OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

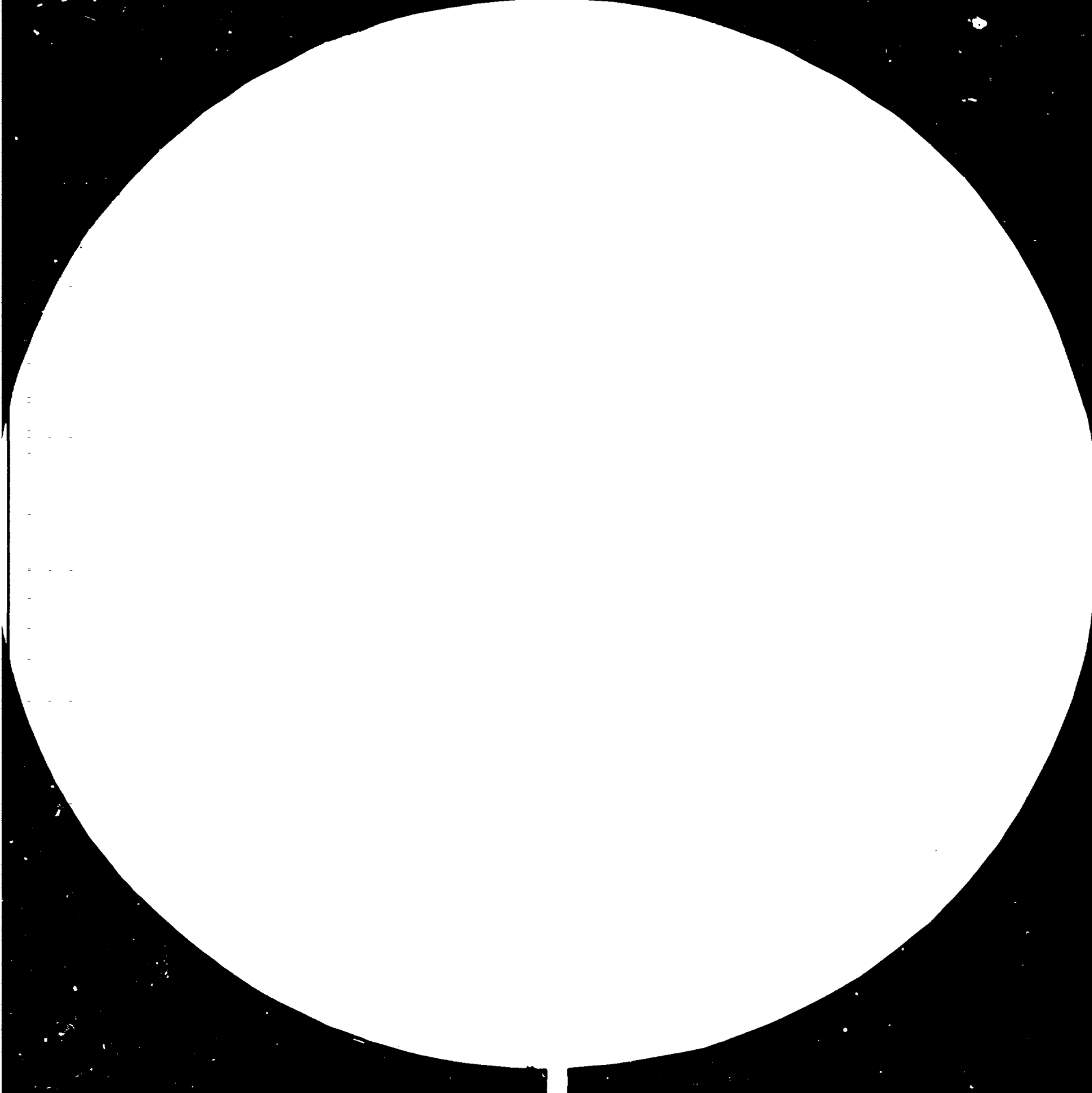
FAIR USE POLICY

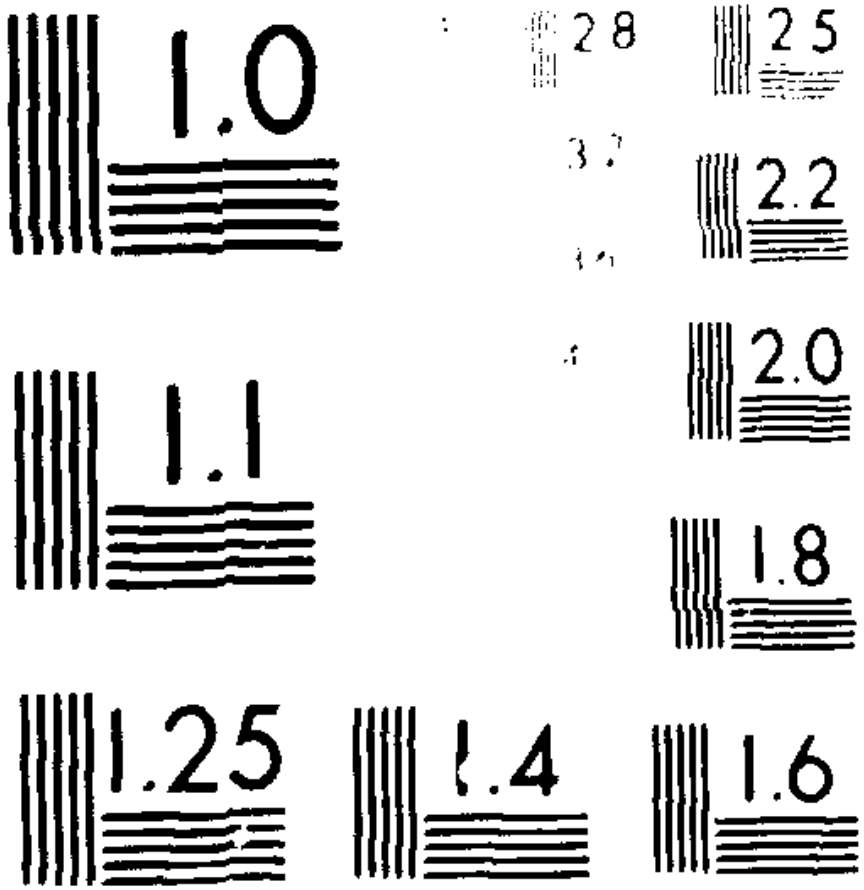
CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org




1.0
2.8
2.5
3.2
2.2
2.0
1.1
1.8
1.25
1.4
1.6

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Distr.
LIMITED
UNIDO/IS.318
18 June 1982
ENGLISH

11573

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

*This document has been reproduced without formal editing.

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

CONTENTS

Algeria

000001

DIRECTION RECHERCHE APPLIQUEE
SOCIETE NATIONALE DE SIDERURGIE

El-Hadjar BP 196
Annaba, Algeria

TEL: 83.22.45
TELEX: 81721

DIRECTOR: M. Hocine Hadjiat
PROFESSIONAL STAFF: 56
BUDGET 1981: $1,620,000

AREAS OF INTEREST: Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82
Thin 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 of 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
ENGINEERING, TESTING PROCEDURES
Corrosion
ECONOMIC ASPECTS, MANAGEMENT
Rationalization and inventory

LINK 000301

Argentina

000002

INSTITUTO ARGENTINO DE SIDERURGIA - IAS

Carlos Maria Della Paolera 226
1104 Buenos Aires, Argentina

TEL: 311-3639
TELEX: 9111 ACIMB AR

DIRECTOR: Dr. Nestor A. Barbagelata
PROFESSIONAL STAFF: 16
BUDGET 1981: $800,000

AREAS OF INTEREST: Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82
/Coal blending/ optimization, technical and economic coal selection for local conditions
MOA /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 /magnetite 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

000003

INSTITUTO DE PESQUISAS TECHNOLOGICAS - IPT
Institute of technological research

Caixa Postal 7141
Cidade Univ. Armando de Salles Oliveira
CEP 05508
Sao Paulo, Brazil

TEL: 369-22-11 R. 410
TELEX: (011) 22831 INPT BR

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 /flaw detection/ in materials such as KIC, JIC, CTD
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 investigation and coatings
Instrumental monitoring of off-shore structures for integrity against failures
2. /NON-DESTRUCTIVE TESTING/ techniques applied to OILFIELD TUBULAR GOODS (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 OF /TOOL 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:Fe+3 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 modeling/ 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 003303

Bulgaria

000004

IRON AND STEEL RESEARCH INSTITUTE

Sofia 1770, Botunetz, Bulgaria

TEL: 89-06-43
TELEX: 022 390 itcmet bg

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

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

LINK 003302

Canada

007008

DEPARTMENT OF METALLURGY AND MATERIALS SCIENCE
MCMASTER UNIVERSITY

1280 Maine Street West
Hamilton, Ontario, Canada, L8S 4L7

TEL: (416) 525-9140 X4793
TELEX: 0619347

DIRECTOR: Dr. J.D. Embury
PROFESSIONAL STAFF: 11
BUDGET 1981: $400,000

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
/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 behaviour, /metal forming/ operations, /plastic flow/ and failure in forming of /aluminium alloys/ and modern structural steels, /fracture mechanics/ for various imposed stress states, /ductile fracture/
Statistical models of /microcrack formation/ in relation to /cleavage failure/ and their application to /low temperature properties/ of controlled rolled /pipeline steel/s. Use of /electron microscopes/ and /scanning methods/ for electromicroscopical transmission
TRANSPORT phenomena in process metallurgy: commercial processes carried out by pneumatically /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 furnace/s and /plasma furnace/s, melting of /sponge iron/ pellets in /electric furnace slag/s
PASSIVE FILMS, localized corrosion, crystal growth and dissolution: localized breakdown of /protective film/s on metals, localized corrosion of nickel, nickel-base alloys and /austenitic stainless steel/s using /potentiostatic techniques/ and /galvanostatic 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
/DIFFUSION/, /TRANSFORMATION KINETICS/, and /THERMODYNAMICS/: heat treatment behaviour of steel alloys including [illegible] and very high /carbon steel/s. Predicting Fe base phase diagrams, /hardenability/, /temperability/, /carbo-[illegible] and /weldability/ and the systematics of HSLA steels; phase transformation kinetics in metals
Iron and STEELMAKING REACTIONS and processes: ironmaking and raw materials, physical chemistry and /carbonization/ transport phenomena, /agglomeration/ and blast furnace ironmaking, carbonization reactions. Mineralogical characterization of /iron ore concentration/, /induration conditions/ for 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 PROPERTIES at ELEVATED TEMPERATURES: deformation and fracture of structural materials at elevated temperatures, effect of microstructure and composition on /plastic creep/, /cavity nucleation/ and growth, /crack extension/; /pressure sintering/
/Cavitation/ in /superplastic alloys/, superplastic deformation of an ultra-fine-grained zirconia alloy, growth of /grain boundary cracks/ in high strength alloys, effect of segregating /impurities/ on /grain boundary creep fracture/
/HYDROMETALLURGY/: /liquid-liquid extraction/ techniques in hydrometallurgical separation of uranium, copper, nickel, cobalt, etc. Removal of radium from uranium /mine tailings/
/SURFACE PROPERTIES/ of metals: reactions between gases and well-characterized metals at an atomic and electronic level (/gas-metal reaction/). /Surface segregation/, /surface nitriding/
Mechanics of METAL FORMING PROCESSES, esp. sheet metal forming, failure analysis, /metal forming instability/ and fracture. /Strain hardening/ and /rate sensitivity/ connected with /strain localization/ and industrial /metal forming failures/
/PLASTICITY/ and deformation processes: sheet and bulk metal deformation processes, assessing the influence of material and processing variables on /forming loads/, deformation modes and /formability limits/
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Coke making
Iron making
Steel making
/Continuous casting/
/Vacuum degassing/
ENGINEERING, TESTING PROCEDURES
Mechanical testing
Corrosion
/Super duty materials/

JOINT PROJECTS WITH:
Cooperative training program involving students and faculty from Brazilian and Chinese universities

LINK 003304

003004

DEPARTMENT OF METALLURGY AND MATERIALS SCIENCE
UNIVERSITY OF TORONTO

Toronto, Ontario, Canada, M5S 1A4

TEL: 416-978-3012

DIRECTOR: Prof. Alexander McLean (Iron and Steel)
PROFESSIONAL STAFF: 12
BUDGET 1981: $200,000

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
/Desulfurization/ with salt coated magnesium granules
/Phosphorous reactions/ in iron and steelmaking
Use of /oxygen probes/ in steelmaking
/Hydrogen dissolution/ in molten slags and molten iron alloys
/Temperature control/ during transfer operations
/Tundish metallurgy/: /fluid flow/ and chemical control
Characterization of /mould powder/s
Use of /rare earths/ in continous casting
Metallurgical aspects of EMS during continous 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/
/Plasma processes/ in steelmaking
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Direct reduction
Iron making
Steel making
/Continuous casting/
Steel casting
/Vacuum degassing/
SERVICES, UTILITIES
Quality control and materials testing
/Waste treatment/ and recycling
ENGINEERING, TESTING PROCEDURES
Chemical testing
ECONOMIC ASPECTS, MANAGEMENT
Recruitment and training

JOINT 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
Remacor, 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, Liaoling Province, China

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

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

003008

SHANGHAI INSTITUTE OF METALLURGY
ACADEMIA SINICA

865 Chang Ning Road
Shanghai, China

TEL: 520050 CABLE: 0253

DIRECTOR: Dr. Zou Yuanxi
PROFESSIONAL STAFF: 400 (Iron and steel sector)
BUDGET 1981: $100,000 (Iron and steel sector)

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
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/ prohibitation 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 Yangtse River, role of /chloride ions/
Corrosion in chemical process plant, steels resistant to /high temperature oxidation/, sulfidation, carbonization and high temperature /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

003009

CENTRAL METALLURGICAL RESEARCH AND DEVELOPMENT INSTITUTE - CMRDI
NATIONAL RESEARCH CENTER

Dokki
Cairo, Egypt

TELEX: Merec UN 94022

DIRECTOR: Prof. Dr. A.A. Abdul Azim
PROFESSIONAL STAFF:58
BUDGET 1981: $300,000

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
Large scale application of new /ore washing/ techniques and sintering tests of Baharia 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: /melting 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 galvanizing 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: TABBRASAT

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/: metals shaping, 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
Manning and organization
Raw materials procurement
Equipment procurement
World trends
Feasibility study preparation

JOINT PROJECTS WITH:
Institut fuer Eisenhuettenwesen, TH Aachen, FR Germany
Universite Technologique de Compiegne, France
Steel and Alloys Institute, Moscow, USSR
Ecole Nationale Superieure d'Arts et de Metiers, France
Polytechnical Institute, Sheffield, UK

LINK 003770

Finland

000011

METALLURGY LABORATORY
TECHNICAL RESEARCH CENTRE OF FINLAND - VTT

Metallimiehenkuja 4
SF-02150 Espoo 15, Finland

TEL: 358 (90)4565400
TELEX: 122972 vttin sf

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

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
/FOUNDRY TECHNOLOGY/: melting of metals (/melting techniques/), /molten metal treatment/ and casting. Casting of special castings 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 film/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
ECONOMIC 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
MEFOS, Lulea, Sweden
University of Uppsala, Sweden
Svenska Gjuteriforeningen, Joenkoeping, Sweden
Technological Institute, Taastrup, Denmark

LINK 003308

Germany, Federal Republic of

000012

INSTITUT FUER EISENHUETTENKUNDE
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:
Coal- gasification, /blast furnace/, steel /melting techniques/, /streaming conditions/, /fracture mechanics/, /wide plate testing/
/Thermodynamics/ and kinetics of steelmaking, material behaviour under particular conditions of usage (/mechanical properties/)
IRONWORKS:
/Waste heat utilization/
/Coal-oil-slurry blowing technology/
/Sinter exhaust gas desulferization/
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/
/Hydrogen 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/s
/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 behaviours, 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
Corrosion
ECONOMIC ASPECTS, MANAGEMENT
Casting
Financing
Raw materials procurement
Equipment procurement
WORLD TRENDS
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
Centro de Pesquisa Usiminas, Horto, Ipatinga-Mg, Brasil
Ironmaking Section, Yawata Works, Nippon Steel, Kitakyushu, Japan

LINK 003309

000013

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

Max-Planck-Strasse 1
D-4000 Duesseldorf, FR Germany

TEL: (0211) 6792-1
TELEX: 8586752

DIRECTOR: Prof. Dr. Hans-Juergen Engell
PROFESSIONAL STAFF: 60
BUDGET 1981: $7,400,000

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 films/s. /Sticky scale prevention/ in /soaking pit/s
2. METAL WORKING:
Optimization of /rolling schedules/ and /cooling conditions/ in /hot rolling/ of HSLA steels. /Thermomechanical treatment/ of low alloy /structural steel/s. /Deformation/ and cooling conditions for generation of /dual phase steel/. /Yield stress/ in the temperature range of /austenite-ferrite-transformation/
Influence of deformation conditions on recrystallization and /grain growth/ of /austenitic stainless steel/s. Measurement and calculation of /rolling forces/. Thermal shape 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 /metallography/. 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-intrusion-pairs during cyclic loading. Calculation of characteristic /dislocation distribution/s in /fatigue hardening/ pure metals. /Hydrogen embrittlement/ at extremly low hydrogen pressure. Calculation of /hydrogen distribution/ in the vicinity of the crack tip under unequilibrium conditions

/Hydrogen permeation measurements/ in iron silicon crystals. Hydrogen embrittlement in nickel. Determination of lattice constants using /X-ray measurement/ at high temperatures
5. PHYSICAL CHEMISTRY:
/Grain boundary segregation/ of phosphorous and tin in iron. Grain boundary segregation and mechanical properties of steels. /Creep embrittlement/ of 1% CrMoV-steels by tramp elements. Effects of segregated nonmetal atoms on the iron self diffusion in grain boundaries (nonmetallic inclusion). Binding modes of nonmetal atoms at interfaces of iron (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 and grain boundary segregation on the corrosion of iron and steel
"Thick passive films" on /stainless steel/s. AES and ESCA-investigations of passive films on stainless steel and of /oxide layers/. Kinetics of methane-transformation by carbon dioxide on iron as a catalyst. Kinetics of the /carburization/ of iron and casehardening steels in methanol-nitrogen. Kinetics of carburization and decarburization of iron, /ferro nickel/ and nickel in CH4-H2
/Graphite coke deposition/ from gas atmospheres on iron, nickel, and alloys, effects of sulphur additions and oxide layers. Oxide and carbide formation on high temperature alloys at low pressures of /carbon monoxide/, methane and CH4-H2S. Creep and corrosion of alloys in corrosive atmospheres. 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/: /impurities/
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Steel making
/Continuous casting/
Steel rolling
ENGINEERING, TESTING PROCEDURES
Mechanical testing
Chemical testing
Corrosion

LINK 003310

India

000014

DEPARTMENT OF METALLURGY
INDIAN INSTITUTE OF SCIENCE

Bangalore 560 012, India

TEL: 34411 CABLE: Science, Bangalore

DIRECTOR: Prof. S. Ramaseshan
PROFESSIONAL STAFF:17
BUDGET 1981: $100,000

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 INRED, ELRED 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 slag, 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 ingots produced by E.S.R. techniques
CUMBUSTION and ENERGY SAVING: optimum /rolling techniques/, ideal /soaking temperature/ to minimise the total energy consumed during rolling
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Direct reduction
Iron making
Steel making
Combustion and energy saving

LINK 003544

000015

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

Ranchi 834 002, India

TEL: 20021 CABLE: ISPAT RANCHI
TELEX: 635-257

DIRECTOR: Dr. G. Mukherjee
PROFESSIONAL STAFF: 251 (technical)
BUDGET 1981: $13,79),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/ refering particularly to coal quality, iron ore, /fluxes/, etc. Coal-gasification and /materials saving/. Coke oven and by product units in steel plants
/COMPOSITE BLOWING/ 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 minimise 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
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
/Instrumentation/ and process control
Quality control and materials testing
ENGINEERING, TESTING PROCEDURES
Corrosion
/Super duty materials/

JOINT PROJECTS WITH:
Bhabha Atomic Research Centre, BARC, India
Central Ferrous Metallurgical Research Institute, TSNIICHERMET, 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. Djoewito Atmowidjojo
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 Univerity, Japan
Department of Metallurty, Kyoto University, Japan
Research Productivity Council, New Brunswick, Canada
LINK 003311

Italy

003317

ISTITUTO DI METALLURGIA
Institute for Metallurgy
UNIVERSITA DI ROMA

15, via Eudossiana
I-00184 Rome, Italy

TEL: 06/464-285

DIRECTOR: Prof. Giuseppe Vicli
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 - NRIM

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

TEL: 03(719)2271

DIRECTOR: Dr. Toru Araki
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
/Thermoelements/ 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

JOINT PROJECTS WITH:
Beijing University of Iron and Steel Technology, China
National Metallurgical Laboratory, CSIR, India

LINK 003313

003319

INSTYTUT METALURGII ŻELAZA
Institute of Ferrous Metallurgy

ul. Karola Miarki 10/12
44-100 Gliwice, Poland

TEL: 31-40-51
TELEX: 036242

DIRECTOR: Prof. Dr. B. Witke
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 ODLEWNICTWA

Ul. Zakopianska 73
30-418 Krakow, Poland

TEL: 648-40 CABLE: I OD
TELEX: Krakow 0322421

DIRECTOR: J. Tybulczuk

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

009921

CENTRAL INSTITUTE FOR METALLURGICAL RESEARCH - ICEM

Mehadia Street 39
77777-Bucharest 7000, Romania

TEL: 494020
TELEX: 011549-r-

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

AREAS OF INTEREST
Iron and steel industry, metallurgy
CURRENT PROJECTS, 1981-82:
/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/es, etc.) on corrosion resistance of /austenitic stainless steel/s of chrome-nickel 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 plate/s
Change of the coal plastic phase characteristics in the coking 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 aluminium 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:
CERIMET, 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, GHIPROMEZ, USSR
Institute for Metallurgical Research, VASCUT, Budapest, Hungary

LINK 003316

Spain

000022

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

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

TEL: 2538900

DIRECTOR: Jose Antonio Bonet Sopena
PROFESSIONAL STAFF: 90
Budget 1981: $5,700,000

AREAS OF INTEREST:
Metallurgy, iron and steel industry
SPECIFIC PROJECTS 1980:
Use of iron ores: optimizing of highly intensive /magnetic/ separation, substitution of oil by coal in peletization, structural analysis in minerals and conglomerates
Nonferrous metals extraction
Science and technique of metals and their corrosion
CURRENT PROJECTS, 1981-82:
/Ladle injection/: /injection lance/, light, adapted to function at 1500 degrees Celsius
Energy saving during sinter processing, prolongated 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:
TECHNOLOGIES, PROCESSES
Iron ore and fuel /beneficiation/
Sintering
Coke making
Iron making
Steel making
Combustion and energy saving
SEVICES,UTILITIES
/Thermal utilities/
Quality control and materials testing
ENGINEERING, TESTING, PROCEDURES
Structural testing
Mechanical testing
Chemical testing
Corrosion

JOINT PROJECTS WITH:
Instituto Argentino de Siderurgia, Argentina
Instituto Mexicano de Investigaciones Siderurgicas, Mexico
LINK 001476

Sweden

000023

INSTITUTET FOER METALLFORSKNING
Swedish Institute for Metals Research

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

TEL: 08/243330

DIRECTOR: Prof. Hans 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 phosphorous 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 steel/s
Analysis, measurement and application of flow patterns, including /thermomechanics/ and recrystallisation
ANALYTICAL CHEMISTRY:
/X-ray measurement/, /scanning methods/ for detecting trace elements, spectrophometry
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 phosphorous 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

/inoculation/, 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 metals: 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/s
/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 alloys elements
AREAS FOR JOINT PROJECTS: TECHNOLOGIES, PROCESSES
/Continuous casting/
ENGINEERING, TESTING PROCEDURES
Structural testing
Mechanical testing
Chemical testing
Corrosion

JOINT PROJECTS WITH:
CETAFRAM, Beauchamp, France
IRSID, Metz, France
CHIITMASH, 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

PK. 21
Gebze, Kocaeli, Turkey

TEL: 2300 CABLE: TUBITAK-GEBZE
TELEX: Istanbul 20737

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 modeling/ of a blast furnace in one of the Turkish integrated steel plants (probably "Eregli") with a computer programmes 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
/Metallography/
/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 circumferencially grown Al-Al3Ni 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

003825

MADEN TETKIK ARAMA ENSTITUSU - MTA
Mineral Research and Exploration Institute

Sehitler Yolu
Ankara, Turkey

TEL: 25-42-50 CABLE: METEA-Ankara
TELEX: 42741 MTA TR

DIRECTOR: Dr. M. Sitki Saner
PROFESSIONAL STAFF: 2000
BUDGET 1981: $34,000,000

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:
Outokumpu-Oy

LINK 003217

INDEX OF ACRONYMS

CENIM	CENTRO NACIONAL DE INVESTIGACIONES METALURGICAS	000022
CMRDI	CENTRAL METALLURGICAL RESEARCH AND DEVELOPMENT INSTITUTE	000009
IAS	INSTITUTO ARGENTINO DE SIDERURGIA	000002
ICCM	CENTRAL INSTITUTE FOR METALLURGICAL RESEARCH	000021
IPT	INSTITUTO DE PESQUISAS TECNOLOGICAS	000003
MTA	MADEN TETKIK ARAMA ENSTITUESUE	000025
NIM	NATIONAL INSTITUTE FOR METALLURGY	000016
NRIM	NATIONAL RESEARCH INSTITUTE FOR METALS	000018
TIMS	EL-TABBIN INSTITUTE FOR METALLURGICAL STUDIES	000010
TUBITAK	MARMARA SCIENTIFIC AND INDUSTRIAL RESEARCH INSTITUTE SCIENTIFIC AND TECHNICAL RESEARCH COUNCIL OF TURKEY	000024
VTT	TECHNICAL RESEARCH CENTRE OF FINLAND	000011

INDEX OF INSTITUTIONS

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

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.