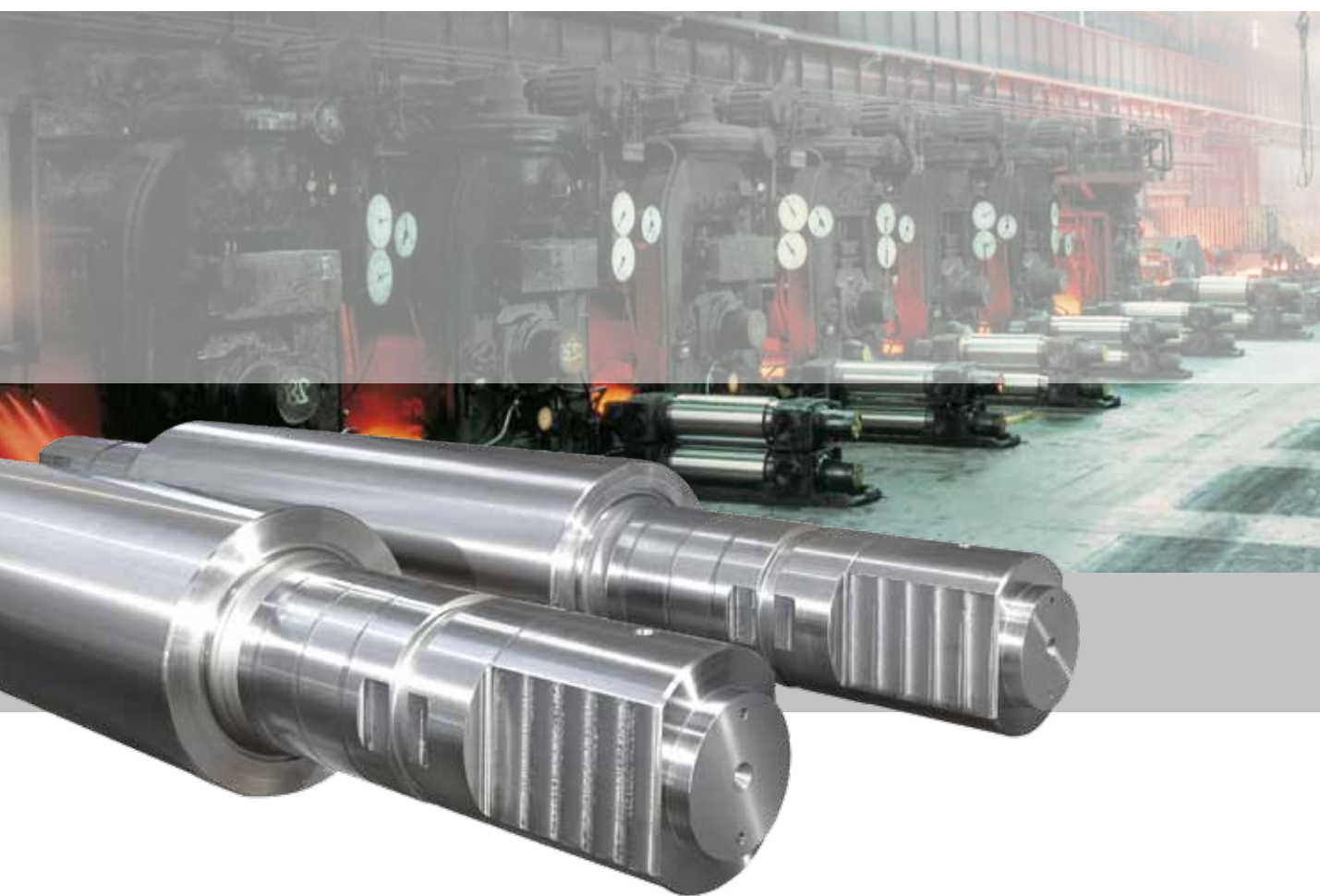



## ROLLS FOR HOT STRIP AND HEAVY STEEL PLATE





# WALZEN IRLE ROLLS INCREASE YOUR ROLLING MILL PRODUCTIVITY

WALZEN IRLE is a worldwide leading company in the production of rolls for various areas of industry. The company stands for over more than 190 years of experience, technological competence, continuous research and development in the production of rolls.

The traditional and consequently close cooperation with machine builders and operators of constructions has lead to permanent and successful improvements of the WALZEN IRLE technologies and has made them an innovative technology leader.

Today we offer top-technology for the steel industry (plate mills, strip mills, sheet mills and section mills) as well as for the paper, rubber, plastic and food industry.

Our technically orientated sales specialists are always available for our customers, to discuss and develop professional solutions for the various problems in rolling mills.

**INCREASE YOUR PROFIT - WITH OUR ROLLING KNOWLEDGE!**





# MORE THAN 300 YEARS OF FOUNDRY EXPERTISE, 200 YEARS OF ROLL CASTING



Rolls »made in Deuz« are used worldwide and have made a name for themselves for sophisticated technology and highest quality.

## Following the most important facts:

- 1693** start of casting and machining of iron parts by Johannes Irle
- 1820** founding year of the iron foundry in Marienborn and casting of the first chilled cast iron roll
- 1906** start of production of heavy rolls
- 1920** casting of the first cast steel roll
- 1950** casting of the first nodular iron roll



- since 2001** big investments in the production of centrifugally casted work rolls for heavy plate mills and roughing rolls as well as work rolls for hot strip mills. Entrance into the production of spin casted work rolls for heavy plate mills and roughing rolls for hot strip mills (40-75 metric tons) and further expansion of production of work roll for hot strip mills
- 2006** erection of the large vertical spin casting machine (up to 80 t casting weight)
- 2007** production start of the new vertical spin casting machine
- 2007** implementation of a complete new production line for heavy rolls
- 2009** more than 100 heavy plate mill rolls, produced with the vertical spin casting machine, are already running in customers mills worldwide
- 2010** WALZEN IRLE celebrates its 190st anniversary as a roll manufacturer
- 2012** the 300th roll has been casted at the vertical spin casting machine
- until today** continuous development of different grades for the benefit of the steel industry



# ROLLS FOR THE STEEL INDUSTRY

IRLE Rolls for the steel industry are manufactured according to the most modern metallurgical and technical machining standards under the leadership of experienced engineers.

The certified quality management system according to DIN ISO 9001:2008 in connection with modernly equipped laboratories guarantees the precise testing of all production steps and has contributed to the worldwide good reputation for rolls.

The continuous improvement of our product materials results in ever increasing performance enhancements of our rolls. Due to the upgrading of our centrifugal casting capacities we are able to fulfill the increasing demands of the steel industry in the future with regards to numbers and dimensions. Technical sales specialists are always at hand to develop professional solutions for the various challenges our customers come across in their rolling mills.

HOT-STRIP ROLLS



HEAVY PLATE ROLLS



BACK-UP ROLLS



EDGER ROLLS



## THE PROPERTIES FOR

- work rolls,
- back-up rolls and
- edger rolls

## FOR THE PRODUCTION OF

- hot strip,
- heavy plates and
- thin sheets

have to be adapted to the specific demands of the rolling mill.

## ROLL CONDITIONS AND ROLL PROPERTIES

The following roll conditions and roll properties have to be taken into consideration:

- stands with deep passes and high thermal and mechanical demands:
  - good thermal conductivity
  - high temperature strength
  - suitable gripping capability
  - sufficient tensile strength in the journal- and core material
- stands in which a true to size band or sheet with good surface quality can be produced:
  - high surface hardness with a low hardness reduction when using a decreasing roll diameter
  - high wear resistance
  - fire-crack resistance
  - dismantling-stability

# MATERIAL RECOMMENDATION

Material	Indefinite		Nodular cast iron			High-chrome rolls						Cast steel / Cast steel graphitized				Special steel		
	I	I plus	SP	SA	SP/A	CR 5	CR 5 plus	CR 15	CR 15 plus	CR 25	CR 25 plus	ST 0	ST 10	STG 20	STG 30	SST	SST mod.	SST-G
Heavy plate																		
Roughing mill	•							•		•						•		
Finishing mill	•	•								•						•		
Edge rolls			•											•				
Hot wide strip																		
Work rolls two-high roughing-mills			•			•		•						•				
Work rolls four-high roughing-mills	(•)	(•)				•	•	•	•	(•)	(•)					•	•	
Work rolls finishing mills	•	•								•	•					•		•
Back-up rolls finishing mills												•						
Edger rolls			•		•									•				
Skin-pass mills																		
Work rolls	•	•								•	•							
Back-up rolls	•	•		•						(•)	(•)							
Steckel mills																		
Work rolls roughing-mills						•	•	•	•							•	•	
Work rolls finishing mill	•	•								•	•					•		•
Edger rolls			•		•									•				
Mechanical properties																		
Tensile strength (N/mm²)	350-500		330-700			800-900		700-800		700-800		600-950		350-650		700-1000		400-550
Bending strength (N/mm²)	450-820		545-1150			1320-1480		1150-1320		1150-1320		580-1120		580-1200		1230-1560		500-850
Alternating Bending strength (N/mm²)	-		100-240			260-300		230-270		230-270		110-420		110-230		240-320		-
Modulus of elasticity (kN/mm²)	160-180		160-180			220-230		220-230		210-230		190-210		180-200		200-210		190-200
Hardness shore C																		
Shell / Work layer	68-85,5		40-70			60-85		60-85		65-85		30-60		40-60		78-86		75-85
Core material	35-45		35-45			35-45		35-45		35-45		30-50		35-55		35-45		35-45

MECHANICAL PROPERTIES  
SHELL MATERIAL

Shell properties	Unit	Roll types						
		CR 5-15 (Hi Cr-Steel)	SST (HSS)	CR 25 (Hi Cr iron)	I (ICDP)	I plus (embedded carbides ICDP)	SST mod. (Semi HSS)	SST-G
Hardness	LD	746-796	774-816	746-816	758-808	774-816	774-816	774-816
	SHC	70-80	75-85	70-85	72-83	75-85	75-85	75-85
Tensile strength	N/mm²	> 800	> 750	> 600	> 350	> 350	> 800	> 400
Bending strength	N/mm²	> 1200	> 1200	> 1000	> 450	> 600	> 1200	> 600
Pressure strength	N/mm²	> 2000	> 2500	> 2000	> 1800	> 2000	> 2500	> 2000
Impact effect	10^4J/m²	2 - 2,5	2 - 3	2 - 2,5	2 - 2,5	2 - 2,5	2 - 3	2-2,5
Elasticity module	KN/mm²	200-220	200-220	220-225	160-180	160-180	200-220	190-200
Coeffecient of thermal expansion	1/°C x 10-6	~ 13	~ 13	~ 13	~ 12	~ 12	~13	~13
Thermal condutability	W/m°C at 500°C	15-20	15-20	10-15	15-20	15-20	15-20	15-20
Specific heat	J/g° C at 500° C	0,5-0,6	0,5-0,6	0,5-0,6	0,5-0,6	0,5-0,6	0,5-0,6	0,5-0,6
Poisson coeffeciency		0,25-0,30	0,25-0,30	0,25-0,30	0,25-0,30	0,25-0,30	0,25-0,30	0,15-0,20
Density	g/cm³	~ 7,7	~ 7,7	~ 7,7	~ 7,5	~ 7,5	~ 7,8	~7,5

Technical guidelines

MECHANICAL PROPERTIES  
CORE AND JOURNAL MATERIAL

Core and journal properties	Unit	Grey cast iron core	Nodular cast iron core
Tensile strength	N/mm²	150-250	350-450
Bending strength	N/mm²	300-450	400-500
Torsional strength	N/mm²	>250	> 350
Tensile yield point	N/mm²	-	320-420
Impact effect	10^4J/m²	2	3-5
Modulus of elasticity	KN/mm²	120-150	150-180
Coeffecient of thermal expansion	1/° C x 10-6	10-11	12-13
Thermal conductivity	W/m°C at 500°C	40-45	25-30
Density	g/cm³	~7,1-~7,2	~7,2-~7,3

Technical guidelines

CHEMICAL COMPOSITION  
SHELL MATERIAL

Material	C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	Mo (%)	SCB* (%)
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High-chrome rolls (HICR steel)

CR 5	1,0-2,0	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	10,0-15,0	0,5-1,5	1,0-3,0	-
CR 15	1,5-2,5	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	12,0-20,0	0,5-1,5	0,8-2,5	-
CR 5 plus	1,0-2,0	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	10,0-15,0	0,5-1,5	1,0-3,0	max. 0,5
CR 15 plus	1,5-2,5	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	12,0-20,0	0,5-1,5	0,8-2,5	max. 5,0

High-chrome rolls (HICR iron)

CR 25	2,0-3,0	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	15,0-25,0	1,0-2,5	0,8-1,2	-
CR 25 plus	2,0-3,0	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	15,0-20,0	1,0-2,5	0,8-2,5	max. 5,0

Special steel (HSS / HSS Semi)

SST	1,5-3,0	0,3-0,9	0,3-1,2	max. 0,05	max. 0,05	4,0-6,0	0,5-1,5	4,0-6,0	max. 15,0
SST mod.	0,5-1,0	0,3-0,9	0,3-1,2	max. 0,1	max. 0,06	6,0-8,0	0,8-2,0	3,0-6,0	max. 10,0
SST-G	3,0-3,5	1,0-2,0	0,3-1,0	max. 0,15	max. 0,02	1,0-2,0	3,0-5,0	1,0-2,5	max. 10,0

Indefinite (ICDP /ICDP plus)

I	3,0-3,5	0,5-1,5	0,3-1,2	max. 0,15	max. 0,1	1,0-2,0	3,0-5,0	0,2-0,6	-
I plus	3,0-3,5	0,8-2,0	0,3-1,2	max. 0,15	max. 0,1	1,0-2,0	3,0-5,0	0,2-0,6	max. 10,0

\*SCB (%) - Sum of elements W, V, Nb, C, Ti - Special Carbide Builder

Technical guidelines



# PRODUCTION CAPACITY

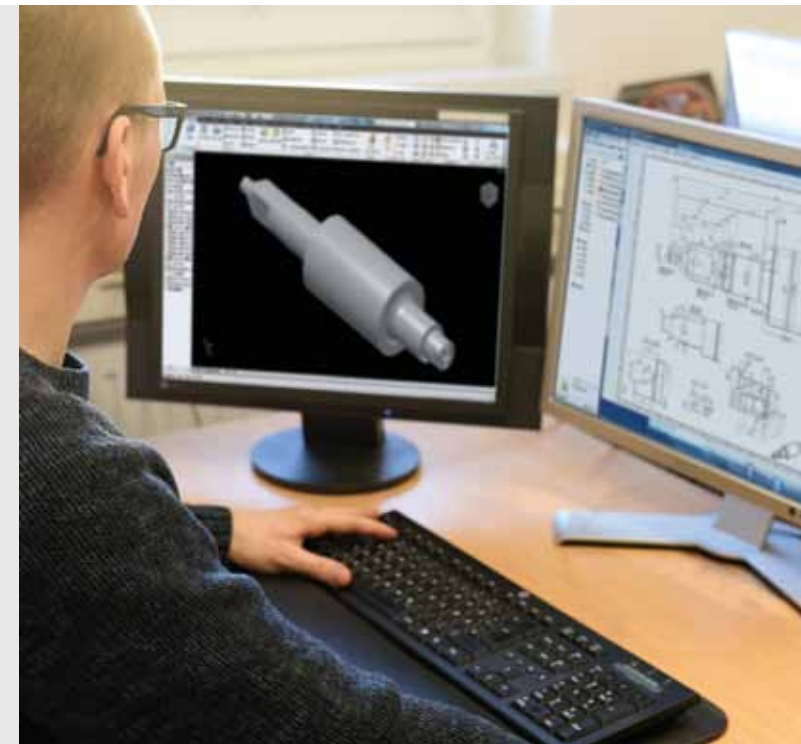


## Casting facilities:

- static single poured and compound casts - single pieces up to a maximum cast weight of 130 tons, over a diameter of over 1,700 mm and 13 m length
- horizontal/vertical centrifugal casting machines for single poured and compound cast pieces up to a barrel length of 6 meters
- vertical spin casting machine for rolls up to 11,5 m length and 75 tons finish weight

## Machining:

- CNC-controlled turning-, milling-, grinding-, drilling-, and balancing machines in 12 processing halls, for finished size:
  - max. barrel length up to 13 meters,
  - Ø over 1,700 mm,
  - 120 tons finished weight
- approx. 1.500 tons finished products per month



# ENGINEERING

WALZEN IRLE has its own engineering- and calculating department (amongst others, according to FEM- Methods of Finite Elements). Thereby the customers get supported effectively by the construction of new plants or major rebuilding of existing rolling mills.

Apart from the preparation of drawings- and order documents the following areas are also covered:

- on-going technical support of the customer regarding our products
- planning of the technical documents for our products
- research and development especially in the area of heated calender rolls in cooperation with the metallurgic laboratory
- Patent monitoring

## Melting facilities:

- 8 electrical melting furnaces (induction), from 3 to 30 tons capacity

## Heat treating facilities:

- 17 gas-fired heat treatment furnaces



## Technical consultation and constructional support

- technical sales support
- dimensioning of components according to customers demands
- load-carrying capacity of the components- and fatigue strength analysis
- optimising of the components according to the customer's requirements

# QUALITY MANAGEMENT

The high requirements of our customer in the material properties of our products are fulfilled by the specialists in our materials laboratory.

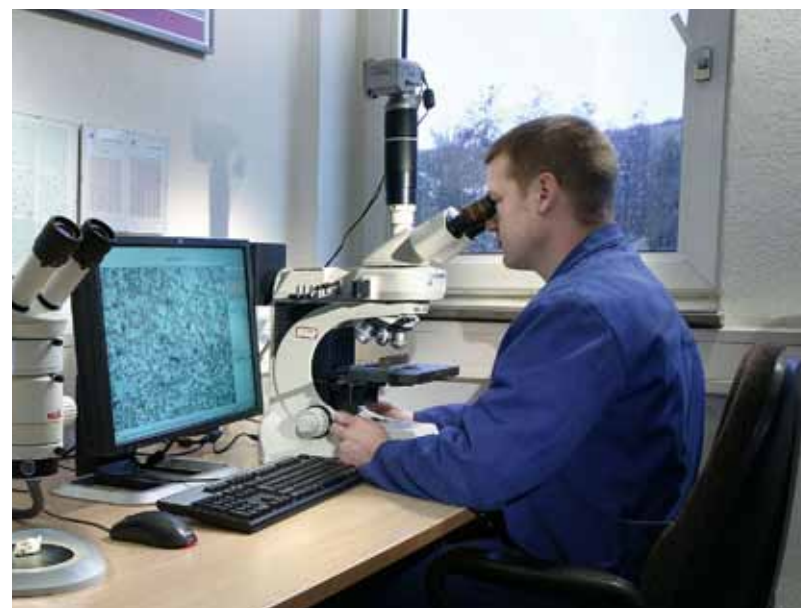
The standard tasks are continuous chemical analyses during the melting- and casting processes, permanent quality controls during all production steps and description of the metallurgic criteria for the manufactured products.

The following essential operations are carried out in the laboratory:

- sales support in the area of application specific material recommendations
- chemical analysis using spectrometer
- measuring the bending and tensile strength
- testing the surface hardness with all, in the industry, accredited measurement- methods
- non-destructive measurements with ultra sonic devices
- non-destructive measurements with eddy-current gauge
- magnetic powder testing
- material tension testing
- surface testing with perthometers
- research and development especially in the area of production methods



The high qualification of our staff in combination with our experience enables us to realise tailor made solutions and customer specific improvements. We are continuously optimising our work process according to the ISO 9001:2008 Quality Management, the ISO 14001:2009 Environment Management and the ISO 50001:2011 Energy Management Systems.



# IRLE GROUP

Due to strategic decisions and developments of the structure, the IRLE GROUP had started with a spin-off into IRLE DEUZ GmbH and WALZEN IRLE GmbH in the early 70's of the last century. WALZEN IRLE is a 100 % subsidiary of IRLE DEUZ GmbH.

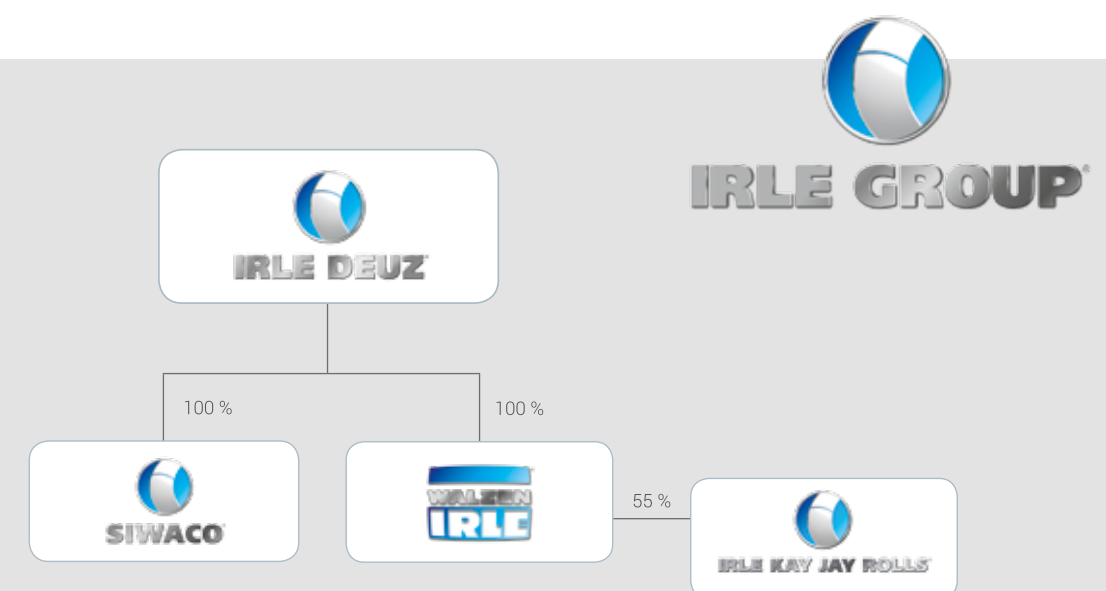
IRLE DEUZ GmbH is the holding of the IRLE GROUP. The IRLE DEUZ Management actively attends strategic developments, organization and business guidelines of the subsidiary companies. The holding provides financial accounting, process planning,

work organization, new constructions as well as maintenance and repairs and operates the it-systems for WALZEN IRLE, SIWACO and IRLE KAY JAY ROLLS.

In 2001 SIWACO GmbH was founded as a service and trading company. SIWACO is a distribution company which is specialized in wear resistant rolls, roll shells and tools for the tube production.

In 2007 a partnership agreement has been closed with the Indian Company Kay Jay Rolls Pvt. Ltd.. Both parties agreed

to build and operate an iron foundry. For this „IRLE KAY JAY ROLLS Pvt. Ltd.“ has been founded. In 2008 the buildings for foundry and workshop have been built, factory equipment has been erected and production processes have been started.





IRLE DEUZ GmbH  
Holding Company  
[www.irl-group.com](http://www.irl-group.com)

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WALZEN IRLE GmbH  
[www.walzenirle.com](http://www.walzenirle.com)

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SIWACO GmbH  
[www.siwaco.com](http://www.siwaco.com)

IRLE KAY JAY ROLLS Pvt. Ltd.  
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IRLE GROUP