng. Ltda and Neoprex Consultant ◆ activity developed in this function
October/92 up to March/95	Hidrobrasileira S.A. Engenharia e Consultoria Técnica Structural engineer, technical coordinator and dams project manager. ✓ activity developed at Hidrobrasileira
March/89 up to June/92	Jaakko Pöyry Engenharia Ltda 1989 to 1992 Head of concrete department 1990 to 1992 Contract manager and projects coordinator 1989 Supervisor Engineer ❖ activity developed at JPE
Jan./76 up to Feb./89	Themag Engenharia Ltda 1986 to 1989 - Head of structures department composed by two divisions: small dams and bridges, soil-structures interaction works and special projects 1984 to 1985 - Head of the small dams division 1981 to 1983 - Supervisor engineer and special design elaboration 1976 to 1980 - Senior engineer at structures department • activity developed at Themag
1975 up to 1976	Escritório Técnico Vieira - Horschutz Ltda. Engineer of the structures calculation team □ activity developed at E.T. Vieira-Horschutz
1972 up to 1974	A.C. Vasconcelos Ltda. Engineer of the structures calculation team ⇒ activity developed at A.C. Vasconcelos



### 3. Main activities

#### SHPPs and SMALL DAMS

##### CODEVASF

- Responsible for the structural design of the Mirorós Dam, Bahia. This project contains:
  - Deviation gallery under the 40 meters earth dam;
  - Water intake for the irrigation channel and for the adductor "Adutora do Feijão";
  - Reinforced concrete access bridge to the water intake, continuous, two 27 meters spans;
  - Control and Loading Chamber to the irrigation channel;
  - Spillway, containing:
    - right walls anchored in the rock;
    - left gravity walls in contact with the earth dam;
    - center spillway pile with prestressed trunnion girders and spillway flush channel with anchored in the rock slab.
- Responsible for the structural design of the Perennation Dam of the Paramirim River – Zabumbão Dam. This project contains:
  - Deviation gallery under the earth dam;
  - Water intake for the irrigation channel;
  - Reinforced concrete access bridge to the water intake, supported on the earth dam, two 18 meters isostatic spans and
  - Spillway walls and channel.
- Responsible for the executive structural design of the Boacica Dam.

##### ITALMAGNÉSIO S.A.

- Responsible for the viability design of the Rio das Velhas river hydroelectric exploitations.

##### USA SMALL DAMS

- Responsible for the viability structural design of the Dodge Falls plant.
- Responsible for the viability structural design of the Youghiugheny plant.
- Responsible for the viability and basic structural designs of the Mahonning Creek plant.

##### CEMAT - CENTRAIS ELÉTRICAS MATOGROSSENSES S.A.

- Responsible for the Powerhouse viability structural design of the Noidore Hydroelectric Plant.

##### CELPA-CENTRAIS ELÉTRICAS DO PARÁ S.A.

- Responsible for the viability structural design of the Aparai Hydroelectric Plant.
- Responsible for the Powerhouse basic structural design of the Aparai Hydroelectric Plant.

##### CPFL - COMPANHIA PAULISTA DE FORÇA E LUZ S.A.

- Responsible for the extension structural design of the Eloy Chaves SHPP.
- *Structural engineering Consulting about the reinforcement construction process of the Eloy Chaves SHPP surge tank.*
- *Responsible for the structural recovery viability design of the spillway, loading chamber and powerhouse of the Gavião Peixoto SHPP.*

##### COELBA - CIA. DE ELETRICIDADE DA BAHIA.

- ❖ COELBA (Companhia de Eletricidade da Bahia) contract manager and coordinator – Alto Fêmeas I Hydroelectric Exploitation (1989 up to 1991 ).
- ❖ Alto Fêmeas I (SHPP) Hydroelectric Exploitation. Responsible for the concrete structures design. The project contains:
  - 5m high labyrinth spillway (dynamics analysis with SAP- 90 modeling);
  - Gate channel, with reinforced concrete trunnion girder;
  - Water intake, adduction channel and loading chamber;
  - Penstock supporting blocks and anchorage;
  - Powerhouse and penstock encasement next to the Powerhouse.



#### **CONSTRUTORA OAS LTDA.**

- ❖ CONSTRUTORA OAS LTDA. contract manager and coordinator for Alto Fêmeas I Hydroelectric Exploitation design adaptation ( 1991 ).
- ❖ Responsible for the Alto Fêmeas I Powerhouse structural recovering.

#### **REPÚBLICA POPULAR DE ANGOLA**

- Responsible for the Gove Hydroelectric Plant structural viability design.

#### **ISRAPEC Hidrosistemas Sociedade Anônima**

- Consulting services – preliminary studies on the civil construction costs of the following Indaiatuba water supply dam: 12,5 m high earth dam on the Capivari Mirim river; 10 m high earth dam on the Córrego Barrinha stream; 21 m high Earth dam on the Ribeirão Furnas river; 28 m and 15 m high alternatives for dam on the Ribeirão Santa Rita river; Pirai II Dam, with RCC and 27 m and 40 m high alternatives and RCC 20 m high Jundiuvira Dam.

#### **UHE UNION Engenharia Ltda**

- Executive design of 3 SHPPs in southern Goiás state: Irara (30 Mw), Jataí (30 Mw) and Retiro Velho (20 Mw) for Hochtief - Brasil PCHs, all of them with horizontal axis Francis turbine.
- Executive design of the Retiro SHPP (18 Mw) in São Joaquim da Barra - SP for Hochtief - Duke Energy with Alstom bulb turbine.

#### **GEOMÉTRICA Engenharia de Projetos Ltda**

- Basic structural design of Coxilha Rica SHPP (30Mw) in Santa Catarina for Eletrosul, with vertical axis Francis turbine.

#### **SOMAR**

- Consolidated basic design of Ponte Branca (10,5 Mw) and São Francisco (7,0 Mw) SHPP in Mogi Mirim, Rio Pardo river, both of them in RCC with uncontrolled spillway, double Francis horizontal axis turbines and fish ladders in the Águas de Santa Bárbara region, SP state.

### **LARGE AND MEDIUM DAMS AND OTHER HYDRAULIC WORKS**

#### **CHESF**

- Paulo Afonso IV Dam water intake structural calculation verification.
- Responsible for the executive structural design of the Itapaparica resettlement (pumping stations on expansive and collapsible soils).

#### **CESP**

- Structural design of the Porto Primavera Plant suction tube.

#### **CODEVASF**

- Responsible for basic structural design criteria for the roller-compacted concrete Jequitaí dams.

#### **ELETRONORTE**

- Structural calculation verification of the Tucuruí Dam bottom outlet.

#### **FURNAS S.A.**

- Responsible for the Simpício Dam structural viability design.
- Responsible for the Itaocara Dam structural viability design.

#### **CONSTRUTORA MENDES JUNIOR**

- Basic design revision of the New Indiya Barrage powerhouse, at Euphrates River in Iraq.

#### **ELETROPAULO - ELETRICIDADE DE SÃO PAULO S.A.**

- Pedreira Lifting Hydroelectric Power Plant (Billings). Responsible for the unit 7 extension executive design.
- Responsible for the structural design of the units 8 and 9 installation viability.
- Responsible for the unit 8 structural executive design (partial).



#### **ALCAN S.A.**

- ❖ Responsible for the structural design of the drainage and flood contention east wall of the Utinga – SP factory.

#### **CONSÓRCIO HIDROCONSULT - MWH BRASIL – TRANSPOSIÇÃO RIO SÃO FRANCISCO**

- *Jatí Hydroelectric Plant – concrete structures design of the Water Intake and Anchorage Block, Embrace Walls, Connection Walls and Spillway.*
- *Ávidos Hydroelectric Plant – concrete structures design of the Loading Chamber, Water Intake and Anchorage Block.*

### **SEWAGE WORKS**

#### **SABESP**

- ❖ Mambu Water Supply System – Responsible for several design adaptations and verifications of the following structures: intake dam; buildings; support blocks and damping towers.
- ❖ Responsible for the “jet-grouting” foundations conception of the pumping station, resulting in saving 500 thousand dollars, in comparison with the slurry walls solution.
- ✓ Static and prestressed effect calculation elaboration on 20 m diameter biodigestors of the Franca Sewage Treatment Plant.
- ✓ Executive design management and coordination of the Franca Water Supply System Dam. Originally planned design in earth dam and later changed to RCC dam, saving 6,5 million dollars to SABESP.  
Presented at the IBRACON First Symposium on Roller-Compacted Concrete Works in April / 95 in São Paulo Engineering Institute.
- ✓ Responsible for the Franca Water Supply System Roller-Compacted Concrete Dam structural design.
- *Responsible for the foundation structural design and detailed manufacturing design of the 34 m diameter and 10 m high metal tank without central column, constructed by the “air-lifting” process, hydraulic design, paving and drainage design of the expansion in 7500 m<sup>3</sup> of the Taboão da Serra Reservation Center 1 reservation capacity, for Construtora H. Guedes.*
- *Responsible for the Booster renovation and expansion design of the Jardim Arpoador, contemplating hydraulic, structural and architectural design, for Construtora H. Guedes.*
- *Responsible for the root type piles foundation design of the crossing pipeline (33 m) over the Rio Tamanduateí river in São Paulo, for Construtora Macaúba.*
- *Responsible for the scale and several bases design of the Sewage Treatment Station of São Miguel Paulista for Construtora Macaúba.*

#### **CESP**

- Concrete structures design of Water Treatment Station of Residential Village of Porto Primavera Plant.

#### **INTARCO**

- ⇒ BOSCH Water treatment Station in Campinas - SP.

#### **PETROBRAS S.A.**

- ❖ Responsible for the structural design conclusion of the Water, Oils and Effluents Treatment Station and of the Terminal e Emissary of Guamaré - RN.

#### **BOEHRINGER S.A.**

- ❖ Responsible for the structural design of the effluents treatment system.

#### **VERMONT ENGENHARIA LTDA.**

- *Condulli S.A. Effluents Treatment System structural design .*



## IRRIGATION STRUCTURES

### CODEVASF

- Responsible for the Formoso H irrigation viability and basic designs.
- Formoso A irrigation project verification and constructive adaptation.

## DAMS AND HYDROELECTRIC PLANTS PROJECT COORDINATION

### COELBA

- ❖ CONSTRUTORA OAS LTDA. contract manager and coordinator for Alto Fêmeas I Hydroelectric Exploitation design adaptation (1991).

### SABESP

- ✓ Executive design management and coordination for Franca Water Supply System. Originally planned design in earth dam and later changed to RCC dam, saving 6,5 million dollars to SABESP.  
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### SOMAR

- Consolidated basic design of Ponte Branca (10,5 Mw) and São Francisco (7,0 Mw) SHPP in Mogi Mirim, Rio Pardo river, both of them in RCC with uncontrolled spillway, double Francis horizontal axis turbines and fish ladders in the Águas de Santa Bárbara region, SP state.

## ENERGETIC AND VIABILITY ANALYSIS

### ENERSUL – MAIN ENGENHARIA

- Structural viability analysis for the Assis Chateaubriand Hydroelectric Plant third generator group implementation.
- Energetic simulation studies, with Excel plans elaboration, for viability analysis of plant above described third generator group implementation, assisting Engineer Reolando Silveira.

## “VALUE ENGINEERING” CONCURRENCES CONSULTANCY

### ABB SUSA INC.- New Jersey - USA

- Consultancy support on the concurrence for the construction company selection in the proposal of Cedae Alegria Sewage Treatment Station in Rio de Janeiro.
- Consultancy support on the concurrence for the construction company selection in the proposal of Sabesp-Barueri treatment capacity extension, from 7 m<sup>3</sup>/s to 9,5 m<sup>3</sup>/s.
- Consultancy support on the concurrence for the construction company selection in the proposal of Sarapuí and Pavuna Sewage Treatment Stations, from the Baía de Guanabara Depollution Program.

### CONSTRUTORA MACAÚBA / CONSTRUTORA H.GUEDES

- Consultancy support on the concurrence for the execution of 7500m<sup>3</sup> treated water reservation metal tank in Taboão da Serra for SABESP.

### CONFAB INDUSTRIAL S/A

- Consultancy support on the concurrence for the construction company selection and for the foundation definition of 4 tanks with 63m diameter and 14,64m high, each one with 45000m<sup>3</sup> naphtha storage capacity, for COPESUL /PETROBRAS - Tramandaí- RS
- Consultancy support on the civil works cost definition of the Aracruz Celulose S.A Fiberline C Evaporation System.
- Consultancy for definition of concrete or metallic structure of evaporators support structure of Veracell – Bahia



## STRUCTURAL RECOVERY – REINFORCEMENTS E RENOVATIONS

### **CVRD - COMPANHIA VALE DO RIO DOCE S.A.**

- Reinforcement design of the tied-back wall foundations between km 1 + 701 and 1 + 795 of the Estrada de Ferro Vitória – Minas railroad.
- Anchorage, reinforcements and structural recovering of the cantilevered walls on km 1 + 300 of E.F. Vitória – Minas railroad.

### **CONSTRUTORA OAS LTDA.**

- ❖ Responsible for the structural recovery of the Alto Fêmeas I Powerhouse.

### **CATERPILLAR DO BRASIL S.A.**

- ❖ Responsible for the expansion structural designs of the buildings A, B (expansion and remodeling), D, Y and external areas at the Piracicaba factory, in SP, reinforcing slabs, beams, columns and foundations of the existing structures. Almost 30.000 m<sup>2</sup> of total designed floor area.

### **CONSTRUTORA OAS LTDA.**

- ❖ Responsible for the Alto Fêmeas I SHPP Powerhouse structural recovery.

### **GOVERNO DO ESTADO DE SÃO PAULO.**

- *Responsible for the structural recovery design of the bridge over the Córrego do Potreiro stream in Trabijú - SP.*

### **CPFL – Companhia Paulista de Força e Luz**

- *Responsible for the structural recovery viability design of the Gavião Peixoto SHPP (SP) spillway, loading chamber and powerhouse.*

### **UHE UNION Engenharia Ltda**

- *Adequacy design of the Retiro SHPP (security and energy generation capacity recovery). Responsible for the complete concept solution of the exploitation recovery due to the implantation of all structures 1,5m below the design elevation, presence of joint-faults and downstream rating curve revision with increased maximum water level of approximately 3m. Note that the problem was detected only after all hydro mechanical equipment were manufactured and the civil works were almost completed.*

## SUBSTATIONS

### **ELETRONORTE**

- Fire walls and transformers bases off all the new substations connected to the Tucuruí Hydroelectric Power Plant.

### **CHESF**

- Water and oil drainage system, next to the transformers bases of Paulo Afonso IV system substations.

### **CESP**

- Study of thermal protection in fire walls at IPT - São Paulo.

### **CELPA - CENTRAIS ELÉTRICAS DO PARÁ S.A.**

- Castanhal substation – structural design of the regional operations center.

### **ELETROPAULO**

- ❖ Responsible for the structural design (1990) and partial participation in the structural design review (1992) of the underground substation bidding project of ETD - Campos Salles SP.



- Civil Engineer of the multidisciplinary team responsible for reviewing the implementation of Anhanguera substation resulting on saving 7,5 million dollars.  
This project was presented at the National Seminary of Electricity Production and Transmission in Camboriu - SC in October 1995.
- Consultancy in the land and implantation selection, quantities and civil works costs estimate of the following described substations:
  - ETD – Iporanga, ETD - Vila Rami, ESD – Europa and ETD - Voith
- Consultancy in the implementation alternatives studies of ETT - Cantareira
- Elaboration of comparative technical opinion of the underground substations implementation: ETD Aclimação and ETD Campos Salles, responsible for cost reduction of 10 million dollars, due to the ETD Campos Salles design modification.

## BUILDINGS AND TOLL BOOTHS

### CONSTRUTORA METROMAR

- ⇒ Lorena building in Santos at Praça Washington, corner with Rua Cyra.

### CONSTRUTORA MAHFUZ

- ⇒ Building at Alameda Campinas (standard floor – ribbed slab with paperboard tubes formwork)
- Chevalier building at Rua 13 de Maio in São Paulo.

### BENEFICÊNCIA PORTUGUESA DE SÃO PAULO

- ⇒ Extension of 9th and 10th floors.

### CONSTRUTORA KELETI

- ⇒ Roof grid (42,5 m x 42,5m) of Furniture Factory Bérghamo in Guarulhos - SP.

### INTARCO

- ⇒ Social building, fuel deposit and garages of Nestlé Factory in São José do Rio Pardo - SP.
- ⇒ Canteen building of Philips in Recife - PE.

### CONSTRUTORA BALBO

- ❑ Lyra and Centaurus buildings in Ribeirão Preto - SP.
- ❑ Monterrey building at Av. Angélica in São Paulo with Outinord technology.
- ❑ Residential complex at Rua Mário Portela – Rio de Janeiro - 3 buildings with 28 floors (Outinord).
- ❑ Adaptation to the ABNT standards of Conjunto Morada dos Deuses in Ribeirão Preto - SP.

### CONSTRUTORA CONCIC PORTUÁRIA

- ❑ Liberal Center building in São José dos Campos - SP.

### CONSTRUTORA ENVIL

- ❑ Saint James building foundations in São José dos Campos - SP.

### CONSTRUTORA AUXILIAR

- ❑ Building at Rua Pamplona.

### CONSTRUTORA GOMES DE ALMEIDA FERNANDES

- ❑ Monumento building – corner of Av. Faria Lima and Av. Eusébio Matoso in São Paulo.

### CONSTRUTORA NOVAÇÃO

- ❑ Banco de La Nación Argentina building - Av. Paulista - São Paulo - SP.

### CECAP

- ❑ Residential complexes with four floors in Guarulhos and Itatiba – SP (Outinord).

### CHESF

- Maintenance and administration building of Paulo Afonso IV Powerplant.



**SUPERMERCADOS MAKRO S.A.**

- ❖ Responsible for the floor design of the Salvador - BA store.

**CATERPILLAR DO BRASIL S.A.**

- ❖ Responsible for the structural design of the L building, with prestressed slabs.

**C.C. CAMARGO CORRÊA - HARZA – HIDROBRASILEIRA S.A.**

- Responsible for the structural design of Parque Turístico Figueiral in Presidente Epitácio.

**ECOVIAS - ETEP**

- Design of the Maintenance and Administration Buildings, Toll Booth Access Gallery at Road BR277 Curitiba – Paranaguá.

**CONSTRUTORA NORBERTO ODEBRECHT S.A. e STR PROJETOS E PARTICIPAÇÕES LTDA.**

- Forecast estimate of concrete volume, formwork area and steel weight for 82 buildings with 5 to 30 floors to be built in São Paulo, as support in concurrence of Public Private Partnership.

**BRIDGES, VIADUCTS AND FOOTBRIDGES**

**CHESF**

- Bridge over the Moxotó waterway in Bahia – continuous with parabolically variable height, spans of ( 34 - 52 - 62 - 52 - 34 ) meters.

**DNER**

- Viaduct at Rua Heitor dos Prazeres - continuous with constant height, spans of ( 44,5 - 37,5 - 44,5 ) meters.
- Bridge over the Pirajussara River - continuous with constant height and 60 degrees of obliquity, spans of ( 20 - 37 - 37 - 20 ) meters.
- Footbridge at km 27 of BR-116, isostatic with cantilevers, spans of ( 7,5 - 40 - 7,5 ) meters.
- Viaduct at Rua Edmundo Scanapieco, isostatic with cantilevers, spans of ( 4 - 26 - 2 ) meters.
- Preliminary design of several bridges and viaducts of Ligaç o Sul (road ring with BR-116) among them, bridge over Pinheiros River with central span of 100 meters.

**DERSA**

- Access viaducts to Avenida dos Portu rios in Santos – continuous with constant heights – spans of ( 30 - 30 - 30 ) meters – curved in plan and ( 35 - 35 - 35 ) meters.
- Responsible for the basic structural design of 55 special artworks, 44 contention works and drainage Works of Rodovia do Sol.
- ✓ Design of the reinforced concrete central spans of viaduct Ignes Collino in Osasco
- ✓ Design of several underpasses and bridge deck over Para ba River of Carvalho Pinto road.

**AGLURB / DERSA**

- Suburb station of Jardim Casqueiro – Responsible for the structural design of prestressed concrete footbridge with 35 meters span.

**COPASP - AEROPORTO DE GUARULHOS**

- Pipeline crossing of Baquirivu River of Gopo va - Aeroporto adductor – prestressed structure, isostatic with 25 m span.

**CESP**

- Porto Primavera Power Plant – Water Treatment Station of Residential Village – access bridge to the Water Intake - prestressed - isostatic with 42 m span.

**PREFEITURA MUNICIPAL DE BAURU**

**CONSTRU OES E COM RCIO CAMARGO CORREA / ANTRANIG MURADIAN**

- Participation in the design team of the bridge in progressive cantilevers with 110 meters central span over the FEPASA yard in Bauru.





**FURNAS CENTRAIS ELÉTRICAS S.A.  
CONSTRUÇÕES E COMÉRCIO CAMARGO CORREA S.A. / ANTRANIG MURADIAN  
BRIDGE OVER MARANHÃO RIVER**

- *Elaboration, in partnership with Antranig Muradian, of the technical solution proposal with material quantities presentation. Three alternatives had been presented: two in cable-stayed bridge, the largest being 340 meters central span (in partnership with STUP) and one in successive cantilevers (winner) with 145 meters central span, developed at the basic design level.*

**GOVERNO DO ESTADO DE SÃO PAULO**

- *Bridge over Parateí River between Santa Isabel and Guararema cities, isostatic with 9 m wide and 29 m extension*
- *23 bridges in the Vale do Ribeira region with 8m to 25m extension.*
- *6 bridges in the Vale do Paraíba region with 8m to 35 m extension.*
- *2 bridges in Adolfo city (10 to 12 m extension) and 5 galleries in Urupês city.*
- *2 bridges in Barra do Turvo with 12 m extension*
- *Bridge in Ribeirão Corrente city with 14 m extension*

**DPJ ENGENHARIA E EMPREENDIMENTOS LTDA.**

- *Design of the Bridge over the Córrego da Capela waterway in Diadema, with 14m wide and 13,8 m extension, including detailed quantitative spreadsheet.*

**ENGECORPS**

- *Design of the bridges A, B, C, N and R for the Companhia de Desenvolvimento dos Vales do São Francisco e do Parnaíba, all of them with precast beams deck and shallow or pile foundation. Bridge A: 8 m wide and spans of 10, 15 e 10 m; Bridge B: 8 m wide and three 10 m spans; Bridge C: 8 m wide and six 20 m spans; Bridge N: 8 m wide and 3 20 m spans and Bridge P: 10,30 m wide and spans of 15, 20, 20, 20 e 15 m.*
- *Basic design of two bridges with slabs relieved by paperboard tubes, over waterway outer ring, for the Secretaria de Recursos Hídricos e Saneamento, works upstream of the Penha dam, with 19,20 m wide deck and 15,25 m span.*
- *Design of two bridges over Lajeado Velho Stream, for BAESA (Energética Barra Grande S.A.) with 7 m wide wood deck over beams and reinforced concrete abutment. Bridge 1 with two ~5,0 m spans and Bridge 2 with one ~5,0 m span.*

**ENERCONSULT**

- *Footbridge design composed by two prestressed precast beams, each one with 30 m span at Hélio Smidt Road – SP 019 – km 02;*

**HIDROSTUDIO**

- *Executive design of “piscinão” (urban drainage reservoir) cover - 35 m diameter reservoir located at Praça da Bandeira in Rio de Janeiro, consisting of integrated slab to 11 prestressed precast beams structure to total load of 1,5 tf/m<sup>2</sup>.*

**DESIGN ANALYSIS AND STAYS AND PRESTRESSING EXECUTION PROPOSALS**

**ALGA BRASIL ENGENHARIA LTDA.**

- ◆ *Analysis of more than 50 prestressed bridges and viaducts designs and 6 cable-stayed bridges, the largest being 1080 m extension for Construtora Odebrecht of Venezuela and elaboration of the corresponding executive proposals.*



## EXECUTION SUPERVISION

### ALGA Spa - ITÁLIA

- ◆ *Monitoring the stays operation execution of the cable-stayed bridge over the Livenza River at Meduna de Livenza in Itália.*
- ◆ *Monitoring the tests execution in wedges for prestressing manufactured in Brazil in Alga Spa test labs.*

### ALGA BRASIL ENGENHARIA LTDA

- ◆ *Monitoring the prestressing operation execution of the Viaduto Antártica structural recovery, including constructor activities planning support in order to fulfill the traffic opening schedule.*
- ◆ *Monitoring the prestressing operation execution of the Viaduto do Glicério structural recovery.*

### CONSTRUTORA OAS

- ❖ *Partial monitoring of the Alto Fêmeas II Hydroelectric Power Plant Powerhouse structural recovery, due to the generator surrounding structure concreting with 50 cm incorrect generator position and other pathologies.*

### CONSTRUTORA BALBO

- *Partial monitoring of the Monterrey building execution at Av. Angélica in S. Paulo with Outinord process.*

## TECHNOLOGY TRANSFER

### ALGA Spa.

- ◆ *Responsible for the equipment national market analysis and selection of American and European companies for prestressing, stay-cables execution, structural bearings and special joints technology transfer. Visits to European and American (Buffalo) technology holders. Responsible for the selection of ALGA Spa, based in Milan – Italy, for providing this technology.*

### ALGA BRASIL ENGENHARIA LTDA.

- ◆ *Responsible appointed by Alga Spa – Milan to receive and transfer the technology to Alga Brasil. Eng. Agostino Marioni's (Euronorm EN 1337 chairman and president of Alga Spa) procurator for Alga Spa entrance in partnership with Alga Brasil.*
- ◆ *Responsible for technology transfer of prestressing and rigging equipment (jacks, prestressing pumps, injection pump), several anchors, structural bearings (pot bearings) and joints from ALGA Spa (for movements up to +/- 165 mm), based in Milan, Italy, to Alga Brasil Eng. Ltda.*
- ◆ *Alga Brasil Eng. Ltda Director and Technical Manager, responsible for the nationalization of prestressing jacks, injection bombs, test and measurement equipment, etc. Lectured at CESP, Construtora OAS, Construtora Norberto Odebrecht in Florianópolis, Themag Engenharia, DER-SP, Autoban in Limeira, Construbase, etc., and for engineers of design companies such as Antranig Muradian, Enescil, Figueiredo Ferraz, etc.*

## STRUCTURES WITH PRECAST COMPONENTS DESIGN

### COPASP - AEROPORTO DE GUARULHOS

- *Airport System of São Paulo Terminal Area – Guarulhos Airport Substation – Responsible for the structural design of W and PI cover and seal precast components – pre-tensioned concrete – spans up to 18 m – for command and control buildings, emergency central and SE-138V building in SF6.*

### ITAIPU BINACIONAL

- *Operational Building – Viability structural design of precast solution.*

### VASP S.A.

- *Cargo Terminal at Guarulhos International Airport. Responsible for the viability structural design of precast solution.*



#### **ARACRUZ CELULOSE S.A.**

- ❖ Participation in the precast elements structural design of Barra do Riacho II – ES unit.

#### **PCC - PAPEL E CELULOSE CATARINENSE S.A.**

- ❖ Responsible for the finishing area concrete structures design, with precast casted in place structure, including 28 000 square meters floor.

### **STREAMS CANALIZATION**

#### **EMURB**

- Responsible for the structural executive design of the Águas Espaiadas stream canalization with precast walls in L and precast slurry wall, and for several bridges, highlighting the viaduct at Av. Vereador José Diniz - prestressed, continuous with variable height, ( 30 - 52 -30 ) meters spans.

### **SUBWAYS**

#### **CMSP-COMPANHIA DO METROPOLITANO DE SÃO PAULO**

- Responsible for the structural designs of Belém and Bresser Stations, as well as respective Bus Terminals.

#### **COOESA – SISTEMA PRI**

- *Responsible for concrete structures in the proposal elaboration for advanced basic and executive designs of Campo Belo, Ibirapuera, Moema, Servidor and Vila Gumercindo stations and Pátio Guido Caloi yard.*

#### **ARCADIS LOGOS**

- *Structural Basic Design of PVE Basuca and PVE Carlos Meira Wells of CMSP Tiquatira Station.*

### **RETAINING TIED-BACK WALLS**

#### **DER-SP**

- Responsible for the structural calculations of the following tied-back walls at SP-99 - Rodovia dos Tamoios - São José dos Campos - Caraguatatuba: km 70+00; km 71+00; km 77+00 (mixed structure with concrete and metal profiles).
- Responsible for the cable-stayed cantilever walls at SP-55 - Caraguatatuba - Ubatuba, Domingas Dias beach.
- Responsible for the tied-back wall structural design at Rodovia Mogi-Bertioga.

#### **FEPASA - FERROVIAS PAULISTAS S.A.**

- Responsible for the structural design of all the tied-back walls, walls and other consolidation works of Guaianã - Paratinga stretch at Serra do Mar.

#### **CVRD - COMPANHIA VALE DO RIO DOCE S.A.**

- Reinforcement design of the tied-back wall foundation of Vitória–Minas Railroad, from km 1+701 to 1+795.
- Bolting, reinforcements and structural repair of cantilever walls at km 1+300 of Vitória–Minas Railroad.

### **SPECIAL DESIGNS**

#### **ELETRONORTE**

- Reinforced concrete shallow foundations, on rock, of transmission line towers of up to 140 m high at Tocantins River bed and banks.
- Calculation verification of Access Tunnel to the Falha da Lagoa ("Lagoon Failure") beneath the Tucuruí Hydroelectric Power Plant earth dam.
- Calculation verification of reinforced rockfill protection against vortices caused by the Tucuruí Hydroelectric Power Plant spillway bottom outlet.



**ELETROPAULO S.A.**

- ❖ Responsible for the structural design (1990) and partial participation in the structural design review (1992) of the underground substation bidding project of ETD - Campos Salles SP.

**PREFEITURA MUNICIPAL DE BAURU**

**CONSTRUÇÕES E COMÉRCIO CAMARGO CORREA / ANTRANIG MURADIAN**

- Participation in the design team of the bridge in progressive cantilevers with 110 meters central span over the FEPASA yard in Bauru.

**FURNAS CENTRAIS ELÉTRICAS S.A.**

**CONSTRUÇÕES E COMÉRCIO CAMARGO CORREA S.A. / ANTRANIG MURADIAN**

**BRIDGE OVER MARANHÃO RIVER**

- Elaboration, in partnership with Antranig Muradian, of the technical solution proposal with material quantities presentation. Three alternatives had been: two in cable-stayed bridge, the largest being 340 meters central span (in partnership with STUP) and one in successive cantilevers (winner) with 145 meters central span, developed at the basic design level.

**NEOPREX INDÚSTRIA E COMÉRCIO LTDA**

- Elaboration of Elastomeric Structural Bearing Technical Catalogue and Calculation Program.

## WOODEN STRUCTURES

**ELETRONORTE**

- Wooden bridges along the Marabá - Imperatriz transmission line – typical for 2,5 m - 4,0 m - 7,5 m and 10,0 m span, for the passage of the 60 tf ABNT design truck.

## CEMENT AND MINING INDUSTRY

**DU PONT**

- Responsible for the structural design of "Fluorspar Mine" in Mato Preto - PR. This project includes: 500 tons primary crushing silos; thickener with 15m diameter and 4,5m high; ball mill base; flotation buildings; entrance and balance; laboratories; maintenance and administration; tailing storage system; raw water dike, explosives depot and substation.

**SERRANA S.A.**

- Responsible for the basic structural design of the clinker, coal and cement loading systems in Cajati.

**FERTECO S.A.**

- ❖ Responsible for the structural design of the iron ore ball mill foundations.

## CHEMICAL, PETROCHEMICAL AND PHARMACEUTICAL INDUSTRIES

**CONSTRUTORA ECISA**

- ⇒ Buildings H (polycondensation) and M (glycol regeneration) of Polyquímica in Americana - SP.

**PETROBRÁS S.A.**

- Responsible for the structural design of the Parque de Tubos building in Emboacica.

**CARBOINDUSTRIAL S.A.**

- ❖ Responsible for the carbon block factory structural design in Serra - ES.

**PETROQUÍMICA UNIÃO S.A.**

- ❖ Responsible for the structural design completion of the CAV-TAR - Capuava – SP factory.

**TUBOS E CONEXÕES TIGRE S.A.**

- ❖ Responsible for the structural design of the Contagem - MG factory and Rio Claro – SP factory reform.



**CEBRACE S.A.**

- ❖ Responsible for the structural design conclusion of the Caçapava - SP glass factory.

**PECTEN BRAZIL EXPLORATION CO.**

- ❖ Responsible for monitoring the structural design of the natural gas unit at Presidente Bernardes Refinery in Cubatão - SP.

**MONSANTO SAFLEX DO BRASIL S.A.**

- ❖ Responsible for the concrete structures design of the security glass film factory in São José dos Campos - SP.

**RHODIA S.A.**

- ❖ Responsible for monitoring the basic structural design of the plastic factory in São José dos Campos - FAPLAS. Participated in the constructor company selection bidding commission.

**LABORATÓRIOS MERREL-LEPETIT**

- ❖ Design of the cleanrooms - GMP - Good Manufacturing Practice - São Paulo.

**VERMONT ENGENHARIA LTDA.**

- *Technical opinion on cleanroom construction viability over landfill next to retaining wall with excessive deformation.*
- *Structural verification for load increase in existing building and design analysis and quantitie reductions for Ciba- Geigy factory galleries and pipe-rack in Taboão da Serra - SP.*

**PETROBRÁS - RPBC / CONFAB / COBRAPI**

- *Responsible for the design of the hydrogen factory furnace foundations in Cubatão.*

**AUTOMOTIVE INDUSTRY**

**CATERPILLAR DO BRASIL S.A.**

- ❖ Responsible for structural expansion designs of buildings A, B (expansion and refurbishment), D, Y and external areas of Piracicaba – SP factory, with reinforcements in existing structures slabs, beams, columns and foundations. Total floor area designed of about 30 000 square meters.
- ❖ Responsible for the building L structural design, with prestressed slabs.

**PAPER AND CELLULOSE INDUSTRY**

**IKPC - INDÚSTRIA KLABIN DE PAPEL E CELULOSE S.A.**

- ❖ Participation in the increasing capacity project of MP-7 paper machine in Telêmaco Borba - PR.
- ❖ Responsible for the design of 28 000 square meters floor (saving 3 cm in thickness, on average, compared to the original project) and printers and corrugator bases of paperboard packaging factory in Jundiá - SP.

**ARACRUZ CELULOSE S.A.**

- ❖ Participation in the precast elements structural design of Barra do Riacho II unit - ES.

**CHAMPION PAPEL E CELULOSE S.A.**

- ❖ Participation in the increasing capacity project of MP-4 paper machine, to 300 tons per day, in Mogi-Guaçu – SP factory.

**PCC - PAPEL E CELULOSE CATARINENSE S.A.**

- ❖ Responsible for the finishing area concrete structures design, with precast casted in place structure, including 28 000 square meters floor.

**CONFAB - VERACEL**

- Design of re-evaporator bases, pumps, several bases, channels, low walls and floor.



## NUCLEAR PROJECTS STRUCTURES

### COPESP - COORDENADORIA DE PROJETOS ESPECIAIS - MINISTÉRIO MARINHA

- ❖ Participation in "Loop-TT" turbine testing base design in Iperó, SP.

## STEEL AND METALLURGICAL INDUSTRY

### MECÂNICA PESADA S.A.

- Structural calculation verification of X-Ray Bunker.

### LNM - LAMINAÇÃO NACIONAL DE METAIS S.A.

- ❖ Responsible for the design of Sandwig rolling mill bases and Junker continuous annealing line.

### ALCAN S.A.

- ❖ Responsible for the winning solution, in partnership with Construtora Keleti, for micropiles foundations of 5000 tons press base.
- ❖ Analysis of the bridge cranes supporting structures (recovery/reinforcement).

### COSIPA - ABB - COBRAPI

- *Rolling Process Waters Recirculation and Treatment System. Responsible for the design of all structures highlighting the clarifier tanks with 28 m diameter and 5 m high, containing water at 45 Celsius degrees, the 11 m diameter Thickener Elevated Tank, the Cooling Tower basin, the Acid Waters Treatment Building, the oily water tanks and treatment buildings, Substation and Pipe-Rack with approximately 1,3 km extension. Responsible for civil design coordination.*

### BELGO MINEIRA PARTICIPAÇÕES – CONFAB

- *Responsible for all the civil design concerning the steelworks dedusting of Siderúrgica Mendes Jr. in Juiz de Fora – MG. All the following structures foundation structural designs were developed: pipelines supports, bag filter building and floor, dust silo, ladders heater and distributors. It was also developed the Cooling Tower design with lower fans, considering the thermal variation on the walls, the architectural and structural design of the electric rooms, and drainage, paving and landscaping of the concerned area.*

## DESIGNS QUALITY CONTROL

## DESIGN COMPLIANCE EVALUATION

## EXPERT INVESTIGATION AND TECHNICAL REPORTS

### CONFAB - PETROBRÁS

- *Audit in the Magna Engenharia Ltda foundations design of two metal tanks over concrete piled slab for naphtha storage for Petrobrás in Tramandaí, Rio Grande do Sul*

### GOVERNO DO ESTADO DE SÃO PAULO

- *Responsible for forensic report elaboration to appoint the event occurred with Bridge over Córrego do Potreiro stream, in Trabiú – SP, causes.*

### CONFAB - PETROBRÁS

- *Audit in Protec Engenharia de Projetos S/C Ltda foundation design of two propylene storage spheres for Petrobrás - REFAP – in Canoas, Rio Grande do Sul.*
- *Audit in FRANKI PILES design of bases, supports and sleepers for gas pipes of SUAPE port in Pernambuco.*

### ALGA BRASIL – RF ENGENHARIA

- *Verification of stretches of the viaduct Antártica reinforcement external cables.*

### ARCADIS LOGOS

- *Design quality control of railway access platform to Vale car dumper in Nacala-a-Velha port, prestressed structure, composed by precast isostatic beams posteriorly merged and subjected to seismic actions.*



#### 4. Specialization and improvement courses

- Slopes stabilization with TECCO system of GEOBRUGG – RUVOLUM software, ministered in April 2005 in Romanshorn – Switzerland
- NBR 6118 - 2003 - course at ABCP promoted by IBRACON and ABNT
  - Prestressed Concrete - Prof. Michael P. Collins - Escola Politécnica of USP
  - Finite Element – Programming in microcomputers - THEMAG
  - Project Management - Alexander Proudfoot - THEMAG
  - Project Administration - Instituto de Engenharia de São Paulo.
  - “New Austrian Tunneling Method” - THEMAG
  - Concrete Technology - THEMAG
  - English Language - 8 anos – THEMAG

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#### 5. Published works

- *100 Practice Questions and Answers on Ethics – first edition in June 2004 and second edition in July 2004*
- *Technical catalog on laminated elastomeric bearings with calculation program for Neoprex Indústria e Comércio Ltda – September 2000 and 2001.*
- *Substations costs optimization via multidisciplinary team on Anhanguera Substation, in São Paulo, basic arrangement definition. Real case – Second best prize obtained at:*  
**National Seminary of Electricity Production and Transmission October 1995 – taking place in Camboriu - SC**
- *Determining factors in the use of roller-compacted concrete in the executive design of Franca dam - SABESP.*  
*Originally planned design in earth dam and later changed to RCC dam, saving 6,5 million dollars to SABESP.*  
**IBRACON First Symposium on Roller-Compacted Concrete Works - São Paulo - April 1995**
- Comparative study between two roller-compacted concrete dams design criteria.  
**XVIII Large Dams Seminar - Nova Iguaçu - PR - April 1989.**

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#### 6. Computers/quality

##### Softwares

- Two versions of STRAP program that allows three-dimensional static and dynamics structural analysis with bars, plates and volumetric elements and post-processor for concrete and metal structures verification;
- Automatic reinforcement detailing programs (ACAD with AUTOCON script);
- Concrete Design 3 – Columns design under unsymmetrical bending moment and axial force – NBR 6318 – 2003 – Professor Lauro Modesto dos Santos;
- Esbelt – reinforced concrete slender columns verification - NBR 6118 – 2003 – Professor Lauro Modesto dos Santos and
- Internally developed programs with emphasis on the one that calculates the prestressing effect in continuous prestressed structures with variable inertia.

##### Quality

- Procedures for design calculation and drawings elaboration and verification in accordance with current quality control standards requirements.
- Structures conception, guidance and monitoring of works by Eng. Vivan. Drawings verified by the authors of structural calculations and final product approval by Eng. Vivan.



## 7. Educational activities

- Constructions Stability Professor at Universidade Mackenzie Engineering School from 1973 to 1979.
- Plan, Spatial and Metric Geometry Teacher of "Curso Vestibular Centro Acadêmico Armando de Salles Oliveira" of São Carlos Engineering School, from March 1970 to December 1971.
- Plan, Spatial and Metric Geometry Teacher of Curso Triângulo Vestibulares in Bauru from August 1967 to April 1970

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## 8. Technical travelings abroad

- ◆ Visit, in April 2005, to the GEOBRUGG high-strength steel mesh factory of TECCO system (superficial slope stabilization) and of rockfalls and erosion protection system in Romanshorn and field visits to several application locals throughout Switzerland and Liechtenstein.
- ◆ Visit, in April 2005, to the pot-bearing and special joints factory of Fernando Lemos LDA in Figueira da Foz, Portugal, and visit to the Cândia Martins bridges and viaducts designs office in Lisbon and
- ◆ Visit to ALGA Spa, in December 2001, for monitoring the rigging operation execution of the cable-stayed bridge over the Livenza River at Meduna de Livenza, Veneto, in Italy, and visit to the prestressing wedges tests laboratory for monitoring the tests of wedges manufactured in Brazil;
- ◆ Visit to Chile, in August 2001, to hold technical lectures on seismic isolators in several Chilean institutions and companies;
- ◆ Visit to Watson Bowman in April 2000, at its head office in Buffalo, USA, in order to verify the quality of the structural bearings and the joints for large displacements;
- ◆ Visit to ALGA Spa in April 2000, with head office in Milan, Italy. Visit to the seismic tests laboratories, pot bearings factory, joints for large displacements factory and elastomeric laminated bearings factory in Monzambano, Italy, in order to choose the best technology to transfer to the Brazilian company;

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## 9. Other Activities

- Member of the Studies Commission of the Reception of Elastomeric Laminated Bearings Standard, current NBR 9783 – 87.
- President of the drafting committee of the design of elastomeric laminated bearings of ABNT.