



ICIT2010

7th International Conference on

# Industrial Tribology

Theme

## Tribology for Steel & Mining Industries

December 2-4, 2010

Venue : Ispat Bhawan, SAIL, Ranchi, India

Organised by



R & D Centre for Iron and Steel  
SAIL, Ranchi

In Association with



Centre for Engineering & Technology  
SAIL, Ranchi

Under the aegis of



Tribology Society of India



Central Coalfields Limited  
Ranchi

### Sponsors

Platinum



Gold



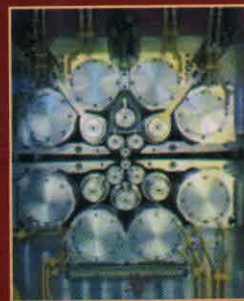
Silver



Co-Sponsors



Media Partner



## Introduction

Tribology, the science and technology of interacting surfaces in relative motion, has been established worldwide as a major enabler for progress of industrialised economies. Realising the far-reaching influence of this subject, Tribology Society of India (TSI) was formed in the year 1989. As a premier professional society, the TSI has a vision to spread awareness and practice of Tribology all across India. To fulfil this mission, the Society has been organising International Conference on Industrial Tribology (ICIT) biennially in different regions of the country. The 7<sup>th</sup> ICIT is being organised in the eastern part of India, in the nature's adorable city of Ranchi, during December 2-4, 2010.

The mineral rich eastern India is the hub of a large network of steel, mining and allied industries. These industries are working under tremendous load of heat, dust and severity. These conditions pose big challenge to Tribology. There is need to develop and apply advanced tribological concepts for improving equipment reliability, reducing energy consumption, and providing healthy working environment to the operating personnel and other habitants. Theme of the ICIT 2010 has therefore been chosen as **"Tribology for Steel and Mining Industries"**.

## About the Organiser

ICIT 2010 shall be organised by R&D Centre for Iron and Steel (RDCIS) in its beautiful premises at Ranchi. RDCIS is the corporate R&D Centre of Steel Authority of India Ltd. (SAIL), the largest steel producer in India. It employs more than 250 scientists and engineers and is a premier research organisation in the field of ferrous metallurgy. The Centre is equipped with state-of-the-art diagnostic and testing facilities including pilot scale laboratories. The major efforts of RDCIS are directed towards process innovations, product development, cost reduction, quality improvement in different SAIL plants. The Centre pursues a number of collaborative research programmes with leading institutions in India and abroad. RDCIS also offers consultancy, specialised testing services, contract research and training assistance to various external organisations.

RDCIS has a dedicated group of Tribologists who are undertaking valuable research projects for improving equipment performance in steel plants. Scientific research is carried out in various areas of Tribology such as wear characterisation, CBMS, testing & analysis of lubricants and rust preventives, development & evaluation of hot and cold rolling oils, design & engineering of lubricant application system, development & application of wear resistant materials and coatings, etc.





## Co-Organisers

ICIT 2010 is being organised in association with Centre for Engineering & Technology (CET) and Central Coalfields Ltd. (CCL) of Ranchi. CET is the design, engineering and consultancy hub of SAIL. It is the nodal agency for acquisition and lateral transfer of technologies pertaining to iron and steel within the SAIL Plants and Units. CCL, a Mini-Ratna company, is a subsidiary of Coal India Ltd., the largest coal producing company of India. CCL has big reserves of coking and non-coking coals and it is spread in 6 coalfields with large number of mines and washeries.

## Media Partners

Steel & Metallurgy, a complete monthly magazine on steel and metals, is the media partner of ICIT 2010. Details of the Conference can be browsed through the website of the publisher at [www.steelmetallurgy.com](http://www.steelmetallurgy.com) or may be seen in the latest issues of the magazine. The Society of Tribologists and Lubrication Engineers (STLE), USA, is also giving wide publicity to the Conference at its website [www.stle.org](http://www.stle.org).

## Scope of ICIT 2010

ICIT 2010 will be dealing with various innovations in Tribology for enhancing the performance of manufacturing industries in general and Steel & Mining Industries in particular. In addition to this, deliberations will be made on some other topics of fundamental nature and of general interests. Some of the broad areas to be covered are:

- Bearing & Gear Tribology
- Bio-Tribology
- Computational Technique in Tribology
- Condition Based Maintenance System
- Contact Mechanics & Friction
- Engine Tribology
- Lubricant & Additives
- Surface Treatment & Coatings
- Tribology aspects in Design & Manufacturing
- Tribology in Metalworking
- Tribology in Mining
- Tribology in Steel Processing
- Tribo-Testing
- Wear Mechanism

## Technical Papers

Engineers, scientists, academicians and practitioners in tribology have been invited to present technical papers in line with the theme of the Conference. There has been overwhelming response to this call and large numbers of papers have been received from across the globe. Over 120 good quality papers have been selected for getting presented in parallel oral and poster sessions. Each technical session will begin with a keynote paper by person of repute. In addition to this, some eminent tribologists have been invited to speak on frontier areas of tribology in the inaugural and plenary sessions. Some of the eminent speakers of the Conference are:

- Dr. Irwin Singer, Naval Research Laboratory, Washington DC, USA
- Prof. SK Biswas, Indian Institute of Science, Bangalore, India
- Shri C Mishra, METC, Jamshedpur, India
- Dr G Sunderajan, ARCI, Hyderabad, India
- Dr AS Sarpal, IOCL, Faridabad, India
- Mr Peter Gandy, Quaker Chemicals, Australia
- Dr Har Prashad, CETR, Hyderabad, India
- Dr Richard Baker, PCS Instruments, UK
- Mr NL Soni, BARC, Mumbai, India
- Dr Stefano Mischler, EPFL Institute, Switzerland
- Mr Ranjit Panesar, Proventus Ltd., UK

Full text of all the technical papers shall be included in the Conference Proceedings on CD ROM and, additionally, abstracts of all the papers shall be printed in a book form. Both the proceeding and book of abstracts shall be handed over to all the delegates of the Conference.

## Awards

Best papers and technical exhibit shall be selected by an Award Committee and shall be awarded in the Concluding Session of the Conference. The award will be given in the following categories among the papers presented during the Conference:

- TSI Best Oral Paper (Academic Research)
- TSI Best Oral Paper (Applied Research)
- TSI Best Poster Paper (Academic Research)
- TSI Best Poster Paper (Applied Research)
- TSI Best Exhibit

Each award will carry a cash prize besides a certificate of commendation. There is scope of sponsoring each of the awards by any organisation on payment of Rs 25,000/- (US \$ 700). The award shall be named on the sponsoring organisation.



## Education Course

On the eve of ICIT 2010, three parallel education courses are being organised on Dec 1, 2010, one each on "Basics of Tribology", "Condition Based Maintenance System" and "Advances in Wear Resistant Materials and Coatings". The course on Basics of Tribology has been designed exclusively for the students of engineering colleges. During the courses, theory and case studies shall be discussed by eminent faculties drawn from Industries, R&D Institutions and Academia. For each course, a nominal fee of Rs 3000/- is being charged from TSI Members and Rs 4000/- from Non-TSI Members. College students are encouraged to attend the course at a subsidised fee of Rs 1000/- only.

Leading organisations are invited to sponsor the education courses at a nominal fee of Rs 50,000/- (US \$ 1500) per course. Adequate advertisement opportunities shall be given to the sponsoring organisations in the courses as well as in Conference .

## Manufacturer's Presentation

Manufacturers/suppliers of equipments, lubricants, additives and service providers related to Tribology were invited to the Conference to project their products/services/innovations through multimedia presentation in the special sessions on Manufacturer's Presentation. A nominal fee of Rs 50,000/- (US \$ 1500) was charged for each presentation of 25 minutes duration. In response to this the following companies shall be making the presentation on their innovative technologies and products:

- IndianOil
- Raj Petro Speciality
- PCS Instruments
- CSM Instruments
- Shell India
- Welding Alloys

## Technical Exhibition

With a view to highlight the advancements made in the area of Tribology, a Technical Exhibition is being organised along with the Conference. Lubricant & Additive Suppliers, Equipment Manufacturers, Tribological Specialists and Service Providers, Technical Book Publishers, etc. have been invited to participate in the Technical Exhibition to highlight their products and services. Well furnished and illuminated exhibition stall of about 2.5 m x 3.0 m size is being provided to each exhibitor at a nominal fee of Rs 50,000/- (US \$ 1500). Suitable mechanism shall be in place to motivate delegates for visiting the exhibition stalls in large numbers.

Some of the confirmed exhibiting companies are:

- CA Polytech
- Cenlube
- Ducom
- Ferrocare
- Indian Oil
- Labindia
- NBC Bearing
- NB Instruments
- PCS Instruments
- SAIL
- Wearresist
- Welding Alloys

## Souvenir & Advertisements

A Souvenir, containing Conference details and informative articles shall be released during the Conference, and will be provided to each registered delegate. Advertisements for the Souvenir can be booked at the following rates:

• Back Cover (Colour)	:	₹ 40,000 (US \$ 1000)
• Front/Back Inside Cover Page (Colour)	:	₹ 30,000 (US \$ 750)
• Colour Full Page	:	₹ 20,000 (US \$ 500)
• B & W Full Page	:	₹ 15,000 (US \$ 350)
• B & W Half Page	:	₹ 10,000 (US \$ 250)

The advertisement material is to be provided in hard copy / transparency or on CD latest by November 15, 2010.

## Conference Sponsorship

Reputed Companies, Organisations and Trade Associations have been invited to join this International Event as sponsors of the Conference. The sponsors get wide publicity in the Conference through display of banners, mention in the Conference Proceedings and Souvenir and other facilities. The details regarding various categories of sponsorship are given below:

CATEGORY	CHARGES		FACILITIES				
	Indian (Rs in Lakhs)	Overseas (US \$)	Free Delegates	Company Logo on all Conf. Materials	Free Colour Ad in Souvenir	Free Stall in TE*	Free Slot in MP**
<b>Platinum</b>	5.00	12000	6	✓	✓	✓	✓
<b>Gold</b>	3.50	9000	4	✓	✓	✓	X
<b>Silver</b>	2.00	6000	2	✓	✓	X	X
<b>Co-Sponsor</b>	1.00	3000	0	✓	X	X	X

\* Technical Exhibition

\*\* Manufacturer's Presentation

Confirmed sponsors of the event are:

• Platinum Sponsors	:	Steel Authority of India Ltd., IndianOil
• Gold Sponsor	:	Central Coalfields Ltd.
• Silver Sponsor	:	Lubrizol India Ltd., BPCL, HPCL
• Co-Sponsors	:	Tata Steel, Raj Petro Specialities

## Spouse Programme

Programme for spouse has also been planned during the Conference on payment basis. A conducted tour may be organised to show places of interests in and around Ranchi on December 2 and 3, 2010.



## Conference Registration

Professionals, researchers, business entrepreneurs and all other practitioners of Tribology from across the globe are invited to attend the Conference and get benefited by sharing advanced knowledge and experiences. Registration in the Conference can be made by paying a fee as per the details given below.

Category of Delegate	TSI Member	Non-Member
Industry	₹ 6,500	₹ 8,000
Group of Four	₹ 22,000	₹ 25,500
Combo-Registration for Industry (Education Course + Conference)	₹ 7,500	₹ 10,000
R&D/Academia	₹ 3,500	₹ 5,000
Retired person/Student	₹ 2,000	₹ 2,000
Overseas	US \$ 200	US \$ 250
Registration of Spouse	₹ 2000 (US \$ 50)	₹ 2500 (US \$ 60)

The registration fee for the Conference will cover participation in Technical Sessions, Conference Proceedings in CD-ROM, Printed materials, Conference kit, Lunch, Tea/coffee, Conference Banquet, etc.

## Payment Details

All payments related to registration of delegates, sponsorship, advertisements, technical exhibition, manufacturer's presentation, participation in educational course, etc. are to be made through crossed demand draft / cheque payable at par, drawn in favour of "ICIT-2010" payable at Ranchi. Money can also be transferred directly to the Conference Account as given below:

A/c Name	: ICIT-2010
A/c No.	: 480102010870093
IFSC Code	: UBIN0548014
SWIFT Code	: UBININBBJAM
MICR No.	: 834026007
Bank's Name & Address	: Union Bank of India, Shyamali Colony Branch, PO Doranda, Ranchi 834002, Jharkhand, India

## About Ranchi

Ranchi is the capital of state of Jharkhand, which is endowed with rich iron ore and coal deposits. With its rich mineral resources and industrial base, Ranchi is rapidly developing into an important industrial sector in India. The city is surrounded by thick forests and beautiful natural waterfalls and still unspoiled by modern commercialism. Ranchi is located in eastern part of India, around 400 km from Kolkata. It has very pleasant and moderate climate and the temperature in December may vary from +8°C and +20°C.

## Travel

Domestic airlines operate between Ranchi and other major cities of India such as New Delhi, Mumbai, Kolkata, Raipur and Patna. Ranchi is also well connected by rail and road with all major cities of the country, namely Bangalore, Bhubaneswar, Chennai, Jamshedpur, Jaipur, Kolkata, Mumbai, Nagpur, Patna, Raipur, New Delhi, Vishakhapatnam, etc. A Travel Desk shall be available at the Conference Venue for arranging return tickets for the delegates.

## Accommodation

Ranchi offers a range of accommodation to suit every budget. Both economy and luxury class hotels are located within 5 km from the Conference Venue. Delegates are requested to book the accommodation in advance to get preferred choice. For assistance in advance booking, Conference Secretariat may be approached before November 25, 2010.

A list of prominent hotels in Ranchi is given below:

HOTELS (Distance from Conference Venue)	Tel No. +91 651-	Fax +91 651-	E-mail	Tariff (Rs)**	
				AC Single	AC Double
<b>Capitol Hill*</b> (3.0 km)	2331330	2330206	reservation@hotelcapitolhill.com	4000-4500/-	4500-5000/-
<b>Ranchi Ashok*</b> (1.5 km)	2480759	2480768	info@hotelranchiashok.com	3500-4500/-	4000-4500/-
<b>Yuvraj Palace*</b> (2.0 km)	2480326	2480328	info@hotelyuvrajpalace.com	3500-4500/-	4000-4500/-
<b>Green Acres</b> (2.0 km)	2252240	2252246	contactus@hotelgreenacre.com	2200-2800/-	2600-2800/-
<b>Green Horizon</b> (3.0 km)	2462100	2462552	contactus@hotelgreenhorizon.com	2400-2800/-	2800-3200/-
<b>Capitol Residency</b> (3.0 km)	2212030	2212038	credidency@gmail.com	2000-3200/-	2500-3500/-
<b>Kwality Inns</b> (4 km)	2460128	2460783	rahul@hotelkwalityinn.com	2175/-	2450/-
<b>Chanakya BNR</b> (4.0 km)	2461489	2460584	chanakyabnrranchi@hotmail.com	1450/-	1700/-
<b>Hindustan</b> (4.0 km)	2206032	2205565		1400-1600/-	1700-2000/-
<b>Chinar</b> (4.0 km)	2207780	2214327	hotelchinar@ymail.com	1600-2800/-	1900-2300/-
<b>Yuvraj</b> (2.0 km)	2482842	2480853	info@hotelyuvrajpalace.com	1800-2400/-	2250-2700/-
<b>Landmark</b>	2560051	2560057		3000/-	3500/-

\* Deluxe Rooms & Suits are available in these hotels.

\*\* Tariff indicated is tentative and are subject to change. Taxes are extra.





## Participating Organizations (Partial List)

Advanced Materials & Processes Research Institute

Ashok Leyland

Balmer Lawrie & Co. Ltd.

Bhabha Atomic Research Centre

Bharat Heavy Electricals Ltd.

Bharat Petroleum Corporation Ltd.

Bhilai Steel Plant

Bokaro Steel Ltd.

CA Polytech

Cenlubes

Central Coalfields Ltd.

Central Mine Planning & Design Institute Ltd.  
(CMPDIL)

Centre for Engineering & Technology

CETR (USA)

CSM

Defence Metallurgical Research Laboratory

Defence Research & Development Org. (DRDO)

Ducom

Durgapur Steel Plant

EPFL Institute (Switzerland)

Ferrocare

GE India Technology Centre

Heavy Engineering Corporation Ltd.

Hindustan Petroleum Corporation Ltd.

IISCO Steel Plant

Indian Institute of Petroleum

Indian Institute of Science

Indian Institute of Technology

Indian Oil Corporation Ltd.

Indira Gandhi Centre for Atomic Research

International Centre for Automotive Technology

JSW Steel Ltd.

Lobindia

Larsen & Toubro Ltd.

Lubrizol India Ltd.

Mecon India Ltd.

Naval Research Institute (USA)

NB Instruments

NBC Bearing

PCRA

PCS Instruments (UK)

Quaker Chemicals Ltd. (Australia)

R&D Centre for Iron and Steel

Raj Petro Specialties Ltd.

Raw Materials Division (SAIL)

Rourkela Steel Plant

Shell India

South Eastern Coalfields Ltd.

Steel Authority of India Ltd.

Tata Steel

Usha Martin Ltd.

Wearresist

Welding Alloys South Asia

Various other leading academic & research institutions



Rock Garden



Hatia Dam

## National Steering Committee

Mr C S Verma, Chairman, SAIL, New Delhi	: Chairman
Mr A S Mathur, ED I/c (RDCIS), SAIL, Ranchi	: Convener
Dr D Mukerjee, ED (RDCIS), SAIL, Ranchi	: Co-Convener
Mr A K Singh, CMD, CMPDIL, Ranchi	: Member
Mr Anand Kumar, President (TSI), Faridabad	: Member
Mr Anand Sen, VP (TQM), Tata Steel, Jamshedpur	: Member
Dr Anil K Gupta, Director, AMPRI, Bhopal	: Member
Mr Ashok K Mehta, ED (TSI), Faridabad	: Member
Mr Basudeo Roy, Advisor, SAIL, Ranchi	: Member
Mr G K Pillai, CMD, HECL, Ranchi	: Member
Mr H K Jain, ED (CET), SAIL, Ranchi	: Member
Dr R K Malhotra, Director (R&D), IOCL, Faridabad	: Member
Mr R K Saha, CMD, Central Coalfields Ltd., Ranchi	: Member
Mr S Radhakrishnan, CMD, BPCL, Mumbai	: Member
Mr S Roy Choudhury, CMD, HPCL, Mumbai	: Member
Dr S K Biswas, Professor, IISc, Bangalore	: Member
Dr T R Chaudhary, DGM (R&D), BHEL, Hyderabad	: Member
Mr V N Sharma, Director, Balmer Lawrie, Kolkata	: Member
Dr Ram Avtar, GM (RT), RDCIS, SAIL, Ranchi	: Organising Secretary
Mr R R Prasad, DGM & HOD (EM), RDCIS, Ranchi	: Technical Secretary

## Organising Committee

### Chairman

**Mr A S Mathur**

Executive Director I/c (RDCIS), SAIL

### Co-Chairman

**Dr D Mukerjee**

Executive Director (RDCIS), SAIL

### Organising Secretary

**Dr Ram Avtar**

General Manager (RT), RDCIS, SAIL

### Technical Secretary

**Mr R R Prasad**

DGM & HOD (EM), RDCIS, SAIL

### Chairman (Education Course Committee)

**Dr A K Mishra**

DGM I/c(EMT), RDCIS, SAIL

## Tribology Society of India

### President

**Mr Anand Kumar**

Former Director (R&D), IndianOil

### Vice-President

**Dr R K Malhotra**

Director (R&D), IndianOil

### Vice-President

**Dr S K Biswas**

Professor, Indian Institute of Science

### Secretary

**Dr B Chakrabarti**

Jt. GM (R&D), L&T Ltd.

### Treasurer

**Mr Ajay Kumar**

Sr. Research Mgr. (R&D), IndianOil



## Functional Committee

Committee	Chairperson	Convener
Conf. Secretariat	Dr Ram Avtar, RDCIS 8986880005	Mr P Pathak, RDCIS 8986880223
Technical	Mr RR Prasad, RDCIS 8986880293 Mr PP Sengupta, RDCIS 8986880138	Mr SK Mohapatra, RDCIS 8986880167
Resource & Souvenir	Mr SC Jain, CET 8986880390 Mr BB Chaudhuri, IOC 06122234754	Mr BC Roy, RDCIS 8986880250 Md I Alam, CCL 9431382798
Exhibition & Manuf. Present.	Mr UCM Gupta, CET 8986880387 Dr BB Agrawal, RDCIS 8986880016	Mr RK Jha, RDCIS 8986880296
Reception & Registration	Mr DS Gupta, RDCIS 8986880312	Mr R Topno, RDCIS 8986880299
Venue	Ms M Menon, RDCIS 8986880007 Mr SC Tripathi, RDCIS 8986880011	Mr C Mandal, RDCIS 8986880288
Accommodation & Transport	Mr SK Srivastava, RDCIS 8986880008 Mr VK Sinha, RDCIS 8986880204	Mr AK Marik, RDCIS 8986880297
Hospitality	Mr AKP Singh, RDCIS 8986874000	Mr DK Jain, RDCIS 8986880201
Cultural	Mr Sharda Rai, RDCIS 8986880004 Mr KK Mallik, RDCIS 8986880073	Mr S Dutta, RDCIS 8986880134
Media & Publicity	Dr BK Jha, RDCIS 8986880009 Mr Biswajit Roy, RDCIS 8986880013	Md. A Hafeez, IICM 9334711653
Award	Dr AP Singh, RDCIS 8986880084	Prof. SK Jha, BIT Mesra 9431173491 Mr PK Bandyopadhyay 8986880291
Education Course	Dr AK Mishra, RDCIS 8986880289	Mr KK Singh, RDCIS 8986880290 Dr A Prabhakaran, Tata 9234567623
Finance	Mr SK Agrawal, RDCIS 8986880010 Mr R Shukla, RMD 9431354354	Mr RC Thakur, RDCIS 8986880178

## Tentative Programme

### December 1, 2010 (Wednesday)

08:00-18:00 Hrs	Education Courses I, II & III
15:00-18:00 Hrs	Conference Registration

### December 2, 2010 (Thursday)

08:00-09:00 Hrs	Registration
09:00-11:00 Hrs	Inaugural Session
11:30-13:00 Hrs	Plenary Session
13:00-15:45 Hrs	Technical Sessions 1A, B, C   Poster Session 1A
16:00-17:45 Hrs	Technical Sessions 2A, B, C   Poster Session 1B
19:00-23:00 Hrs	Cultural Programme and Dinner

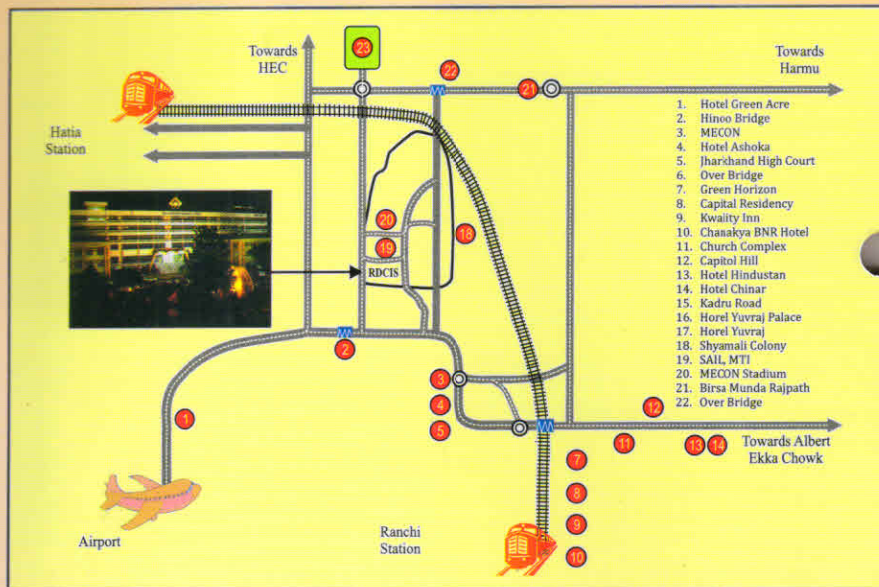
### December 3, 2010 (Friday)

08:30-09:00 Hrs	Registration
09:00-10:45 Hrs	Technical Session 3A, B, C   Poster Session 2A
11:30-13:00 Hrs	Manufacturer's Presentation Session 1
14:00-15:30 Hrs	Manufacturer's Presentation Session 2
15:45-17:30 Hrs	Technical Session 4A, B, C   Poster Session 2B
19:00-23:00 Hrs	Cultural Programme and Dinner

### December 4, 2010 (Saturday)

08:30-09:00 Hrs	Registration
09:00-11:15 Hrs	Technical Session 5A, B, C
11:30-13:00 Hrs	Concluding Session

## Venue Map



## Correspondence

All correspondence should be made at following address:

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