



TOGETHER
for a sustainable future

OCCASION

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TOGETHER
for a sustainable future

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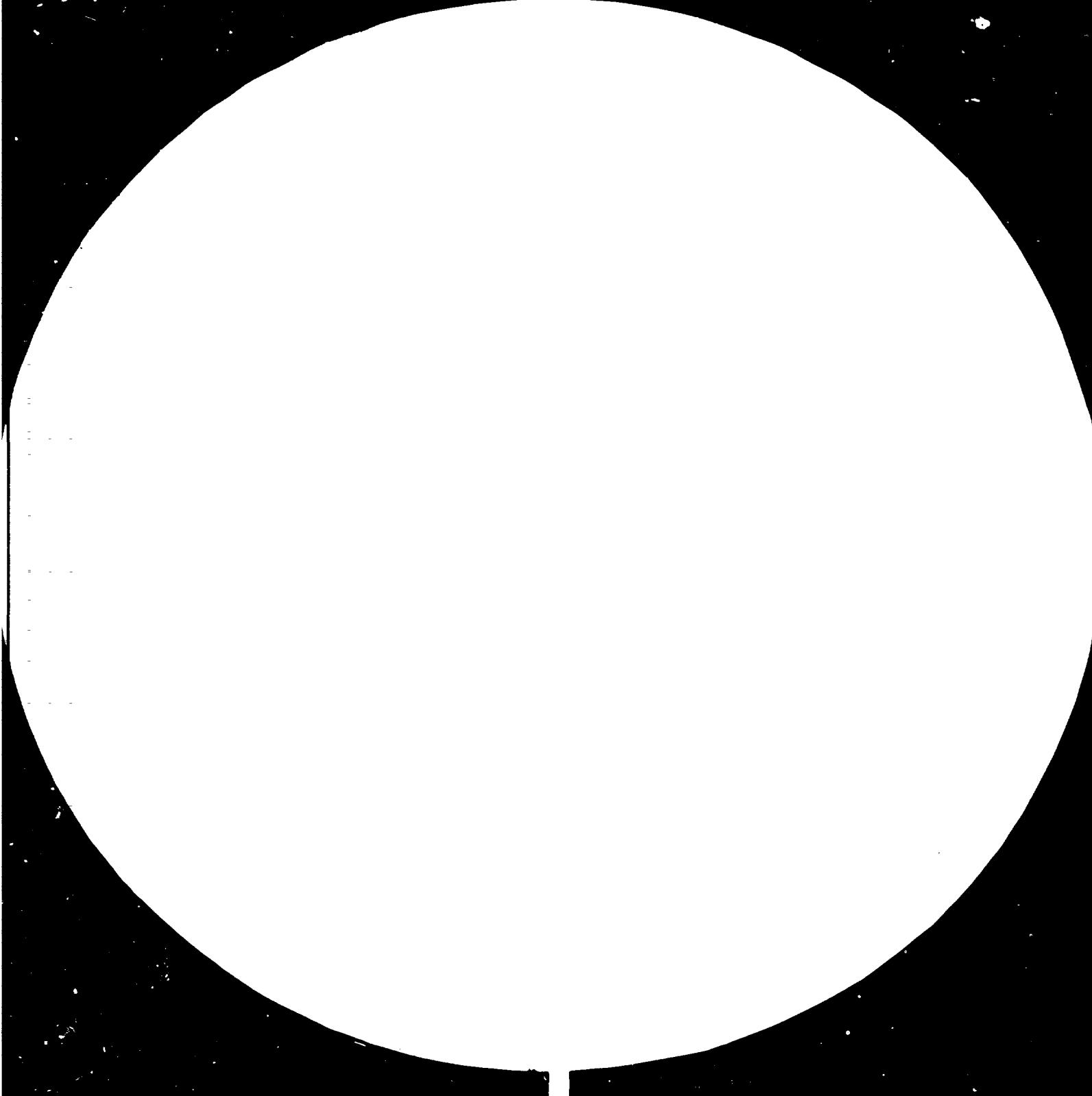
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DIRECTORY OF
INDUSTRIAL AND TECHNOLOGICAL
RESEARCH INSTITUTES:
METALLURGY SECTOR

Prepared for
INTIB - THE INDUSTRIAL AND TECHNOLOGICAL INFORMATION BANK
by the Development and Transfer of Technology Branch
UNIDO Technology Programme

002302

P R E F A C E

In recognition of the importance of industrial research and development activities, UNIDO has carried out a number of programmes and projects for the stimulation, promotion, and co-ordination of research activities in developing countries, and recently published a "Directory of Industrial and Technological Research Institutes" (UNIDO/IS.275) and a "Directory of Industrial and Technological Research Institutes in Africa" (UNIDO/IS.299).

The Third General Conference of UNIDO recommended that UNIDO should promote a regular exchange of information between research and development institutes and laboratories of both developed and developing countries.

The Vienna Programme of Action on Science and Technology for Development recommended promotion of co-operative arrangements between research and development institutes in developed and developing countries.

In this connection, UNIDO has compiled this directory, based on replies to questionnaires. It is recognized that the listings are in no sense comprehensive, and that many important institutes have been omitted. When the next edition is being prepared, all iron and steel institutes listed will be asked to update their entries and it is hoped that the coverage can be extended significantly.

Nevertheless, this directory is intended to comply with the recommendations of the above meetings, i.e. it provides a tool for the use of those who need to know where research on a certain problem is taking place, and/or something about the research programme of a given institute. It is hoped that this information will make it easier to develop co-operation among iron and steel institutes working on similar research subjects, strengthening the technological capabilities of institutes in developing countries, and reducing duplication and waste of industrial research and development potential.

We express our thanks to those who have contributed information to the directory. Though every care was taken in compiling this work, we are aware that errors and omissions remain. Suggestions for changes or for inclusion of additional research centres in a future revised edition should be made by filling out the questionnaire found at the end of the directory, and sending it to:

Development and Transfer of Technology Branch
United Nations Industrial Development Organization
PO Box 300
A-1400 Vienna
Austria

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Algeria

000301

DIRECTORAT DES RECHERCHES APPLIQUEES
COMITE NATIONAL DE SIDERURGIE

11-Hadjar BP 194
Annaba, Algeria

TEL: 83.22.45
TELE: 81721

DIRECTOR: M. Hocine Hadjat
PROFESSIONAL STAFF: 56
BUDGET 1981: \$1,820,000

AREAS OF INTEREST: Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82
*In plate quality slabs made by continuous casting
*use of siderite/ in sintering and /blast furnace/ (the Algerian iron ore deposit of Ouenza contains a high proportion of siderite not yet exploited. Appropriate technology: mixing with hematite/, /calcination/, etc.)
*use of blast furnace slag for building construction (at the moment used only for roads construction, soon for cement), building of houses
*/metal recovery/ of zinc electrolysis wastes; cadmium, lead, copper and other elements (/beneficiation/)
System of stimulation c' innovation in the Algerian steel plants
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
/Pelletizing/
Coke making
Direct reduction
Iron making
Steel making
/Continuous casting/
Steel rolling
SERVICES, UTILITIES
Quality control and materials testing
/Waste treatment/ and recycling
SINTERING, TESTING PROCEDURES
Corrosion
ECONOMIC ASPECTS, MANAGEMENT
Nationalization and inventory

LINK 003301

Argentina

000002

INSTITUTO ARGENTINO DE SIDERURGIA - IAS

Carlos Maria Della Paolera 226
1104 Buenos Aires, Argentina

TEL: 311-3639
TELEX: 9111 ACIND AR

DIRECTOR: Dr. Nestor A. Barbagelata
PROFESSIONAL STAFF: 16
BUDGET 1981: \$400,000

AREAS OF INTEREST: Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82
/Coal blending/ optimization, technical and economic coal selection for local conditions
MMA /iron ore concentration/, search of a high iron-content product by /flotation/
/Iron ore blending/ optimization for sintering, technical and economic components selection for local conditions
Pelletizing of /magnetic concentrates/, optimization of pellet characteristics for /blast furnace/ and direct reduction
/Ladle injection/ techniques for /liquid steel/ refining to improve steel quality
/Steel solidification/: Improving continuous casting and /ingots/ moulds design
/High temperature deformation/ of steel, design of /thermomechanical treatment/ for better steel properties
Rolling simulation, evaluating equipment behaviour and optimizing rolling process
/High strength steels/ /steel sheet conformability/, relation of /drawing defects/ and metallurgical characteristics
Energy saving, optimizing use of national energy sources in steel industry
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering and /pelletizing/
Combustion and energy saving
Coke making
Direct reduction
Iron making
Steel making
/Continuous casting/
Steel casting
/Vacuum degassing/
Steel rolling
SERVICES, UTILITIES
/Instrumentation/ and process control
ECONOMIC ASPECTS, MANAGEMENT
Raw materials procurement

LINK 000224

Brazil

400003

INSTITUTO DE PESQUISAS TECNOLÓGICAS - IPT
Institute of technological research

Caixa Postal 7141
Avenida Univ. Armando de Salles Oliveira
CEP 05500
Sao Paulo, Brazil
TEL: 269-22-11 R. 410
TELEF: (011) 22831 INPT 9R

DIRECTOR: Dr. Alberto Pereira de Castro
PROFESSIONAL STAFF: 700
BUDGET 1981: 650,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
1. Materials and mechanical testing in /OFF-SHORE STRUCTURES/
TECHNOLOGY:
/Fracture mechanics/ parameters for /crack analysis/ and
/flow detection/ in materials such as KIC, JIC, CID
Evaluation of resistance to /fatigue cracks/ initiation,
/crack extension/ and /toughness/ of /welded joints/
Evaluation of probability of failure and fatigue life
prediction in /structural steel/s
Materials testing and corrosion in marine environment:
/cathodic protection/ of steel, welding procedure tests,
damage investigations and coatings
Instrumental monitoring of off-shore structures for integrity
against failures
2. /NON-DESTRUCTIVE TESTING/ techniques applied to OILFIELD
TUBULAR GOOD (Testing of /tubes/ and /drill pipes/
utilized in oilfield both at installation and during
service life);
Detection of /magnetic/ flux field around tubular section and
along longitudinal direction, /ultrasonic techniques/ for
inspection of tubes, tube /wall thickness measurement/s by
detection of backscattered gamma rays through the wall
(/gamma ray measurement/)
3. QUALITY CONTROL IN /MOL STEEL/: Study of /microstructural
properties/ such as grain size, carbides, level of
/inclusions/, /decarburization intensity/ and heat
treatment; mechanical tests in tool steels, esp. toughness
and /wear/ resistance tests; performance tests
4. Theoretical and empirical correlations between BLOWING
PARAMETERS of BOF process and carbon dioxide:monoxide ratio
in the fumes and Fe-2.7e3 ratio and total Fe of the slag
Principal problems of static control models of BOF
/temperature control/ deriving from uncertainties on the
thermal balance of the operation due to variations of
carbon dioxide:monoxide ratio during the blow and the final
state of /iron oxidation/ in the slag
Assessment of the importance of /blowing conditions/ (/lance-
bath distance/, /oxygen pressure/, life and design of the
/lance nozzles/, etc.); thermal generation phenomena on BOF
vessels; /theoretical modeling/, experimental laboratory
scale /hot modelling/ using IPT and cooperating institutes'
facilities and data analysis for one Brazilian BOF plant
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Steel making
SERVICES, UTILITIES
Quality control and materials testing

LINK 003393

Bulgaria

300004

IRON AND STEEL RESEARCH INSTITUTE

Sofia 1770, Botanets, Bulgaria
TEL: 89-06-43
TELEX: 622 390 Icermet bg

DIRECTOR: Prof. Dr. Boris Brakaliyski
PROFESSIONAL STAFF: 450

AREAS OF INTEREST

Iron and steel industry, metallurgy
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
/Pelletizing/
Coke making
Direct reduction
Iron making
Steel making
Steel casting
/Vacuum degassing/
Steel rolling
Combustion and energy saving
SERVICES, UTILITIES
Environmental control

LINK 003362

70708
 DEPARTMENT OF METALLURGY AND MATERIALS SCIENCE
 MCMASTER UNIVERSITY
 1280 Main Street West
 Hamilton, Ontario, Canada L8S 4L7
 TEL: (416) 525-9140 14733
 TELEX: 6919347
 DIRECTOR: Dr. J.D. Ebdon
 ASSISTANT STAFF: 11
 SUPPORT 1981: \$469,360
AREAS OF INTEREST
 Iron and steel industry metallurgy
 Current research topics:
 -MECHANICAL PROPERTIES of /structural steel/s and /high
 temperature application steel/s;
 Large scale /deformation/ and /microscopic aspects of the
 relationship of structure and mechanical behavior; /metal
 forming/ /operating, /plastic flow/ and failure in forming
 of /aluminized alloys/ and /modern structural steels/
 /fracture mechanics/ for various imposed stress states;
 /ductile fracture/;
 Statistical model or /failure-mechanism formation/ in relation to
 cleavage failure/ and their application to /low
 temperature properties/ of controlled rolled /pipeline
 steel/s; use of /electron microscope/ and /scanning
 methods/ for electronmicroscopic transmission
 processes carried out by mechanically //injecting powder/s
 into /liquid iron/ and /liquid steel/ //injection
 techniques/). Factors which determine whether solid
 particles will enter the liquid or remain in the gas phase,
 /fluid flow/ models. Effects of /heat transfer/ and /mass
 transfer/ in the actual systems
 Ferroalloys production in conventional /arc furnaces/ and
 /plasma furnaces/, melting of /sponge iron/ pellets in
 /selective surface alge/s
 PASSIVE FILMS: localized corrosion, crystal growth and
 dissolution; localized breakdown of /protective films/ on
 metals; localized corrosion of nickel, nickel-base alloys
 and /austenitic stainless steel/s using /potentiostatic
 techniques/ and /electrostatic techniques/;
 Iron and STEELMAKING REACTIONS and processes: control of
 soluble oxygen and sulphur in iron and steelmaking and the
 formation of non-metallic inclusions/ in iron and steel;
 /deoxidation/; /transformation kinetics/ and /thermodynamics/ of
 heat treatment behaviour of steel alloys including /high Cr
 and very high /carbon steels/. Predicting Fe balance and
 diagrams, /hardability/, /temperability/, /esposure/, /nickel/
 and /seildability/ and the systematic of HSLA steels; /steel/
 transformation kinetics in metals
 Iron and STEELMAKING REACTIONS and processes: ironmaking and
 raw materials, Physical chemistry and /carbonization/;
 transport phenomena, /agglomeration/ and /metallurgical
 ironmaking, carbonization reactions. Mineral logical
 characterisation of /iron ore/ concentration/, /induration
 conditions/ or an optimum combination of /strength/ and
 /reducibility/ for acid pellets
METAL OXIDATION/ and solid state reactions: kinetics and
 thermodynamics of metal oxidation, role of metal and oxygen
 diffusion on the growth kinetics and structural development
 of oxide films and scales on metals and alloys; /high
 temperature stable/ structural materials for gas turbines
 engines //gas turbine steels/;
MECHANICAL SUBJECTS as EQUIPED TEMPERATURES: deformation
 and fracture of structural materials at elevated
 temperatures, effect of microstructure and composition on
 /plastic creep/, /cavily nucleation/ and growth, /craek
 extention/; /stress relaxation/;
Cavitation/ in /superplastic alloys/, superplastic
 deformation of an ultra-fine-grained zirconium alloy,
 growth of /grain boundary cracks/ in high strength alloys,
 effect of segregating /laserites/ on /grain boundary creep

161010
DEPARTMENT OF METALLURGY AND MATERIALS SCIENCE
UNIVERSITY OF TORONTO
Toronto, Ontario, Canada, M5S 1A4

TEL: 416-916-3812
DIRECTOR: Prof. Alexander McLean (Iron and Steel)
PROFESSIONAL STAFF: 12
STUDENT STAFF: \$200,000

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
/Deoxidation/ with salt coated magnesium granules
/Superplastic forming/ in iron and steelmaking
/use of oxygen probe/ in steelmaking
/Hydrogen dissolution/ in solid slags and molten iron alloys
/Temperature control/ during transfer operations
/Furnish metallurgy/; /Fluid flow/ and chemical control
Characterization of /solid powder/ e
fus of /rare earth/ in continuous casting
Metallurgical aspects of EMS during continuous casting
Thermodynamics/ of /molten iron alloys/
Nitrogen dissolution/ in slags
Surface tension measurement/s of molten iron alloys
Welding chemistry
Metal recovery/ of alloying elements from /oxide wastes/
releas processes/ in steelmaking
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

/Direct reduction
Iron making
Steel making
Continuous casting/
Vacuum degassing/
SERVICES, UTILITIES
Quality control and materials testing
/Waste treatment/ and recycling
/MELTING, CASTING PROCEDURES
Chemical testing
ECONOMIC ASPECTS, MANAGEMENT
Recruitment and training

JRWY PROJECTS WITH:
Atlas Steels, Canada
Lake Ontario Steel, Canada
Stelco Incorporated, Canada
Allegheny Ludlum Steel, USA
Inland Steel Company, USA
Kaiser Steel Company, USA
Dow Chemical, USA
Reactor, USA
University of Kyoto, Japan
National Physical Laboratory London, UK

000007

IRON AND STEEL RESEARCH INSTITUTE
ANSHAN IRON AND STEEL COMPLEX

2, Wu Yi Road
Anshan, Liaoning Province, China

DIRECTOR: Dr. Chen Yi-Zhai
PROFESSIONAL STAFF: 620
BUDGET 1981: \$2,700,000

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Steelmaking: /in-line injection/ metallurgy, /composite
blowing/ (top-bottom) process of oxygen
Steel rolling: controlled rolling in /steel bars/, production
of /high pressure boiler tube/, production of /high
strength steel/; concrete /reinforcing bars/
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Shantou, NC
/Pelletizing/
Iron making
Steel making
/Continuous casting/
Steel casting
/Vacuum degassing/
Steel rolling
Combustion and energy saving
SERVICES, UTILITIES/
/Incorporation/ and process control
Quality control and material testing
ENGINEERING, TESTING PROCEDURES
Mechanical testing
Electrical testing
Chemical testing
Corrosion
/Super duty materials/

LINK 003306

LINK 003205

202008

SHANGHAI INSTITUTE OF METALLURGY
ACADEMIA SINICA

86# Chang Ning Road
Shanghai, China

TEL: 520058 CABLE: 0253

DIRECTOR: Dr. Zou Yuxi
PROFESSIONAL STAFF: 40 (Iron and steel sector)
BUDGET 1991: F100,000 (Iron and steel sector)

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1991-92:
MECHANICAL and MATERIAL TESTING:
Mechanism of the /scavenging process/ in non-/strain ageing/ steels, /internal friction techniques/ as a method to study behaviour of nonmetallic /inclusions/, e.g. carbon and nitrogen
/Ageing of transition elements/ in iron and steel!
Influence of /rare earths/ on the /mechanical properties/ of iron and steels; mechanism of /grain growth/ prohibition by rare earth elements in iron and steel, improvement of mechanical properties by /grain refining/
CORROSION:
/Aluminium coatings/ on /mild steels/ by electrolysis in fused salts for protection against /high temperature oxidation/, alloys coatings, /electrochemistry/
Corrosion performance of /carbon steel/s in the Yangtze River, role of /chloride ions/
Corrosion in chemical process plant, steels resistant to /high temperature oxidation/, sulfidation, carbonization and high temperatures /hydrogen corrosion/
Environmental sensitive cracks, effects of various environmental parameters on /stress corrosion cracking/ of /reinforcing bars/ in concrete and in sodium chloride (salt) solution saturated with /calcium hydroxide/, mechanism of the cracking (/crack analysis/)
/Fracture mechanics/ and slow /strain rate/ techniques for evaluation of /high strength steels/ sensitivity towards stress corrosion cracking. Environmental sensitive cracking of steels in sulphur hydrides containing media
Applicability of /stainless steel/s /amorphous steels/ for corrosion resistant materials
AREAS FOR JOINT PROJECTS:
SERVICES, UTILITIES
Quality control and materials testing
ENGINEERING, TESTING PROCEDURES
Mechanical testing
Corrosion

LINK 003307

303009

CENTRAL METALLURGICAL RESEARCH AND DEVELOPMENT INSTITUTE -
CNRDI
NATIONAL RESEARCH CENTER

Dokki
Cairo, Egypt

TELEX: Meroc UN 94022

DIRECTOR: Prof. Dr. A.A. Abdul Azim
PROFESSIONAL STAFF: 58
BUDGET 1991: \$300,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1991-92:
Large scale application of new /ore washing/ techniques and sintering tests of Bahari iron ore, substantial pilot plant tests, preparation of large ore samples, major modifications to pilot plant layout and flowsheet, screening and washing tests, /ore drying/ tests, sintering tests comparing raw and washed ores
Improving production of /free cutting steel/, /spring steel/, /carbon steel/s for nuts and bolts; /sintering techniques/, /metal forming/, mechanical and metallurgical testing of products, industrial applications
Improving /mechanical properties/ and /high temperature corrosion/ resistance of H.H./high temperature stable/ steel: long term /creep test/s on products
Improving /strength/ and /toughness/ of commercial /high strength steels/ low alloys: variable rolling schedules achieving /fine grain structure/ in the metal (/grain refining/). Corrosion tests on the resultant steels
Relationship between "as cast" structures of /mild steels/ and subsequent /rolling techniques/: preparing steel samples having a wide variety of "as cast" structures; subjecting these samples to standard rolling techniques; recommending favourable "as cast" structures for use in the continuous casting process
Evaluation of heat treatment process for spring steel manufacture, optimum heat treatment cycles for metal quality
Improving production techniques and product quality of hot dipped galvanization steel /steel sheet/: operational studies on the galvanising plant. Improvement of industrial process control leading to better grade of product, lowered production losses and /materials saving/ in zinc
Introduction of /oxygen lancing/ in electric /arc furnace/s: testing in electric furnaces and analysis of the effect of this technique on metal quality and economic aspects of the steelwork furnaces
Evaluation of Egyptian /bentonite/ for industrial use in foundry: acid and alkali activation of bentonite and testing of activated products
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
/Pelletizing/
Direct reduction
Iron making
Steel making
/Continuous casting/
Steel casting
Steel rolling
SERVICES, UTILITIES
/Instrumentation/ and process control
Quality control and materials testing
ENGINEERING, TESTING PROCEDURES
Structural testing
Mechanical testing
Chemical testing
Corrosion
/Super duty materials/
ECONOMIC ASPECTS, MANAGEMENT
World trends
Feasibility study preparation

JOINT PROJECTS WITH:
Egyptian Iron and Steel Company Helwan
Delta Steel Company
Technical University of Clausthal, FR Germany
Spring Steel Company
Egyptian Academy of Scientific Research

LINK 003798

000010

EL-TABBIN INSTITUTE FOR METALLURGICAL STUDIES - TIMS

P.O. Box 862
Cairo, Egypt

TEL: 39642 CABLE: TABURASAT

DIRECTOR: Prof. Dr. A.M. Radwan
PROFESSIONAL STAFF: 50
BUDGET 1981: \$717,000

AREAS OF INTEREST

Iron and steel industry, metallurgy

CURRENT PROJECTS, 1981-82:

Increase of productivity by ore beneficiation, sintering,
treatment of /local raw materials/ to be used such as iron
ores, sands for casting, etc. Coke making, design and
redesign of metallurgical units, etc.
Pollution and environmental control technology, utilization
of energy resources, water and residues, environmental
management

/Instrumentation/ and process control

Ferrous and non-ferrous metallurgy

/Foundry technology/: casting, automation

Heat treatment

Mining engineering

AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

Iron ore and fuel /beneficiation/

Sintering

/Pelletizing/

Coke making

Direct reduction

Iron making

Steel making

/Continuous casting/

Steel casting

/Vacuum degassing/

Steel rolling

Combustion and energy saving

SERVICES, UTILITIES

Transport and materials handling

/Thermal utilities/

/Electrical utilities/

/Instrumentation/ and process control

Design and construction

Quality control and materials testing

/Waste treatment/ and recycling

Environmental control

ENGINEERING, TESTING PROCEDURES

Mechanical testing

Electrical testing

Chemical testing

Corrosion

ECONOMIC ASPECTS, MANAGEMENT

Costing

Planning and organization

Raw materials procurement

Equipment procurement

World trends

Feasibility study preparation

JOINT PROJECTS WITH:

Institut für Eisenhüttenwesen, TH Aachen, FR Germany

Université Technologique de Compiegne, France

Steel and Alloys Institute, Moscow, USSR

École Nationale Supérieure d'Arts et de Métiers, France

Polytechnical Institute, Sheffield, UK

LINK 003770

Finland

000011

METALLURGY LABORATORY
TECHNICAL RESEARCH CENTRE OF FINLAND - VTT

Metallinkenkujas 4
SF-02100 Espoo 15, Finland

TEL: 350 (91)4565400
TELEX: 122972 vttfin sf

DIRECTOR: Prof. Pekka Jauho
PROFESSIONAL STAFF: 50
BUDGET 1981: \$1,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
/FURNACE TECHNOLOGY/: melting of metals (/melting techniques/), /molten metal treatment/ and casting. Casting of special coatings and alloys. Heat treatment of castings. Moulding, core making and sand reclamation, /shell mould method/. Testing of /foundry materials/ /CORROSION/ and corrosion prevention: corrosion of metals and metallic coatings, testing of the performance of protective films/s, /corrosion failures analysis/, /potentiostatic techniques/, equipment for measuring thickness and porosity of coatings, /tensile testing/ machines for slow /strain rate/ /stress corrosion/ testing, /stress corrosion cracking/ of /austenitic stainless steel/
/METALLOGRAPHY/ and metals analysis: /structure analysis/ using /X-ray methods/, optical and /electron microscopes/, /scanning methods/ for surface testing
METAL WORKING and heat treatment by using model materials: working technology and workability (formability) of metals (/metal forming/), analysis of failures caused by incorrect working or heat treatment practices (/metal forming failures/)
MINERAL ENGINEERING: /magnetic/, electrostatic and gravity /mineral separation processes/
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel beneficiation
Iron making, /cupola furnace/
Steel making, /injection techniques/
Steel casting
Steel rolling
SERVICES, UTILITIES
Thermal utilities, steel heat treatment, /fluidized beds/
Instrumentation and process control
Quality control and materials testing
ENGINEERING, TESTING PROCEDURES
Structural testing, /microstructural properties/
Mechanical testing
Chemical testing
Corrosion
ENVIRONMENTAL ASPECTS, MANAGEMENT
Recruitment and training

JOINT PROJECTS WITH:

Technical University of Denmark, Copenhagen
SINTEF, Trondheim, Norway
Royal Institute of Technology, Stockholm, Sweden
Swedish Institute of Production Engineering, IVF, Gothenburg, Sweden
Luleå, Sweden
University of Uppsala, Sweden
Svenska Gjuteriföreningen, Jönköping, Sweden
Technological Institute, Tæstrup, Denmark

LINK 003398

Germany, Federal Republic of

000012

INSTITUT FUER EISENHUETTEKUNDE
Institute for Ironworks
RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN

Intzestrasse 1
D-5100 Aachen, FR Germany

TEL: 0241/805782 CABLE: thac d
TELEX: 832704

DIRECTOR: Prof. Dr. W. Dahl
PROFESSIONAL STAFF: 160
BUDGET 1981: \$3,600,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Cook-gasification, /blast furnace/, steel /melting techniques/, /streaming conditions/, /fracture mechanics/, /wide plate testing/
/Thermodynamics/ and kinetics of steaking, material behaviour under particular conditions of usage (/mechanical properties/)
IRONWORKS:
/Waste heat utilization/
/Coal-oil-slurry blowing technology/
/Sinter exhaust gas desulfurization/
Iron ore beneficiation: heating, filtering, separation of pollutants (/ore washing/)
Reduction: transporting, /agglomeration/, thermodynamics
METALLURGY:
/Electro-slag refining process/
Fundamental studies on slags: /slag rheology/
/Nitrogen diffusion/
Processing techniques: /alkaline-earth metal treatment/ of /pig iron/ and steel; /spray refining/
/Plasma processes/: /nitrogen solubility/ in /liquid steel/ and its alloys in a /plasma furnace/
/-dogen embrittlement/ of steel
/Interfacial tension/ between /molten iron alloys/ and fluid slags, /gas pockets/, physical and chemical reactions at the impact of /oxygen streaming/ on crude iron
Welding, welding temperature cycles
Continuous casting: /structural steel/
/Thermomechanical treatment/: /deformation/; corrosion behaviour of /austenitic stainless steel/
/Rupture toughness/ of /high strength steels/, fracture mechanics of steels after /carburization/, /crack extension/ for classification of high strength steels under stress conditions, /stress ratio/ and its importance for steel behaviour, fracture mechanics due to /microstructural properties/
/Strain hardening/
Changed mechanical properties as a result of /ageing/
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
/Pelletizing/
Coke making
Direct reduction
Iron making
Steel making
/Continuous casting/
Steel casting
/Vacuum degassing/
Combustion and energy saving
SERVICES, UTILITIES
Transport and materials handling
/Instrumentation/ and process control
Design and construction
Quality control and materials testing
/Waste treatment/ and recycling
Environmental control
ENGINEERING, TESTING PROCEDURES
Structural testing

Mechanical testing
Chemical testing
Compression
ECONOMIC ASPECTS, MANAGEMENT
Costing
Financing
Raw materials procurement
Equipment procurement
TENDENCIES

FEASIBILITY STUDY PREPARATION

JOINT PROJECTS WITH:
Direct Reduction Research Laboratory Nippon Kokan, Kawasaki,
Japan
Chief Ironmaking, Research Laboratory, Kawasaki Steel, Chiba,
Japan
Chiyoda Company, Tsurumi, Yokohama, Japan
Centre de Pesquisa Usiminas, Horto, Iperatinga-Mg, Brasil
Ironmaking Section, Yawata Works, Nippon Steel, Kitakyushu,
Japan

LINK 003309

900013

MAX-PLANCK-INSTITUT FUER EISENFORSCHUNG
Max-Planck-Institute for Iron Research

Max-Planck-Straße 1
D-4000 Düsseldorf, FR Germany

TEL: (0211) 6792-1
TELEX: 6586752

DIRECTOR: Prof. Dr. Hans-Jürgen Engell
PROFESSIONAL STAFF: 60
BUDGET 1981: 87,400,000

AREAS OF INTEREST

Iron and steel industry, metallurgy

CURRENT PROJECTS, 1981-82:

1. CHEMICAL METALLURGY:

Metallurgical possibilities for the removal of /inclusions/ from /liquid steel/s. Optimization of slag in the /electro-slag refining process/. Oxygen activity in /pig iron melts/. Solid electrolyte probes for /continuous oxygen measurement/ in molten steel /electrolytes/. /Oxidation degree/ of iron oxide in metallurgical slags (/iron oxidation/)

/Mass transfer/ between an injected gas stream and metal melts (/injection techniques/). Kinetics of formation of /oxide/ /mns/s. /Sticky scale prevention/ in /working pit/s

2. METAL WORKING:

Optimization of /rolling schedules/ and /cooling conditions/ in /hot rolling/ of HSLA steels. /Thermomechanical treatment/ of low alloy /structural steels/. /Deformation/ and cooling conditions for generation of /dual phase steel/. /Field stress/ in the temperature range of /marteite-ferrite-transformation/

Influence of deformation conditions on recrystallization and /grain growth/ of /austenitic stainless steel/s. Measurement and calculation of /rolling spread/. Thermal stress control in /cold rolling/ of strip. Influence of geometric and kinematic non-symmetry on the cold rolling process. Influence of chemical composition of drawing soap on the /metal rheological properties/

/Direct water cooling/ of /steel wire/. Testing of steels by /fracture mechanics/ methods. Influence of the geometry of the specimen on the stable /crack extension/ during fracture mechanics tests. /Crack arrest/. Fracture mechanics test of /welded joints/. /Creep rupture test/

3. APPLIED MATERIAL SCIENCE:

Atomic configuration in /iron solid solution/s. /Structure analysis/ at high temperatures. Heterogeneous phase transitions due to /magnetic/ effects in alloys.

/Plasticity/ of iron solid solutions. Thermomechanical treatment of electric sheets. /Mechanical properties/ and structure of /bainitic steel/s with low carbon content. /Creep/structural changes/ in coated nickel-alloys with high strength at high temperatures. Quantitative /metallurgy/. Calculations of /internal stress/es, considering also transformation processes. Kinetics and morphology of /precipitation/, /coarsening/ and /spheroidisation/. Interaction between precipitation and deformation at high temperatures (/creep/, /metal fatigue/). Hot galvanization of /silicon steel/s.

4. PHYSICAL METALLURGY

Finite element analysis of /creep deformation/ in crack vicinity. /Crack tip opening displacement/ (COD) in elastic-plastic materials. /Creep crack growth/ measurement. Theory of creep crack growth in metallic materials under /constant loading/ or /cyclic loading/. Model for the /cracking of oxide scales/ on creeping metals. Sequence effects during /fatigue cracks/ initiation in various steels.

Formation mechanism of extrusion-intrinsic-pairs during cyclic loading. Calculation of characteristic /dislocation distribution/s in /fatigue hardening/ pure metals.

/Hydrogen embrittlement/ at extremely low hydrogen pressure. Calculation of /hydrogen distribution/ in the vicinity of the crack tip under equilibrium conditions

Hydrogen permeation measurements/ In iron-silicon crystals. Hydrogen embrittlement in nickel. Determination of lattice constants using X-ray measurement/ at high temperatures.

Numerical Chemistry:

Grain boundary segregation/ of phosphorous and tin in iron.

Creep boundary segregation and mechanical properties of steels. /Creep embrittlement/ of Fe-Al-Mn-steels by creep studies.

Elemental diffusion in grain boundaries (nonmetal atoms on the iron surface)

Diffusion of segregated nonmetal atoms on the iron surface (ESCA-studies)

Silicon /surface segregation/ on iron single crystals. Oxygen surface segregation on metal and oxides. Measurements of hydrogen adsorption on surfaces and fracture surfaces of iron-silicon alloys and nickel by contact potential

differences (surface properties/). Influence of surface area/

on grain boundary segregation/ on the corrosion of iron and steel.

Thick passive films/ on stainless steels/a. AES and ESCA-

Investigations of passive films on stainless steel and of

/oxide layer/. Kinetics of methane-transformation by carbon dioxide on iron as a catalyst. Kinetics of the

carburization/ of iron and carburizing steels in methanol-nitrogen.

Kinetics of carburization and decarburization of iron, ferronickel and nickel in CH₄-H₂

/graphite coke deposition/ from gas atmospheres on iron, nickel, and iron. Effects of sulphur addition and oxide layer, oxidized carbide formation on high temperature oxidation stresses of carbon monoxide, methane and CO₂-H₂O. Creep and corrosion of alloys in corrosive atmosphere. Structural changes of alloys by high temperature creep/ and high temperature corrosion/

Bulk and grain boundary diffusion/; stress corrosion/, effect of nitrogen/; off-shore structures/; crack extension/ in sea water/; hydrogen binding energies/ in iron and steel;

electrochemical influences/; strain direction/; aspiration/

AES/ESCA joint projects: TECHNOLOGIES, PROCESSES

Steel making

/Continuous casting/

STEEL ROLLING ENGINEERING, TESTING PROCEDURES

Mechanical testing

Chemical testing

Corrosion

000014

**DEPARTMENT OF METALLURGY
INDIAN INSTITUTE OF SCIENCE**

Bangalore 560 012, India

India

DIRECTOR: Prof. S. Ramaeshan

PROFESSIONAL STAFF: 17

BUDGET: \$110,000

AREAS OF INTEREST

Iron and steel industry, metallurgy

CURRENT PROJECTS: 1981-82:

ORE AND FUEL BENEFICIATION: Energy saving for grinding by addition of minor amount of surfactants/; properties of

the produced fines to find out their suitability for actual usage.

DIRECT REDUCTION: analysing physico-chemical reactions in rotary kilns/ process based on mathematical and other

/theoretical modeling/ studies

IRON MAKING:

Analysis of blast furnace/ process; mathematical model of the process to determine response time of the process for any fluctuations in input variables

ANALYSIS OF IRRED, EIEB AND PLASMA MELT (plasma processes/): mathematical and other models to develop a better understanding of the process and to determine its

suitability under Indian conditions

STEEL MAKING:

Equilibrium model of steel making processes; temperature and composition of bath as a function of time if alloy, metal and gas are in-global equilibrium or in restricted

equilibrium

ELECTRO-Slag refining process/: analysing physico-chemical

aspects using low temperature models, characteristics of

processes produced by E.S.R. Technique

COMBUSTION AND ENERGY SAVING: optimum/rolling techniques/;

ideal/ making temperature/ to minimise the total energy consumed during rolling

AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

Iron ore and fuel/beneficiation/

Direct reduction

Steel making

Combustion and energy saving

LINK 003310

INDIA

RESEARCH AND DEVELOPMENT CENTER FOR IRON AND STEEL
STEEL AUTHORITY OF INDIA

Ranchi 834 002, India

TEL: 20021 CABLE: ISPAT RANCHI
TELEX: 625-257

DIRECTOR: Dr. G. Mukherjee
PROFESSIONAL STAFF: 251 (technical)
BUDGET 1981: \$12,790,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:

Experimental /blast furnace/, appropriate technology of iron making suited to the characteristics of /local raw materials/ referring particularly to coal quality, iron ore, /fluxes/, etc. Coal-gasification and /materials saving/. Coke oven and by product units in steel plants /COMPOSITE FLOWING/ in converter steel making operation, appropriate technology incorporating concurrent blowing from top and bottom in steel making converter to optimize productivity and increase converter lining life /Agglomeration/ of ore fines, technology for /cold bounded pellets/ /Injection techniques/: /coal injection/, /lime dust injection/ into blast furnace and /desulfurization/, /desiliconization/ of hot metal outside blast furnace /Twin hearth technology/, /deoxidation/, secondary steel making and casting, extended arc melting (/arc furnace/) Systems for cooling to minimize roll /wear/ (/cooling conditions/), /cold/ rolling/ studies to improve surface quality, shape and tolerance; introduction of roll lubricants in /hot rolling/ mills Low alloy /high strength steels/ (HSLA steels), /boron/-treated cold-rolled deep drawing /steel sheet/, special grades of /ferritic stainless steel/s, substitution of /molybdenum/ in Mo-bearing steels, /weld-wire/ for spirally welded pipes Steel plant refractory qualities and practices, /lance coating technology/ for /ladle injection/ Energy saving: improving the performance of burners, burning fuel, heat exchangers, efficient utilisation of fuel /Instrumentation/ and control systems

Fracture and /failure analysis/ of /structural steel/s and /pipeline steel/s, /rupture toughness/ techniques, /high temperature deformation/ of steels, /abrasion resistant/ materials for components of steel plant equipment, /dual phase steel/ for automotive applications, /creep resistant steel/s, material characterization Coatings and suitable techniques for corrosion resistance of structural steels, /mechanical properties/ at high temperature and in hostile environment; corrosion resistance of /gas pipeline/s, /stress corrosion cracking/ analysis

AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

- 1.1. ore and fuel /beneficiation/
- /sintering
- /Pelletizing/
- Coke making
- Direct reduction
- Iron making
- Steel making
- /Continuous casting/
- Steel casting
- /Vacuum degassing/
- Steel rolling
- Combustion and energy saving
- SERVICES, UTILITIES
- /Instrumentation/ and process control
- Quality control and materials testing
- ENGINEERING, TESTIVE PROCEDURES
- Corrosion
- /Super duty materials/

JOINT PROJECTS WITH:
Bhabha Atomic Research Centre, BARC, India
Central Ferrous Metallurgical Research Institute,
TSNICHERMET, USSR
British Steel Corporation, UK
International Flame Research Foundation, The Netherlands
British Carbonisation Research Association, BCRA, UK

LINK 002191

Indonesia

000016

NATIONAL INSTITUTE FOR METALLURGY - NIM

Kompleks LIPI
Jalan Cisitu
Bandung, Indonesia

TEL: 022-81055

DIRECTOR: Dr. Ir. Djoeuwito Atmodjojo
PROFESSIONAL STAFF: 150
BUDGET 1981: \$1,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:

Ferrous alloys (/ferro manganese/, /ferro silicon/, etc.); appropriate technology for processing /local raw materials/ including feasibility study Small scale /blast furnace/ using charcoal for production of /pig iron/ Appropriate technology for small scale cement plant producing cement of medium quality Treatment of iron and nickel bearing /laterite/ /Beneficiation/ and processing of copper sulfide of Kuroko-type deposit ores from Sulawesi Processing of /sulfide ores/ by /sulphation roasting/ process

JOINT PROJECTS WITH:

National Institute for Pollution and Resources, Japan
Department of Mineral Science and Technology, Kyoto University, Japan
Department of Metallurgy, Kyoto University, Japan
Research Productivity Council, New Brunswick, Canada

LINK 003311

Italy

000017
ISTITUTO DI METALLURGIA
Institute for Metallurgy
UNIVERSITA DI ROMA

15, via Eudossiana
I-00184 Rome, Italy
TEL: 06/464-284

DIRECTOR: Prof. Giuseppe Vichi
PROFESSIONAL STAFF: 20

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Physical and mechanical metallurgy
Extractive metallurgy
Ferrous and nonferrous metallurgy

LINK 003312

Japan

000018
NATIONAL RESEARCH INSTITUTE FOR METALS - NRIIM

3-12 Nakagururo-2 Meguro-ku
Tokyo 153, Japan

TEL: 03(719)2271

DIRECTOR: Dr. Toru Arai
PROFESSIONAL STAFF: 464
BUDGET 1981: \$20,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Reliability and evaluation of /strength/ of steels under
various environmental and /loading conditions/
Long term /fatigue tests/ of /structural steel/ under
natural, corrosive and high temperature environments, with
the agreed testing methods and specimens. Damage rule and
prediction method of material life are established on the
basis of fatigue mechanism studies
Refining of /pig iron/ containing /niobium/ and some other
elements: combined production process of valuable metals,
e.g. niobium, tantalum, and a high quality steel from a
complex Chinese iron ore
Atmospheric corrosion of metals and alloys: estimating the
corrosion rate of bare metals and alloys and improving
surface coating processes

MATERIALS DEVELOPMENT:

/Superconductivity/ and /cryogenic/ materials
/Reactor materials/, /austenitic stainless steel/, /aluminium
alloys/, surface coatings

Iron-titanium-oxygen alloys for hydrogen storage: /metal
hydride/

/High temperature stable/ /gas turbine steels/
Sea-water resistant /high strength steels/ with high
/toughness/ for /off-shore structures/, /fracture
mechanics/ and /mechanical properties/ of those steels

/Thermocouples/ with high performance and extended lifetime,
for direct conversion of heat energy into electricity

PROCESS ENGINEERING:

Preventing pollution by water-soluble moulds: /metal
recovery/ from /waste water/ by metal suspension
electrolysis

/Materials saving/ by recycling of automobile metal scrap,
energy saving by direct reduction process: direct reduction
furnace; usage of new metal resources

Welding procedure: /welding robots/, shape and dimension of
/welded joints/

MATERIALS RELIABILITY:

Mechanical strength of structural materials, /creep rupture
test/, /creep test/, /creep metal fatigue/ test, /high
temperature fatigue/ test, /rotating bending fatigue/ test
/Ultrasonic techniques/ for steel cracks in advanced nuclear
power reactors

/Stress corrosion cracking/ and /corrosion fatigue/, /crack
arrest/ in LWR materials

/Electron microscopes/ analysis

AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

Iron making

Steel making

SERVICES, UTILITIES

Quality control and materials testing

ENGINEERING, TESTING PROCEDURES

Corrosion

JINT PROJECTS WITH:

Beijing University of Iron and Steel Technology, China

National Metallurgical Laboratory, CSIR, India

LINK 003313

Poland

000019

INSTYTUT METALURGII ZELAZA
Institute of Ferrous Metallurgy

Ul. Karola Wårski 10/12
44-100 Gliwice, Poland
TEL: 31-40-51
TELEX: 936242

DIRECTOR: Prof. Dr. B. Witka
PROFESSIONAL STAFF: 751
BUDGET 1981: 96,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Organisation of metallurgical institutes, trouble shooting,
feasibility studies and training in Angola, Brazil,
Argentina, Mexico, China and Peru
Ferro-alloys production and consumption in Pakistan
Feasibility studies and local iron ores application in
Cameroon
Production of tools and simple agricultural equipment in Laos
/Wire drawing/
Rolling

AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

Iron ore and fuel /beneficiation/
Sintering
Iron making
Steel making
/Continuous casting/
/Vacuum degassing/
Steel rolling
Combustion and energy saving
SERVICES, UTILITIES
/Thermal utilities/
/Instrumentation/ and process control
Design and construction
Quality control and materials testing
/Waste treatment/ and recycling
Environmental control
ENGINEERING, TESTING PROCEDURES
Structural testing
Mechanical testing
Electrical testing
Chemical testing
Corrosion
/Super duty materials/
ECONOMIC ASPECTS, MANAGEMENT
Marketing
Recruitment and training
Rationalization and Inventory
World trends
Feasibility study preparation

LINK 003315

000020

INSTYTUT GÓŁEWNICTWA

Ul. Zakopiańska 73
30-418 Krakow, Poland

TEL: 642-40 CABLE: I GD
TELEX: Krakow 0322421

DIRECTOR: J. Tybulecuk

AREAS OF INTEREST
Iron and steel industry, metallurgy
/Foundry technology/
Nonferrous metals industry, casting of metals, welding
Chemical processing of coal and wood, charcoal, coke
Refractory materials industry
Linings for melting and heat treatment furnaces
Plasticity

LINK 003314

Romania

300021

CENTRAL INSTITUTE FOR METALLURGICAL RESEARCH - ICER

Yehadia Street 39
77777-Bucharest 7000, Romania

TEL: 494030
TELEX: 011349-TC-

DIRECTOR: Dr. Eng. I. Dragan
PROFESSIONAL STAFF: 705
BUDGET 1981: 45,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1991-92:
/Ladle injection/ techniques
Manufacture technology for /aluminium alloys/ for aircraft
industry and /reactor materials/
Influence of certain factors (chemical analysis, including
residual elements content, structure and microstructure,
/internal stress/ess, etc.) on corrosion resistance of
/austenitic stainless steel/s of chrome-riched 18-8 and
chrome-manganese-nickel-nitrogen types
Hot and cold processing, heat treatment, adjustment and
control of titanium alloys used in aircraft and chemical
industries
Methods to determine sensitivity to /hydrogen embrittlement/
and /stress corrosion cracking/. Characterization of the
quality of hydrogen media resistant /steel plates/
Change of the coal plastic phase characteristics in the
cooking process
Obtaining and characterization of the various synthetic forms
of carbon, of /pyrocarbon/, /pyrographite/ and vitreous
carbon types
Adjustment and control of fuel tubes (shroud tubes) of
zirconium alloys for nuclear reactors
Extruding and finishing technology for complex shapes made of
steel and ferrous alloys
Manufacture of round and flattened wires from silicon and
resistant steels and alloys /steel wire/
Improving /fatigue strength/ of oil /drill pipes/; improving
quality of the AISI 4330 /stainless steel/
Stainless and special steel making procedures
Steels with high stress corrosion cracking resistance,
rolling of flat products made of stainless and heat
resisting steels
Interaction between /plasticity/ /metal forming/ and
/fracture mechanics/ in the process of /hot plastic
forming/ of stainless steels
Methods for complete burning of liquid and solid fuels in the
/blast furnace/. Deoxidization and aluminum bearings steel
alloying procedures. Improving quality of carbon and
converter alloyed steels by establishing the process in the
converter and the steel treatment outside the furnace.
Manufacture technology for special quality silicon
transformer steel
Reduction of coke consumption, /Hot rolling/, /rolling
techniques/ for /silicon steel/, etc.
Energy saving, /materials saving/, /metal recovery/,
microalloyed steels for dynamically stressed welded
structures
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
/Pelletizing/
Coke making
Direct reduction
Iron making
Steel making
/Continuous casting/
Steel casting
/Vacuum degassing/
Steel rolling
Combustion and energy saving
SERVICES, UTILITIES

Transport and materials handling
/Thermal utilities/
/Electrical utilities/
/Instrumentation/ and process control
Design and construction
Quality control and materials testing
/Waste treatment/ and recycling
Environmental control
ENGINEERING, TESTING PROCEDURES

Structural testing
Mechanical testing
Electrical testing
Chemical testing

Corrosion
/Super duty materials/
ECONOMIC ASPECTS, MANAGEMENT
Costing
Marketing
Financing

Planning and organization
Recruitment and training
Rationalization and inventory
Raw materials procurement
Equipment procurement
World trends
Feasibility study preparation

JOINT PROJECTS WITH:

CERINET, Torino
NISSHIN Steel Company, Japan
NISSHO IWAI Corporation, Japan
VOEST-Alpine, Austria
Royal Institute for Metallurgical Research
Metallurgical Research Institute, TNIICERNET, USSR
Metallurgical Research Institute, GHIPKOMEZ, USSR
Institute for Metallurgical Research, VASCUT, Budapest,
Hungary

LINK 003316

Spain

Sweden

000022

CENTRO NACIONAL DE INVESTIGACIONES METALURGICAS - CENIM
CENTRE SUPERIOR DE INVESTIGACIONES CIENTIFICAS

Avenida Gregorio del Amo
S/n Ciudad Universitaria
Madrid-3, Spain

TEL: 2538900

DIRECTOR: Jose Antonio Sureda Sopena
PROFESSIONAL STAFF: 90
BUDGET 1981: \$5,700,000

AREAS OF INTEREST:

Metalurgy, iron and steel industry
SPECIFIC PROJECTS 1980:
Use of iron crees; optimizing of highly intensive /magnetic/
separation, substitution of oil by coal in pelletization,
structural analysis in minerals and conglomerates
Nonferrous metals extraction
Science and techniques of metals and their corrosion
CURRENT PROJECTS, 1981-82:
Ladle injection/: /injection lance/, light, adapted to
function at 1530 degrees Celsius
Energy saving during sinter processing, prolonged ignition,
preheated charge, sinter in double bed, etc.
Combustion study in /lance nozzles/ zone
Heat recovery from waste gases of electric furnace
/Coal injection/ in /blast furnace/
AREAS FOR JOINT PROJECTS:
TECHNICAL SCIENCES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
Coke making
Iron making
Steel making
Combustion and energy saving
SERVICES, UTILITIES/
Thermal utilities/
Quality control and materials testing
ENGINEERING, TESTING, PROCEDURES
Structural testing
Mechanical testing
Chemical testing
Corrosion

JINPT PROJECTS WITH:

Instituto Argentino de Siderurgia, Argentina
Instituto Mexicano de Investigaciones Siderurgicas, Mexico
LINK 001476

000023

INSTITUTET FOER METALLFORSKNING
Swedish Institute for Metals Research

48, Drottning Kristinas Vaag
S-114 28 Stockholm, Sweden

TEL: 08/243330

DIRECTOR: Prof. Rune Lagneberg
PROFESSIONAL STAFF: 70
BUDGET 1981: \$3,600,000

AREAS OF INTEREST

Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Influence of sintering atmosphere on material properties of
sintered steel parts
Temperature distribution and /flow pattern/ of the /liquid
steel/ in the moulds during continuous casting of steel
Influence of phosphorus on the properties of low-alloy steels
Criteria for service-life increase of /high temperature
stable/ steels used for power equipment
Influence of /porosity/ on the /mechanical properties/ of
sintered steel
/Rare earths/ addition to /stainless steel/s, their influence
on corrosion, /metal oxidation/ and creep properties
Properties of /tool steels/
Analysis, measurement and application of flow patterns
including /thermomechanics/ and recrystallisation
ANALYTICAL CHEMISTRY:
/X-ray measurement/, /scanning methods/ for detecting trace
elements, spectrophotometry
STRUCTURAL METALLURGY:
/Creep/: /creep rupture test/ of /ferritic stainless steel/s
and /austenitic stainless steel/s, /microstructural
properties/, creep behaviour of /welded joints/, /thermal
fatigue/ of steels for /hot rolling/ and continuous casting
equipment, /strain rate measurement/ to determine residual
life of creep deformed materials
Hot working: /high temperature deformation/, correlation of
flow behaviour and microstructure evolution, /microalloyed
steel/s, /copper alloys/, austenitic stainless steel,
/aluminium alloys/, /high speed steel/, /austenite-ferrite-
transformation/, /grain refining/, extruding, /dual phase
steel/, /grain boundary segregation/
Cold /metal forming/: dual phase steels for the automobile
industry, /ductile fracture/ with particular reference to
/wire drawing/ (/drawing defects/); influence of different
alloying additions, /annealing/ temperatures and cooling
rates on the mechanical properties
In situ experimentation by /electron microscopes/. Analysis
of /cavity nucleation/, /cavity growth/ and /cavity
linkage/ around /inclusions/ and their role in the ductile
failure of wire (/failure analysis/)
/Metallography/
MECHANICAL METALLURGY:
/Strength/, ductility, fatigue properties, /toughness/,
/formability limits/ and machinability
/Quenched steel/s and /tempered steel/s: influence of
residuals on properties, metal scrap based steelmaking
particularly for /steel strip/, /high strength steels/,
tolerable limit of phosphorus in different steels (non-
metallic inclusion)
Tool steels: vacuum heat treatment, influence of /slow
cooling/
High speed steels: Influence of carbide characteristics on
properties
Welding: microstructural properties of welds and heat-
affected zones; sulfide /stress corrosion cracking/;
interaction between micro-inclusions, microstructure and
mechanical properties in weld metal; /high temperature
cracking/ in weld metal of austenitic stainless steels,
/tensile testing/
SOLIDIFICATION and CASTING:
/Steel solidification/: Industrial grain refining by

/Innervation/, effective nucleants thermodynamically
 stable under prevailing melt conditions; /cooling
 conditions/
 Continuous casting of steel: conditions prevailing in the
 moulds, e.g. function and properties of /mould powder/ and
 frictional forces between strand and mould
 Reaction between solid and liquid metal: elements
 /diffusion/ from liquid phase to solid metal; hot
 galvanization and the silicon problem, /soldering/ of wire
 Powder metallurgy: effects of /impurities/ compounds,
 /materials saving/ by using less pure raw materials when
 producing semifinished products
 CORROSION:
 Microstructure and /stainless steel/
 Corrosion fatigue: /protective film/s, /pitting potential/
 in connection with applied loads, /crack extension/
 /fatigue cracks/
 Passivity or dissolution of stainless steels:
 /electrochemistry/, /grain corrosion/, borides and
 substitution of nickel and chromium by other alloy elements
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
 /Continuous casting/
 ENGINEERING, TESTING PROCEDURES
 Structural testing
 Technical testing
 Chemical testing
 Corrosion

JOINT PROJECTS WITH:

-ETAFRAI, Beauchamp, France
 IRSID, Metz, France
 VNIITMASH, Moscow, USSR
 Central Iron and Steel Research Institute, Peking, China
 Bergakademie, Freiberg, German DR

LINK 003618

Turkey

060024

DEPARTMENT OF MATERIALS RESEARCH
 MARMARA SCIENTIFIC AND INDUSTRIAL RESEARCH INSTITUTE
 SCIENTIFIC AND TECHNICAL RESEARCH COUNCIL OF TURKEY - TUBITAK

0K, 21
 Gebze, Kocaeli, Turkey
 TEL: 2300 CABLE: TUBITAK-GBZB
 TELEX: Istanbul 20737C

DIRECTOR: Prof. Lutfullah Ulukan

AREAS OF INTEREST

Iron and steel industry, metallurgy
 CURRENT PROJECTS, 1981-82:
 Development of the Process and Quality Control System of the
 Turkish Karabuk Iron and Steel Works
 /Blast furnace/ operation optimization: mathematical
 /theoretical modelling/ of a blast furnace in one of the
 Turkish integrated steel plants (probably "Eregli") with a
 computer programme on heat and material balance of the
 furnace, maximum productivity, minimum coke rate, and iron
 ore pricing
 /X-ray measurement/, /scanning methods/, /electron
 microscopes/
 Thermal properties
 /Magnetic/ properties
 Alloys
 /Metallurgy/
 /Mechanical properties/ and /testing/
 /Non-destructive testing/
 Heat treatment
 Powder metallurgy
 Raw materials, industrial wastes
 /Plasma processes/
 Foundry
 Investment casting
 /Shell mould method/
 Forging, rolling, pressing
 /Sponge iron/ pellets, /dual phase steel/, /ultrasonic
 techniques/, /inclusions/ in steel, /electro-slag refining
 process/, /hydrogen embrittlement/ in in-situ composites,
 orientation relation between phases in circumferentially
 grown Al-Al₃N₄ eutectic composite
 Centrifugal casting process for rolls
 Physical properties of moulds and core sands
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
 Iron making

JOINT PROJECTS WITH:

Metallurgical Institute Hasan Brkic, Zenica, Yugoslavia
 LINK 003318

400825

**MADDE TETKIK ARAMA DUSTRIESI - MTA
Mineral Research and Exploration Institute**

Sakisir Yolu
Ankara, Turkey

TEL: 39-42-54 CABLE: METEA-Ankara
TELEX: 42741 MTA TR

DIRECTOR: Dr. M. SITKI SANCAR

PROFESSIONAL STAFF: 2000

BUDGET 1981: \$14,000,000

AREAS OF INTEREST

Iron and steel industry, metallurgy

CURRENT PROJECTS, 1981-82:

Exploration of ore deposits

AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES

Iron ore and fuel /beneficiation/

Sintering

Coke making

ECONOMIC ASPECTS, MANAGEMENT

World trends

Feasibility study preparation

JOINT PROJECTS WITH:

Tutokuspe-Dy

LINW 003217

Subject Index

Abrasion resistant	India 00015	Blowing conditions:	Brazil 00003
Ageing	Germany, Federal Republic of	SEE ALSO Composite blowing	
Ageing of transition elements	China 00000		
Ageingeration	Canada 00005		
Aging	Germany, Federal Republic of		
Aircraft industry	000012		
Alkaline-earth metal trichloride	India 00015		
Alloys	Russia 00021		
Alloys: SEE ALSO Copper alloys	Germany, Federal Republic of		
Alloys: SEE ALSO Aluminum alloys	Germany, Federal Republic of		
Alloys: SEE ALSO Nickel-based steel	Germany, Federal Republic of		
Alloys: SEE ALSO Melted iron alloys	Germany, Federal Republic of		
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EL-TARIBIN INSTITUTE FOR METALLURGICAL STUDIES	000010	SCIENTIFIC AND TECHNICAL RESEARCH COUNCIL OF TURKEY DEPARTMENT OF MATERIALS RESEARCH	000024
INDIAN INSTITUTE OF SCIENCE DEPARTMENT OF METALLURGY	000014	SHANGHAI INSTITUTE OF METALLURGY ACADEMIA SINICA	000008
INSTITUT FUER EISENMUETTERKUNDE Institute for Ironworks RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	000012	SOCIETE NATIONALE DE SIDERMURGIE DIRECTION RECHERCHE APPLIQUEE	000001
Institute for Ironworks INSTITUT FUER EISENMUETTERKUNDE RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	000012	STEEL AUTHORITY OF INDIA RESEARCH AND DEVELOPMENT CENTER FOR IRON AND STEEL	000015
Institute for Metallurgy ISTITUTO DI METALLURGIA UNIVERSITA DI ROMA	000017	Swedish Institute for Metals Research INSTITUTET FUER METALLFORSKNING	000023
Institute of Ferrous Metallurgy INSTYTUT METALURGII ZELAZA	000019	TECHNICAL RESEARCH CENTRE OF FINLAND METALLURGY LABORATORY	000011
Institute of technological research INSTITUTO DE PESQUISAS TECNOLOGICAS	000003	UNIVERSITA DI ROMA ISTITUTO DI METALLURGIA Institute for Metallurgy	000017
INSTITUTET FÖR METALLFORSKNING Swedish Institute for Metals Research	000023	UNIVERSITY OF TORONTO DEPARTMENT OF METALLURGY AND MATERIALS SCIENCE	000006
INSTITUTO ARGENTINO DE SIDERURGIA	000002		
INSTITUTO DE PESQUISAS TECNOLOGICAS Institute of technological research	000003		
INSTYTUT METALURGII ZELAZA Institute of Ferrous Metallurgy	000019		
INSTYTUT ODKLADNICTWA	000020		
IRON AND STEEL RESEARCH INSTITUTE ANSHAN IRON AND STEEL COMPLEX	000004 000007		
ISTITUTO DI METALLURGIA Institute for Metallurgy UNIVERSITA DI ROMA	000017		
MADEN TETKIK ARAMA ENSTİTÜSÜ Mineral Research and Exploration Institute	000028		
MARMARA SCIENTIFIC AND INDUSTRIAL RESEARCH INSTITUTE DEPARTMENT OF MATERIALS RESEARCH	000024		

UNITED NATIONS



NATIONS UNIES

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

QUESTIONNAIRE

Co-operative Arrangements
Among Research Institutes
(Iron and Steel Sector)

Country _____

1. Name of institute _____

2. Institute address _____

Telephone _____ Cable address _____

Telex _____

3. Name of director/head of institute _____

4. Total number of professional staff in
1981/1982 _____

5. Name of the person in charge to be contacted
on industrial research activity _____

6. Approximate budget in 1981
(give approximate equivalent in US Dollars) _____

7. Joint Research Proposed:

In what areas of competence is your institute interested in joint
research programmes with research organizations of other developing
and developed countries? (Check below and specify title)

TECHNOLOGIES / PROCESSES/	SERVICES / UTILITIES/	ENGINEERING / TESTING PROCEDURES/	ECONOMICS / MANAGEMENT/
7.1.1 <input type="checkbox"/> ore and fuel beneficiation	7.2.1 <input type="checkbox"/> transport and material handling utilities	7.3.1 <input type="checkbox"/> structural	7.4.1 <input type="checkbox"/> costing
7.1.2 <input type="checkbox"/> Sintering	7.2.2 <input type="checkbox"/> thermal utilities	7.3.2 <input type="checkbox"/> mechanical	7.4.2 <input type="checkbox"/> marketing
7.1.3 <input type="checkbox"/> Pelletizing	7.2.3 <input type="checkbox"/> electrical utilities	7.3.3 <input type="checkbox"/> electrical	7.4.3 <input type="checkbox"/> financing
7.1.4 <input type="checkbox"/> Coke Making	7.2.4 <input type="checkbox"/> instrumentation and process control	7.3.4 <input type="checkbox"/> chemical	7.4.4 <input type="checkbox"/> manning and organization
7.1.5 <input type="checkbox"/> Direct Reduction	7.2.5 <input type="checkbox"/> design and construction	7.3.5 <input type="checkbox"/> corrosion	7.4.5 <input type="checkbox"/> recruitment and staff training
7.1.6 <input type="checkbox"/> Iron Making	7.2.6 <input type="checkbox"/> quality control and material testing	7.3.6 <input type="checkbox"/> super duty materials	7.4.6 <input type="checkbox"/> rationalization and inventory
7.1.7 <input type="checkbox"/> Steel Making	7.2.7 <input type="checkbox"/> waste processing and recycling		7.4.7 <input type="checkbox"/> procurement of raw materials
7.1.8 <input type="checkbox"/> Continuous Casting	7.2.8 <input type="checkbox"/> environmental control		7.4.8 <input type="checkbox"/> procurement of equipment
7.1.9 <input type="checkbox"/> Casting			
7.1.10 <input type="checkbox"/> Vacuum Degassing			
7.1.11 <input type="checkbox"/> Steel Rolling			
7.1.12 <input type="checkbox"/> Combustion and energy conservation			7.4.9 <input type="checkbox"/> world trends and feasibility studies

Please specify each project title with summary objectives and names of the institute with whom you would like to co-operate, if any.

8. Joint Research Experience:

If your institute is already carrying out joint research programmes/exchanges of trainees/information exchange/know-how agreements with a colleague institute abroad, please list project title, name of institute and outline present stage of joint work.

9. We enclose herewith our brochures/annual report

Co-operative R+D Project Documents/

Reports (past, ongoing, proposed one)

10. Please send to:

Mr. H.W. Pack
UNIDO (D1981)
P.O. Box 400
A-1400 Vienna
Austria.



