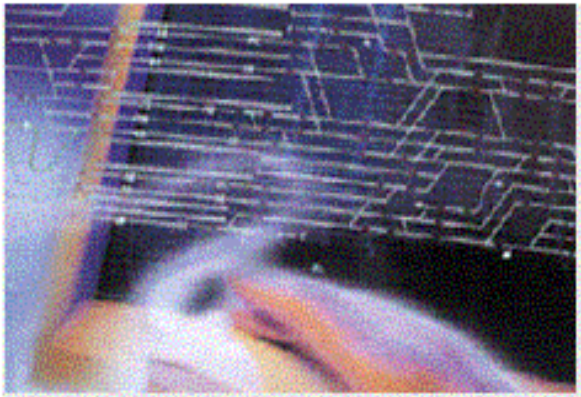
SIEMENS

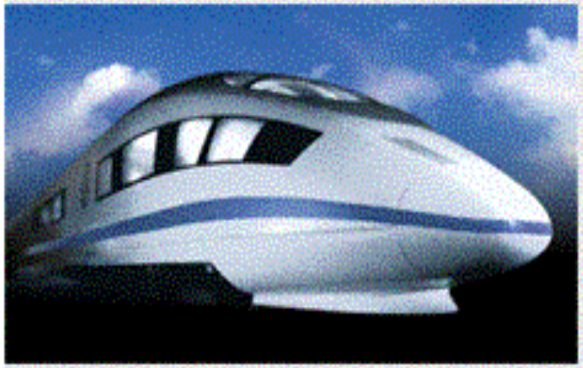
THE VAL SYSTEM : THE NEW GENERATION

SIEMENS Transportation Systems

Range of activities

Siemens Transportation Systems supplies …





… for rail-based transportation the world over

Siemens Transportation Systems, subsidiary of Siemens

- An Association between the technological know-how of Siemens Transportation Systems (formerly Matra Transport International) and the industrial and commercial power of Siemens, one of the worldwide leaders in railway products and services.

Siemens Transportation Systems

- Worldwide control centre of Siemens for automated urban transit systems.
- World leader in automatic unmanned subway systems, automatic train control and automatic traditional subway networks.
- Supplier in France of the products and services of the Siemens "Transportation Systems" division.

Some examples of products……

…..Météor Paris...

- Commissioning: 1998
- Transport capacity: 28,500 to 40,000 pphpd
- Max. speed: 80 km/h
- Min. headway: 85 s.
- Operation:
  - Pinched loop, temporary single track, shuttle
  - Mixed operation:
    automatic mode / manual mode
  - On-board video

Line 14:

7.5 km / 7 stations / 19 trains and 6 vehicles
+ extension to the St Lazare Station

System availability: 99,97 %

Some examples of products.....
CBTC New York..... and coming in Barcelona

Météor Technology:
Modernisation design of the whole subway system of New York

- Network of 25 lines
- 4 track lines: 2 express / 2 all stops

- Capacity/day: 4 million passengers/day
- Max. speed: 60 miles/h
- Min. headway: 2 min.

First line planned for modernisation

Canarsie Line L

17 km / 24 stations / 24/24 hours

Civis

Vehicle operated by automatic optical guidance system
developed jointly by Siemens Transport Systems and Irisbus

Transport capacity	Up to 3,000 pphpd
Max. speed	> 20 km/h
Min. headway	3 min.
Operation	- Vehicles with rubber tyres
	- No guidance required (on-board camera)
	- Reserved track, unmarked track
	- Guidance on track, guidance in station

Progressive and flexible system

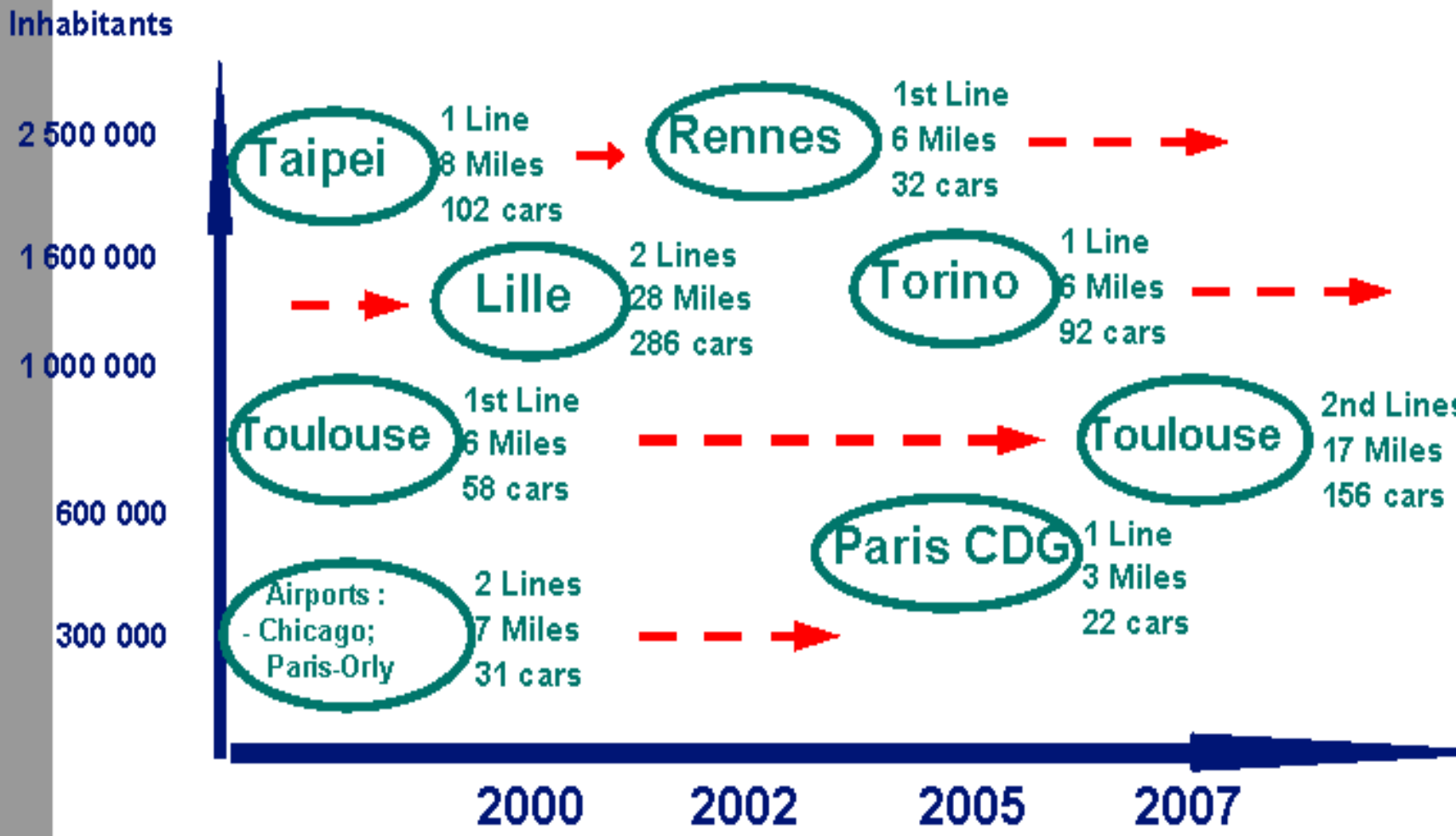
The VAL solution

Capacity	Up to 30,000 pphpd
Operat. speed	80 km/h
Min. headway	60s.
Operations	Pinched loop, temporary single track, shuttles, platform doors

More than a billion passengers transported without accidents

Availability / Punctuality > 99.97 %

The VAL system : the new generation



VAL in the world

- 5 cities and 3 airports
- 119 km lines in service, under construction or ordered
- + 1.5 billion passengers transported safely since 1983

Projects	Current status	km	Nb. vehicles	Nb. stations	Opening date
Lille1	in service	13.2	108	18	1983
Lille 2 Phase 1-4	in service	27	168	39	1989-99
Orly	in service	7.2	16	4	1991
Chicago O'Hare	in service	4.3	13	5	1992
Toulouse A	in service	10	82	15	1993
Taipei	in service	13	102	12	1996
Lille 2 Phase 5	in service	3.5	-	5	2000
Rennes	in service	9.3	32	15	2001
Toulouse ext. A	under construction	2.5	28	3	2003
Turin	under construction	9.6	92	15	2005
Toulouse B	under construction	16	70	20	2006
Paris CDG	Design	4,3	22	5	2005
Total		118,9	743	157	

The VAL system : High Train Frequency

- Short station length
  - **Reduced infrastructures**
- Reduced waiting time
  - **Enhance attractiveness**
- Adapted to the demand
  - **Reduce operating costs**

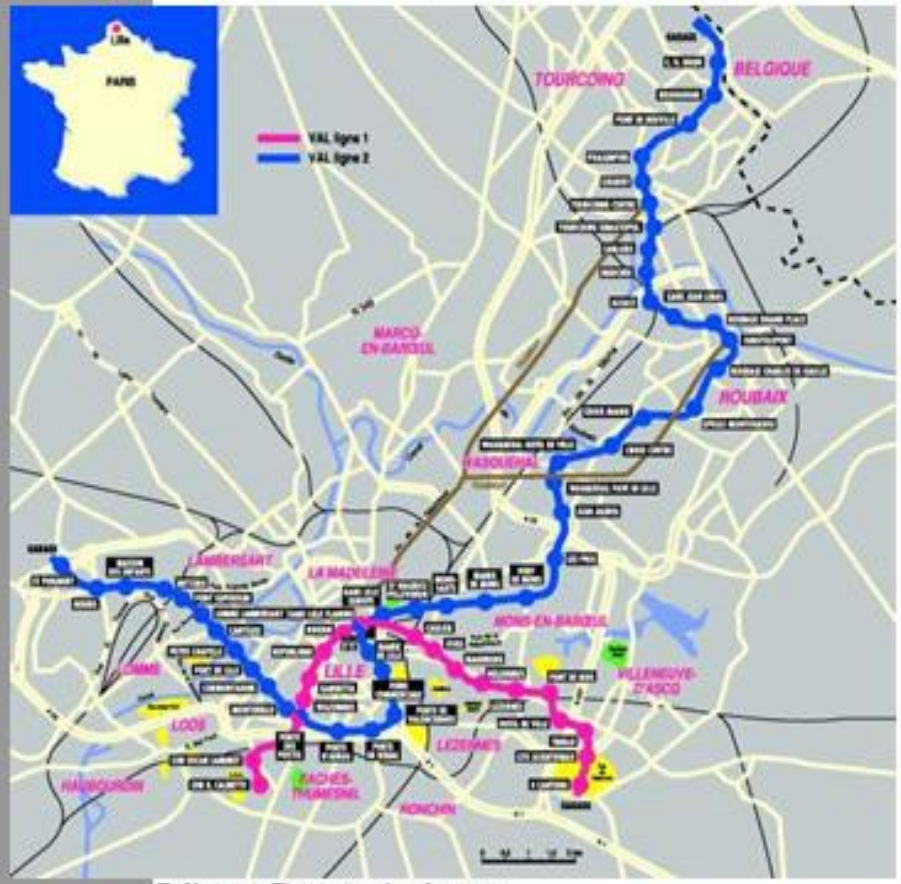
27 August 1999

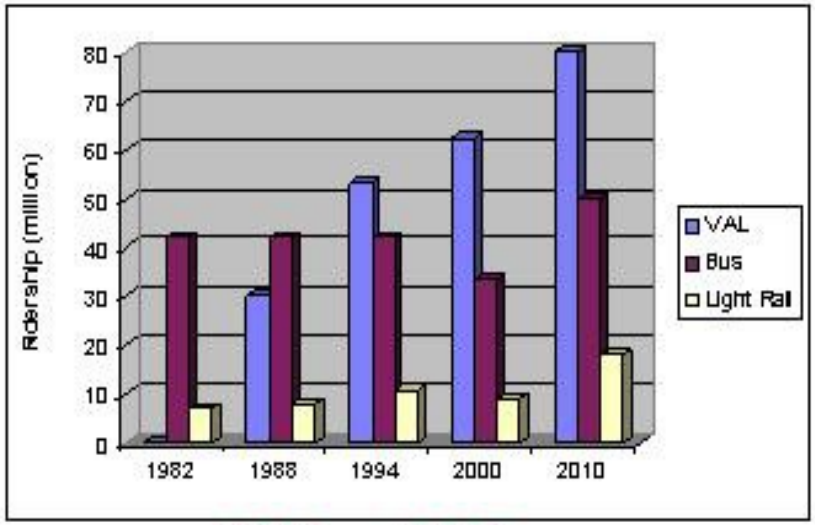
QUATRE CANTONS Time	Headway(mn)	CALMETTE Time	Headway(mn)
05:12:00	06:00	05:12:00	06:00
05:24:00	04:00	05:48:00	04:00
06:12:00	02:00	06:36:00	02:00
06:52:00	01:20	07:16:00	01:20
06:56:00	**01:00**	**07:20:00**	**01:00**
07:12:00	01:20	**07:36:00**	01:20
07:44:00	01:30	08:08:00	01:30
08:32:00	02:00	08:56:00	02:00
09:36:00	03:30	10:00:00	03:30

Lille - VAL Operating Time Tables
A one minute headway during peak hour

The VAL system : Benefits of full automation

Lille Network





2000 vs 1999

28,1% increase of VAL traffic
Decrease of bus & ligh rail traffic
Suburban remains constant +0,1%
58,3% journeys are on the VAL

Benefits of the VAL System

Quality of Service

- Short headway between trains
- Flexibility / Adaptability to needs
- Extended operating hours

Even at off-peak hours

- High commercial speed

Passenger Safety

- Fail-safe design of automation systems
- Platform screen doors
- Dedicated site

Benefits of the VAL System

Operation

- Insertion and withdrawal of trains in real time
- Automatic management of trains in depot areas

Low operation costs

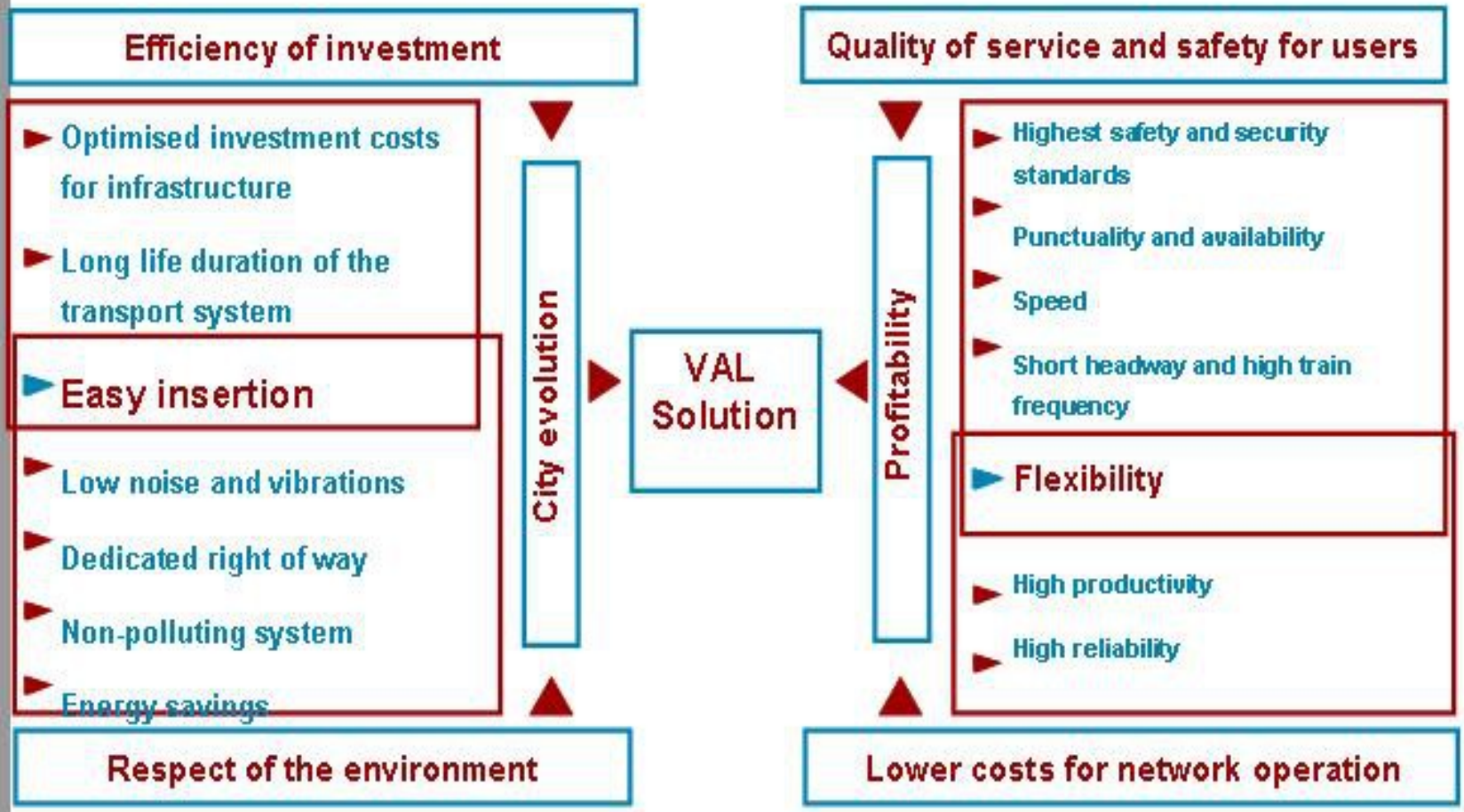
- No staff required on board
- Integrated maintenance assistance
- Higher global productivity

Comparison between transit systems

Criteria	Traditional subways	VAL	TRAMWAYS
Capacity (P.P.H.P.D*)	10,000 - 50,000	3 000 - 30 000	2,000 - 7,000
Headway Peak hours Off-peak hours	2 - 4 mn 10 mn	1 - 2 mn 6 mn	4 - 6 mn 23 to 30 mn
Commercial speed	25 - 35 km/h	30 - 40 km/h	10 - 20 km/h
Productivity Passengers/year/staff	50,000 / 100,000	150 to 200,000 in Lille	50,000 / 100,000
Safety Systems and Stations	High but frequent interference problems on track	Very high platform doors, video supervision and on-line passenger assistance	Medium conflicts with urban traffic (cars, 2 wheeled vehicles, pedestrians)

* ***P.P.H.P.D.: Passengers / hour / direction***

The VAL solution



The VAL system : Safety and Reliability

Emergency Evacuation

- **Avoid on line evacuation when possible and proceed to the next station**
  - UITP recommendation
- **If exceptionally on line evacuation must be proceeded within a managed time:**
  - Stop all the trains on the line section
  - Automatic and safe switch-off of the traction power before deboarding
  - Without the needs of operators actions (on board - Control Center)

The VAL system : Safety and Reliability

Automatic Push-Recovery

- Removal of a train, if exceptionally stranded on line (for small consist of 2 cars)
- Automatic coupling of the following vehicle without any on-line operator assistance
- Deboarding the passengers at the next station

The VAL system : the new generation

The Manless system key elements

- The Automatic Train Control
- The Automatic Train Supervision
- The VAL vehicles

Based on 20 years experience (D&B - O&M)
Using the latest technology
Developped with the operating companies

The VAL system : the new generation

The Automatic Train Control

- Contact-less train detection (no track circuit)
- Positive detection by inductive loops continuous transmission of a message and negative detection by vital infrared barriers
- 2 versions:
  - bidirectional operation for Lines operated 24h/day
  - One direction/track for most of Urban applications operated 20h/day

The VAL system : the new generation

The Automatic Train Supervision

- Open Architecture (PC Based)
  - Easy expandability
  - Worlwide support
  - Operators data base access
- Operator's features
  - Ergonomy (Windows)
  - Video-Audio display
  - Rear projected mimic board

- Standard Communication protocols (TCP-IP)

VAL 208

Features:

- More than 30% glass surfaces
- 46m² useful surface area
- Weight: 28 tons
- Nominal power supply: 750 V (DC)
- Power by element: 520 kW
- 1 motor per wheel (8 per element)

Options:

- Air conditioning
- On-board video monitoring / JAVAVAL
- Dynamic display of itinerary
- Fitted adjustable seats
- On-board maintenance assistance device

Max. capacity/vehicle: 145-245 passengers

The VAL vehicle

The VAL 208 in Rennes

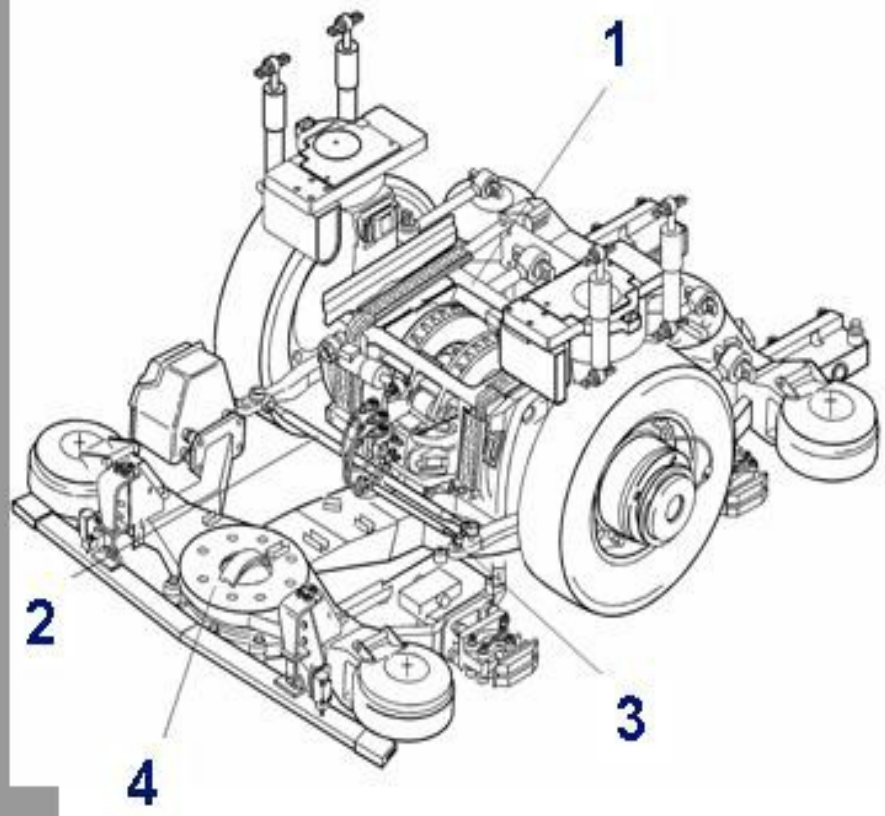
The VAL vehicle

- **Propulsion**
  - Four synchronous wheel hub motors
  - Permanent magnets (energy saving)
  - Low rotating speed - no differential gear box (noise reduction)
  - High redundancy (one inverter per motor)
  - No motor collector brushes (easy maintenance)

The VAL vehicle

- **Electro-hydraulic brakes**
  - Regenerative breaking
  - Not sensitive to freezing temperatures
  - Discs joined to the motors (reduce weight and dimensions)
  - Electro-hydraulic brakes
- **Running gear**
  - Directional wheels (instead of axles) reduce force on track
  - Air spring suspension (floor levelling in station)

The VAL vehicle



The VAL Bogie

1 Bolster Cross Member

2 Direction Rod

3 Direction Rod

4 Guidance Frame

The VAL vehicle

The VAL bogie

VAL CONCEPT

- **A BODYSHELL as a result of :**
  - **A combination of aluminium and composite elements,**
  - **The intensive use of easy assembly techniques.**

- **Advantages :**
  - *Bolted Aluminium Profiles* ⇒ *reduced weight*
  - *Polyester Body Ends* ⇒ *aesthetics*
  - *Phenolic protection on underframe extremities* ⇒ *fire Barrier 30 minutes*
  - *Assembly by gluing* ⇒ *good finishing easy assembly*

VAL BODYSHELL

BODYSHELL BOLTED ASSEMBLY

VAL BODYSHELL

GLUING EXTERIOR PANELS AND WINDOWS

VAL 208 CONCEPT

- **A CABIN with :**
  - **An increase of floor area dedicated to passengers,**
  - **A maximization of glass surfaces,**
  - **An optimized gauge.**
- **Advantages :**
  - *Increased Floor area accommodation* ⇒ *better flexibility for seat*
  - *Glass surfaces* ⇒ *better Passenger comfort (+30 % VAL208 compared to VAL 206)*
  - *Optimised Gauge* ⇒ *better Passenger comfort (height, 208 or 258 mm width)*

VAL 208 : LILLE

SIEMENS

The VAL system : the new generation

Thank you for your attention