行政院所屬機關因公出國人員出國報告書

（出國性質：考察）

# 考察韓國及日本高速鐵路建設與營運計畫
# 出國報告書


服　務　機　關：交通部會計處、路政司

出國人員姓　名：黃 秀 英、周 永 暉

職　稱：專門委員、科長


出國地點：韓國、日本

出國期間：民國 91 年 12 月 9 日至 12 月 16 日

報告日期：民國 92 年 3 月

系統識別號:C09200002

# 公 務 出 國 報 告 提 要

頁數: 42　含附件: 否

報告名稱:

考察國營鐵路公司民營化後財務監督事宜

主辦機關:

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出國類別: 考察

出國地區: 日本　韓國

出國期間: 民國 91 年 12 月 09 日 -民國 91 年 12 月 16 日

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分類號/目: H4／鐵路　H4／鐵路

關鍵詞: 鐵路、高鐵、列車

內容摘要: 基於高鐵計畫爲我國首宗民間投資交通建設案，政府與民間係爲「夥伴關係」共同來推動。爲增進高鐵工程局及台灣高鐵公司對於未來高鐵營運前試車及列車維修生產等作業之瞭解，乃參訪正在執行高鐵建設之韓國高鐵計畫，並實地試乘KTX列車。另台灣高鐵公司（THSRC）車輛因採日本新幹線700系爲參考系統，除實地瞭解日本車輛製造情形與流程，並參訪JR東海公司籌資進行名古屋車站站區土地開發案例，以及爲紓解東京車站調度瓶頸所進行品川車站建設之因應做法。面對二十一世紀高速化時代的運輸環境，高鐵已成爲未來生活的重要交通工具，除應積極建設外，實需早日完成通車營運之前置準備作業。

本文電子檔已上傳至出國報告資訊網

# 考察韓國及日本高速鐵路建設與營運計畫出國報告書

## 目　　錄

# 考察韓國及日本高速鐵路建設與營運計畫報告

## 壹、前言

高鐵建設計畫為我國目前最重要的運輸計畫之一，也是「挑戰二〇〇八：國家發展重點計畫」的重要計畫。基於高鐵建設計畫為民間參與投資交通建設案，政府與民間係為「夥伴關係」共同來推動建設，為增進高鐵局及台灣高鐵公司對於未來高鐵列車營運前之試車及列車維修生產等作業事項之瞭解，特安排參訪正在執行高鐵建設計畫之韓國高鐵，包括 KTX 總機場及車輛製造廠參訪及實地試車之本考察行程。

台灣南北高速鐵路建設計畫自七十九年完成可行性研究後，迄今已歷十年，其間因政府社會福利支出及經常性財務支出增加，而調整公共建設預算分配，以致於影響交通建設經費籌措。因此，「台灣南北高速鐵路建設計畫」是政府開始對於具有自償性的計畫嘗試以民間參與方式（BOT 模式）之首件建設計畫。同時，由於台灣高鐵公司所採用核心機電系統為日本東海道及山陽新幹線（採 700 系列車參考模型），為此，特考察正在日本車輛製造所的台灣高鐵列車模型，並搭乘名古屋至東京段的新幹線列車，且參觀 JR 東海公司位於東京品川的站體改建工程。

另為促使高鐵通車營運後，帶動台灣各車站區域之繁榮，並期形成新都市中心及交通轉運中心，目前正著手進行車站新市區開發之規劃。有關台灣高鐵主要車站週邊位置已規劃的車站特定區，共計五個特定區，範圍達 1390 公頃，可容納計畫人口約 18 萬人。為此，亦參訪位於日本名古

屋市中心的名古屋車站（建於 1937 年）開發案例，該案例由 JR 東海公司籌資以站區土地作為開發基地，興建雙子塔（Office Tower 及 Hotel Tower，樓高分別為 51 層及 53 層）與車站連結，是現今較具規模及成功的開發個案。

另為應鐵路局 93 年 6 月底完成公司化及 96 年 6 月底完成民營化後財務運作等事宜，將原擬赴英、德先進國考察其原屬國營之電信事業民營化後之財務運作及政府對於其財務控制及監督情形之出國計畫，變更併同本次考察計畫辦理，並就韓國高鐵建設計畫之財務規劃進行瞭解，同時對日本國鐵於 1987 年民營化後，實際運作情形加以查訪，尤其六家客運公司中，僅 JR 東海公司、JR 東日本公司及 JR 西日本公司屬真正民營化，且負擔原有巨額的債務虧損。至 JR 九州公司、JR 四國公司及 JR 北海道公司則不僅未負擔原有的債務，且仍接受政府補貼。最後要特別感謝經由高速鐵路工程局與台灣高鐵公司的行程安排與協助，得以在短暫的考察行程裡，拜會韓國高鐵建設公團理事長蔡映錫先生，三星（SUMSUNG）總裁金善九博士，現代建設副社長孔泳鎬先生等，以及日本鐵道局局長石川裕己先生、副局長白取健治先生，JR 東海公司副本部長梅本薰先生等，並順利完成重點考察之目的。

# 貳、考察行程

本次考察自民國九十一年十二月九日（星期一）至十二月十六日（星期一），共計八日。參訪人員除本部二人外，主要為高鐵局何局長煖軒、邱組長大展，以及台灣高鐵公司劉總經理國治與林資深副總天送。其主要考察地點，包括韓國 KTX 總機場、車輛製造所與試車線，以及日本車輛公司、及名古屋與品川之車站開發等，詳細行程如表 1 所示。

表 1 考察韓國及日本高速鐵路建設與營運計畫行程表

| 日　期 | 地點 | 考察行程記要 | 備註 |
|---|---|---|---|
| 12 月 9 日（星期一） | 啟程 | 台北→韓國漢城（仁川國際機場） | 搭乘國泰 CX420 |
| 12 月 10 日（星期二） | 韓國 | 參訪韓國鐵路車輛製造所<br>參觀 KTX 總機廠 | |
| 12 月 11 日（星期三） | 韓國 | 參訪 KTX 試車線<br>（試乘韓國高鐵列車） | |
| 12 月 12 日（星期四） | 日本 | 韓國漢城→日本名古屋<br>參訪日本車輛公司-豐川製作所<br>(參觀台灣高鐵列車客艙模型) | 搭乘日本 Asiana 航空 OZ122 |
| 12 月 13 日（星期五） | 日本 | 參訪 JR-東海公司名古屋車站開發（JR Central Nagoya Tower）<br>名古屋→東京（Nozomi1220/1400） | 搭乘東海道新幹線列車 |
| 12 月 14 日（星期六） | 日本 | 整理資料（搭乘北陸新幹線列車） | |
| 12 月 15 日（星期日） | 日本 | 整理資料 | |
| 12 月 16 日（星期一） | 返程 | 參訪 JR-東海公司品川新站（東京）建設及其站區開發<br>東京（成田國際機場）→台北 | 搭乘長榮航空 BR2195 |

# 參、韓國高鐵KTX相關建設計畫

## 3.1 韓國高速鐵路（KTX）計畫概要

韓國高鐵，即為京釜高速鐵路，以Korea Train eXpress簡稱KTX，路線由韓國首都漢城至釜山（計有漢城、忠南、大田、大邱、慶州及釜山等車站），路線長度全長412公里，旅行時間約為116分鐘，每日運量52萬人次。本計畫在1989年5月規劃定案，1990年6月確定路線，1992年6月決定57公里的試車線計畫，1994年6月決定採用法國TGV系統，1999年12月起開始進行試車作業。茲就相關資料略述如下：

專案期間：1992年6月～2004年4月

興建單位：KHRC（Korea High Speed Rail Construction Authority，韓國高鐵建設公團）

建設成本：約新台幣4982.65億元（即第一階段為142億美金）

通車規劃兩階段：

1.第一階段：2004年4月於漢城至大邱間通車營運

2.第二階段：2008年於漢城至釜山間（經慶州）通車營運

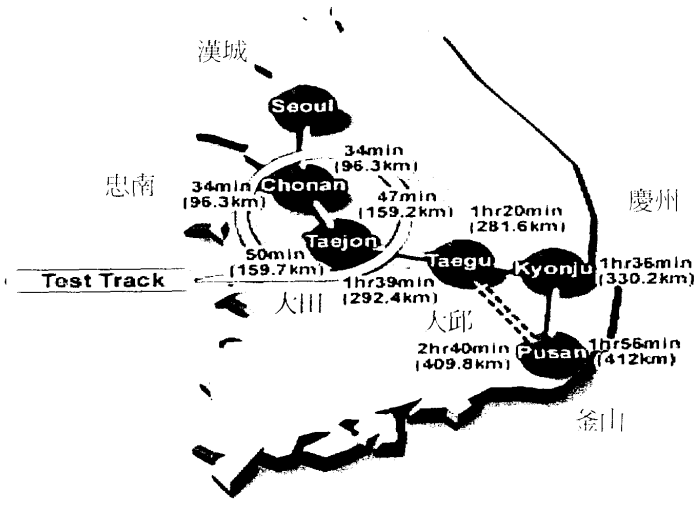
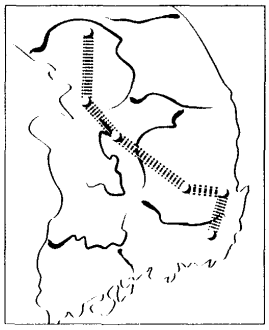



圖 3-1 韓國高速鐵路路線示意圖

表 2 韓國高速鐵路技術資料彙整表

# Korea High Speed Rail
# Technical Data

## Operation

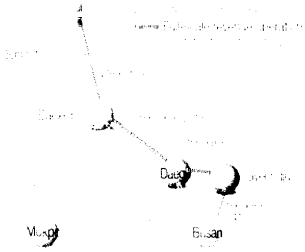


| | |
|---|---|
| Max. operation speed: | 300km/h |
| Number of train-sets: | 46 |
| Min.headway: | 4minutes |
| Transport Capacity: | 520,000passengers/day |

## Track

| | |
|---|---|
| Max. design speed: | 350km/h |
| Min.horizontal curvature: | 7,000m |
| Max. gradient: | 2.5% |
| Distance between trackcenter: | 5.0m |
| Track gauge: | 1,435mm |
| Track Standard: | UIC 60, continuously welded rail, Concrete PC sleepers, Elastic rail-fastening |

## Civil Works

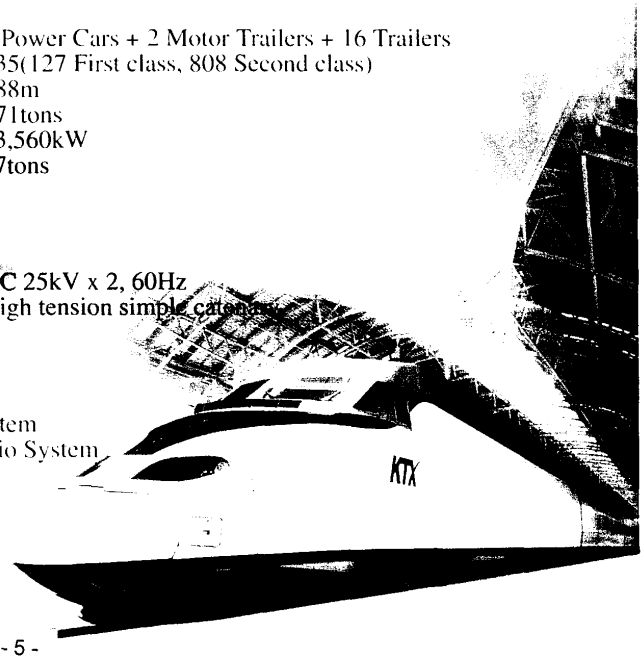


Track bed configuration:

| | | |
|---|---|---|
| Total | 412km | 100% |
| Earthwork | 111km | 27% |
| Tunnel | 189km | 46% |
| Bridge | 112km | 27% |

## Rolling Stock

| | |
|---|---|
| KTX train configuration: | 2 Power Cars + 2 Motor Trailers + 16 Trailers |
| Seats per train-set: | 935(127 First class, 808 Second class) |
| Length: | 388m |
| Weight: | 771tons |
| Traction power: | 13,560kW |
| Max.axle load: | 17tons |




## Power Supply

| | |
|---|---|
| Power Supply System: | AC 25kV x 2, 60Hz |
| Catenary System: | High tension simple catenary |

## Signaling & Communication

ATC, CTC, Electronic Interlocking System
Information Super Highway, Train Radio System

## Safety Devices:

Automatic Detectors for Fire,
Obstacles in track, Climatic condition

## 3.2 參訪 ROTEM 公司車輛製造廠

參訪位於儀旺（UIWANG）的 ROTEM 電聯車製造廠--儀旺工場。ROTEM 公司重組成立於 2002 年 1 月，前身即為 1999 年 7 月成立的 KOROS（Korea Rolling Stock Corporation），此係源於 1964 年早期開創的韓國車輛製造廠。

儀旺工場，佔地 66.1 公頃，每年製造 500 輛電聯車。本次察訪由 ROTEM 廠長李鶴秀（常務理事）親自接待，並說明經由法國 TGV 高鐵列車引進，該工廠正從事韓國高鐵列車 34 組（680 輛）的生產與製造。茲就 KTX 列車系統（如圖 3.2 所示）略述如下：

技術來源：法國TGV系列之推拉式（Push-Pull）列車

列車性能：最高每小時 300 公里

列車編組：採 16 & 20 節車廂之編組型態

引進組數：12組（法國TGV）

製造組數：34組（ROTEM生產製造）

客艙等級：2 種艙等（座位型式為 2+1 及 2+2 兩種）

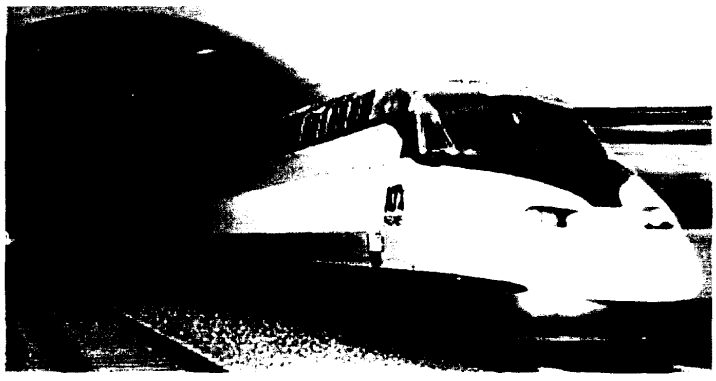
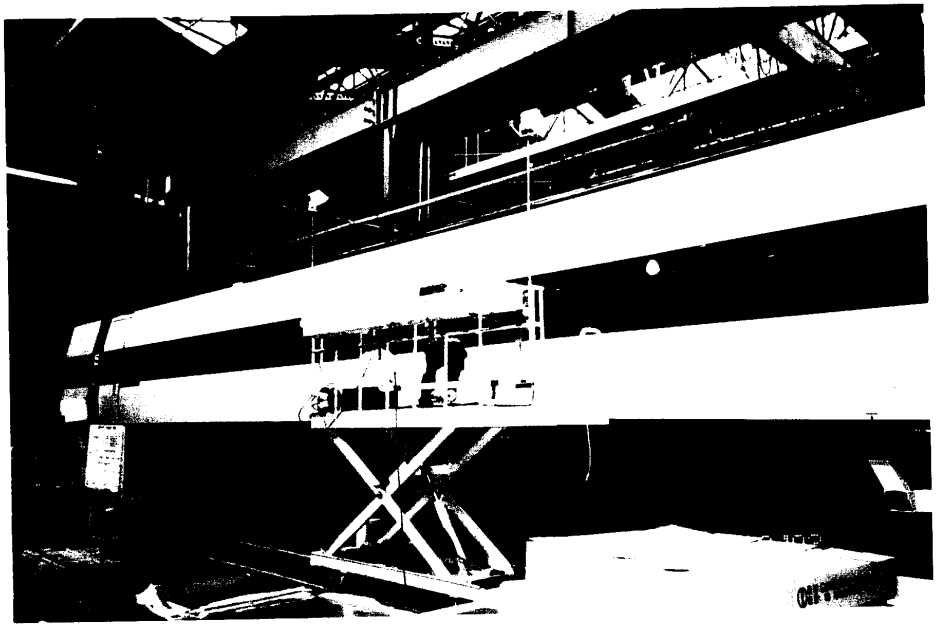


圖 3.2 韓國 KTX 高鐵列車


▲照片 3-1 儀旺工場內廠景（一）

▼照片 3-2 儀旺工場內廠景（二）



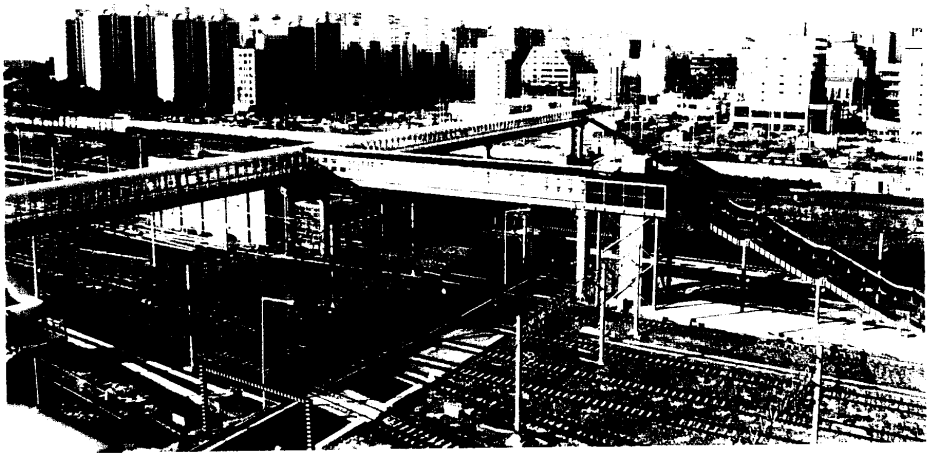
### 3.3 參訪 KTX 高陽機廠

韓國高鐵全線兩處機廠（Depot），高陽機廠位於漢城北方 13.5 公里（已近南北韓界）。該基地興建於 1998 年 12 月 4 日至 2002 年 11 月 30 日，共 48 個月，全場 142.242 公頃，共有 18 股股道，共可容納 56 組高鐵列車。

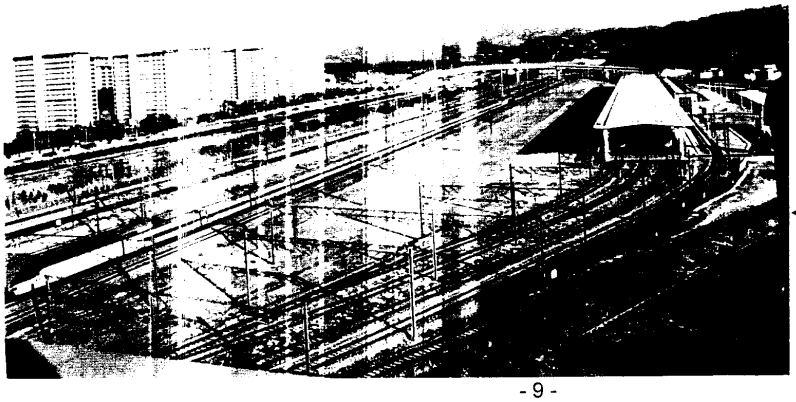
高陽機廠建設區分為兩階段，總經費 2354.76 億韓元（土地成本約 7 億美金，土建成本約 2 億美金）。

▲照片 3-3 高陽機廠廠處

▼照片 3-4 機廠軌道佈設與跨越人行天橋




▲照片 3-5 及 3-6 機廠內列車實景



◀照片 3-7 機廠外軌道佈設

## 3.4 韓國高鐵測試軌與試車線

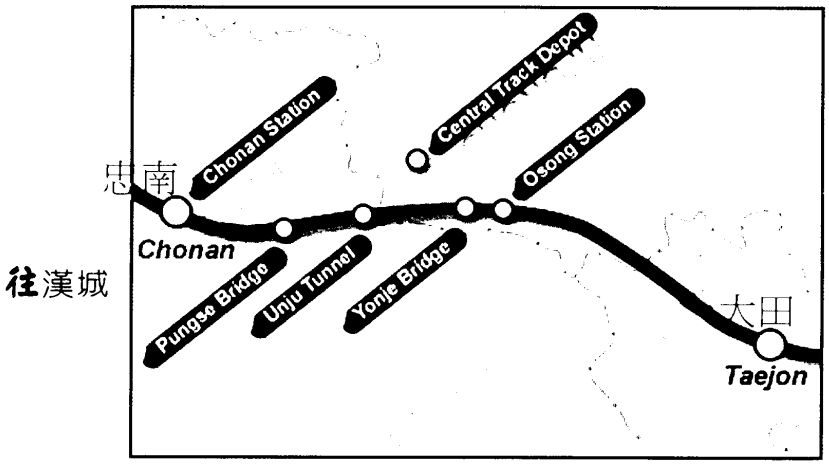
一、測試軌（KTX Test Track）

規劃區間：忠南～大田間路線

完工時間：已於 2000年10月完成

測試時間：於 2000年12月完成第一次車輛測試

測試路線長度： 57.2 公里



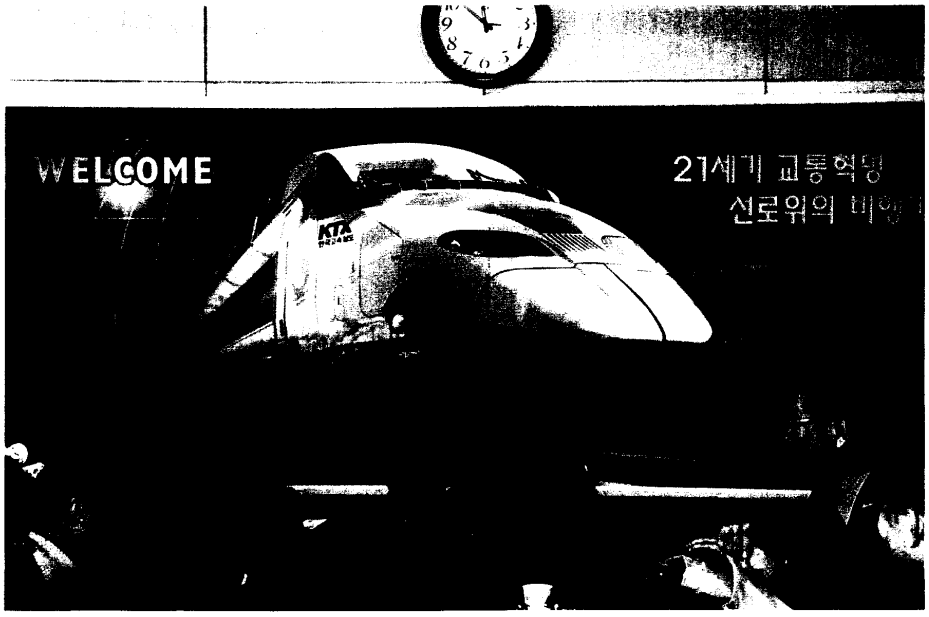

▲圖3-3 試車路線示意圖

▼圖3-4 隧道實景圖

## 二、試車路段接待簡介

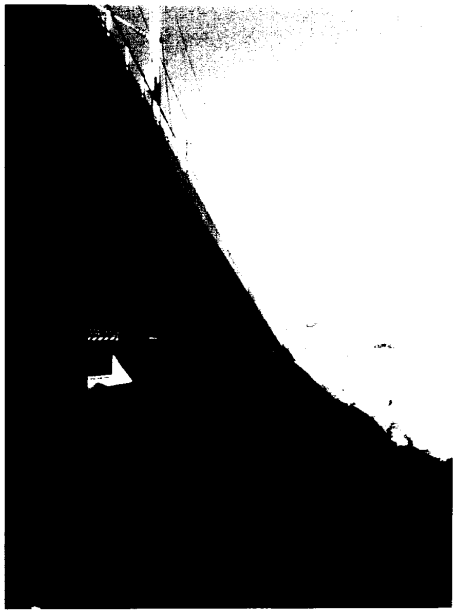
前往位於 Joongboo 的試車路段，高陽車輛試驗整備事務所所長李鍾龍，中部事務所所長李光三（Chongwon-Kun, Chung Cheongbuk-Do）分別接待與解說。

本計畫由政府出資 45%，建設公團出資 55%，列車測試人員計 183 組人力，於 1999 年 12 月起從時速 40 公里至 2000 年 6 月已逐步測試到時速 300 公里。值得一提，韓國建造單位為能充分與民眾交流，特別安排簡報中心，同時介紹長焊鋼軌等軌道施作。此外，並選擇高架路段之 4-1 車站，於該車站站體空間闢建簡報空間，由解說員說明高鐵工程採「支撐先進工法」與「全跨預鑄吊裝工法」等，再安排搭乘巴士至試乘 KTX 列車處，詳如照片所示。

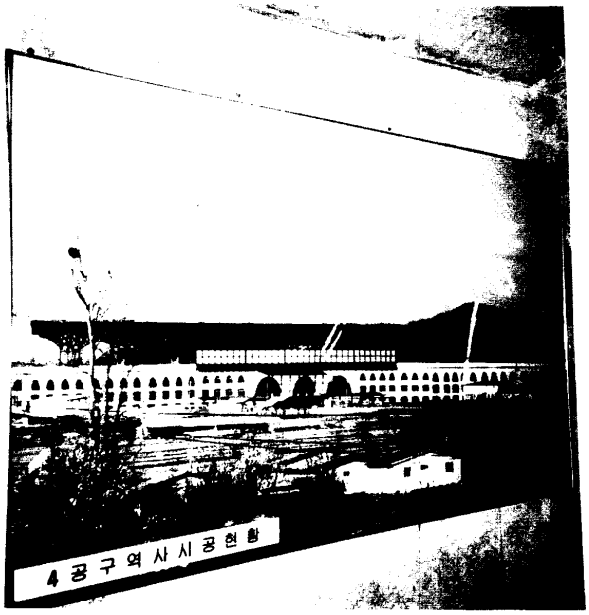



照片3-8 試車接待所簡報室

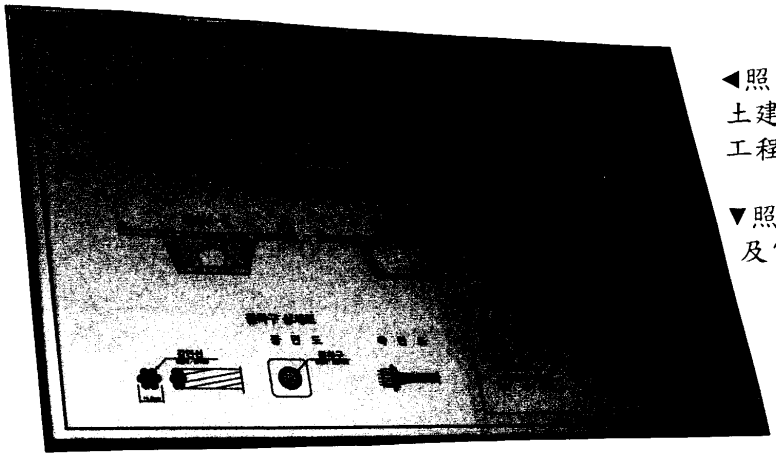

照片3-9 高鐵土建工程段高架橋下作工地簡報入口處



照片3-10 土建工程標完工段

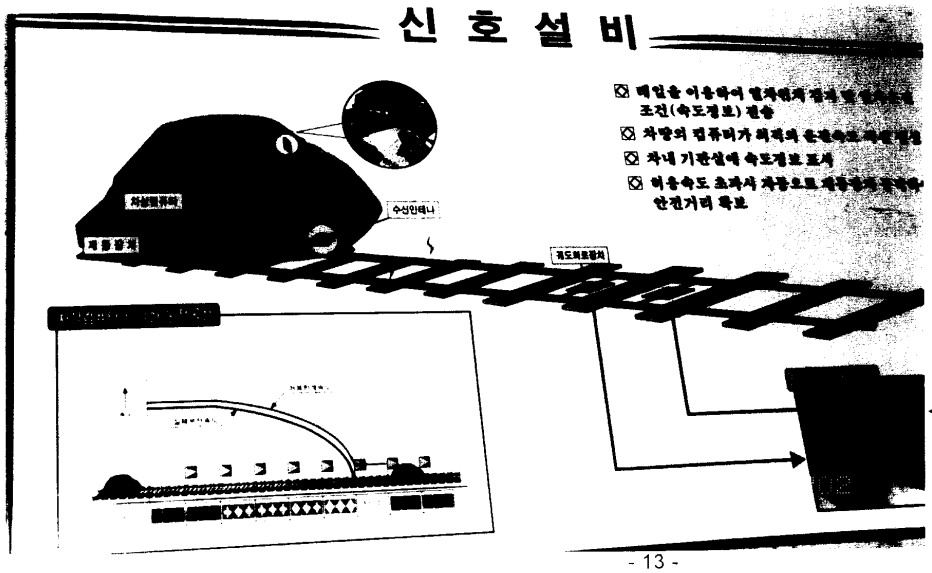



照片3-11 高鐵4-1車站未來完工圖



◀照片3-12高鐵土建工程段高架工程說明圖例

▼照片3-13軌道及電力工程圖說


◀照片3-14軌道電路圖說

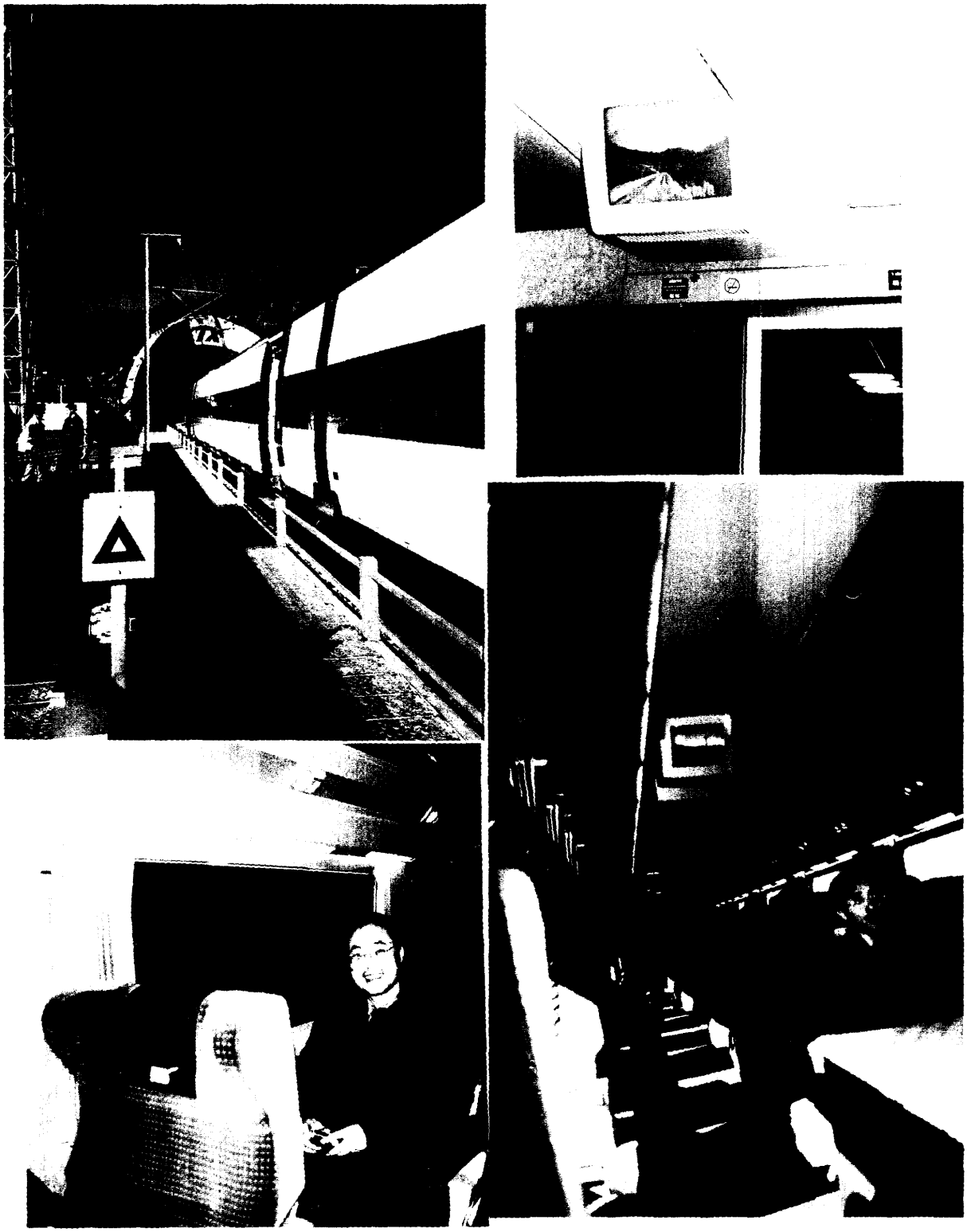
## 三、試乘韓國KTX高鐵列車

韓國第一次車輛測試於2000年12月完成，目前仍陸續測試中，並提供民眾申請試乘。列車時速由每小時157公里到每小時357公里。一般列車935座位數頭等車廂127位（如圖1-5所示）及二等車廂808位（如圖1-6所示）。韓國KTX高鐵列車係採用法國TGV列車，該推拉式列車，屬動力車前後各2輛（計4輛）加上16輛客車廂之配置設計。

照片3-15 全體考察團員試乘韓國高鐵KTX列車後合影

圖3-5 韓國KTX列車頭等車廂

圖3-6 韓國KTX列車二等車廂



照片 3-16~照片 3-19 韓國高鐵試乘內裝實況

## 3.5 韓國高鐵財務計畫

一、背景說明

有關韓國高鐵建設計畫，係由 KNR 於 1991 年 6 月提出初步財務計畫，SOC 推動委員會於 1993 年 6 月核定財務計畫。該計畫總成本原為 10 兆 7,400 億韓元（1998 年幣值）

- ⇨ 其中 45%由政府負擔（政府補助 35%，政府公債 10%）
- ⇨ 餘 55% 由 KHRC 自行籌措（信用保險 31%，海外舉債 18%，民間資金 6%）

1998 年 7 月核定 Kyung-bu 高鐵修正計畫，共分為兩階段進行，總建設成本修正為 18 兆 4,358 億韓元（1998 年幣值）。

- ⇨ 第一階段成本：12 兆 7,377 億韓元
- ⇨ 第二階段成本：5 兆 6,981 億韓元
- ⇨ 其中 45%由政府負擔（政府補助 35%，政府公債 10%）
- ⇨ 餘 55% 由 KHRC 自行籌措（信用保險 29%，海外舉債 24%，民間資金 2%）

二、籌資計畫

依據 1988 年修正通過之主計畫，採二階段興建，該經濟效益分析中，計畫益本比為 1.10，內部報酬率 11.84%。至於資金來源有五部分，包括政府負擔、自有資金、信用保險、海外舉債、民間資金，茲分述如下：

1.政府負擔：補助 5 兆 7,320 億韓元（於 2002 年底止）。

2.自有資金：補助 7 兆 57 億韓元（於 2002 年底止）。

3.信用保險：約 4,600 億韓元（當年幣值）。

4.海外舉債：約 3,800 億韓元（當年幣值）。

5.民間資金：約 2,624 億韓元。

三、財務分析

依據 KHRC 維持由政府分擔 45%，且票價定為航空費率之 70%之規劃要件，本計畫經分析具財務可行性。其重要假設條件如下：

1.市價：收益與成本之物價調整率相同。

2.政府分擔比例：45%。

3.收益項目：只有票箱收入(航空費率之 70%，火車費率之 1.3 倍)。

4.成本項目：投資、營運、利息、折舊。

5.物價：依照 KDI 之預測資料。

至於融資條件方面，在韓國海外舉債利率為 8%下，政府公債利率約為韓國國內債券利率之 2/3，其債券利率分別為：

| 年 | 債券利率 |
|---|---|
| 1998 | 18% |
| 1999 | 14% |
| 2000~2002 | 10% |
| 2003 | 9% |
| 2004~ | 7% |

為此，計畫財務內部報酬率為 8.09%，大於資金成本的 6.78%，故本計畫財務可行。有關財務分析結果，分列如下

| 計畫說明 | 財務內部報酬率(%) | 還本年（單年計） | 還本年（累計） | 債務清償年 |
|---|---|---|---|---|
| 1988 年修正通過之主計畫 | 8.09 | 2009 (營運後 5 年) | 2015 (營運後 11 年) | 2031 (營運後 27 年) |

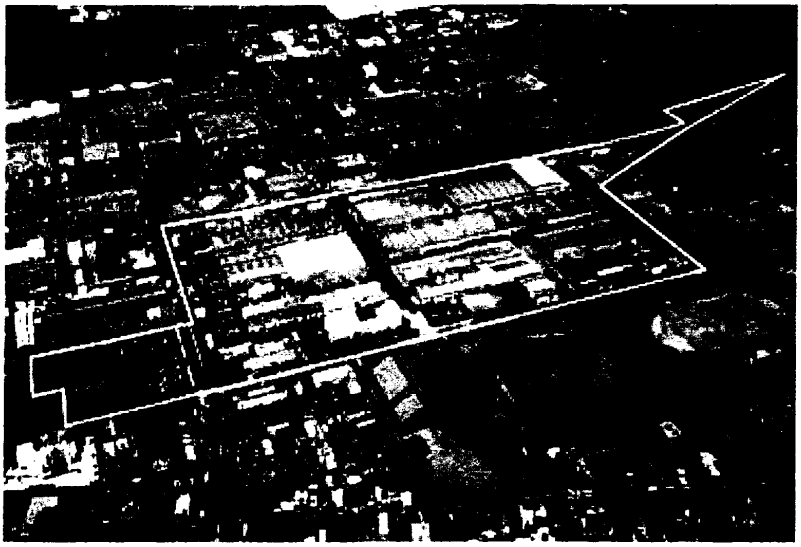
# 肆、參訪高鐵採用日本新幹線列車實體模型

## 4.1 參訪日本車輛（Nippon Sharyo）

台灣高鐵公司（THSRC）車輛系統採用日本新幹線700系為參考系統，有關THSRC核心機電系統承商現況，可由圖4-1圖示說明得知日本車輛製造株式會社主要負責車輛部分。

本次考察為實地瞭解車輛製造情形與流程，特別安排在12月12日參訪位於名古屋旁之豐川市內的日本車輛豐川製作所。日本車輛豐川製作所於1964年開廠，工廠占地約31.4萬平方公尺，為日本車輛製造株式會社所屬四個製作所之一，具研發設計及生產組裝有關海內外各式鐵路車輛、高鐵列車及大型輸送機械之總合性車輛製作工廠，全廠員工數1,150人。

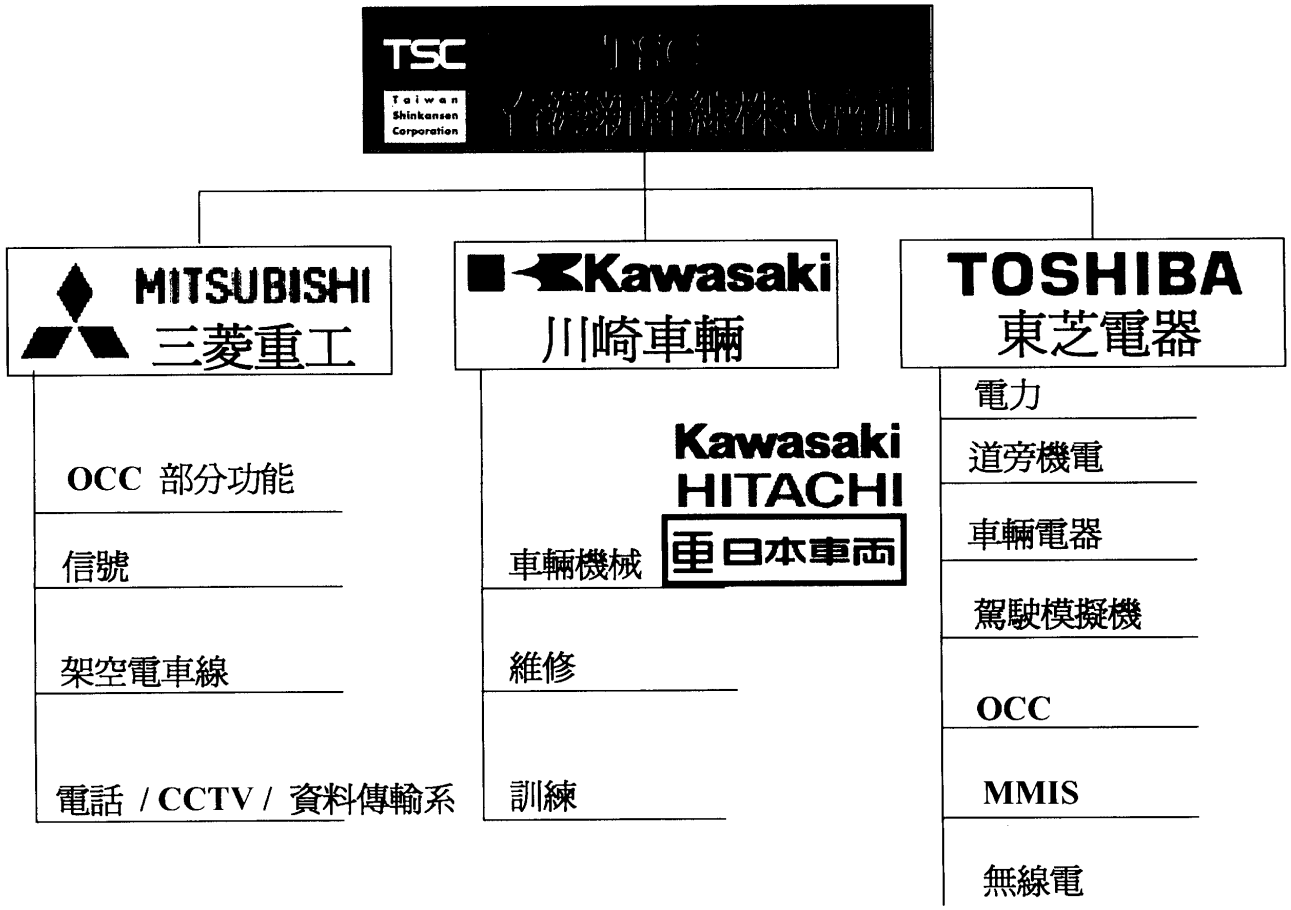
目前台灣高鐵列車客艙實體模型，係由TSC（台灣新幹線株式會社）設計，並將列車客艙實體模型設置於此。本次參訪時，先由川崎重工株式會社車輛部副總裁大橋忠晴、日本車輛製造株式會社車輛部技術長風早清弘等接待與解說，再赴現地參觀工廠製造情形。



照片4-1 日本車輛豐川製作所現址

照片4-2 日本車輛製造株式會社豐川製作所座談會場

圖 4-1 THSRC 核心機電系統承商說明圖



## 4.2 高鐵列車客艙實體模型

目前日本新幹線700型列車，為東海新幹線之主力車輛，台灣高鐵公司依C&OA之補充資料（機電系統規範2.1.5條內容）規範，以700型列車為基本（如圖4-2）。

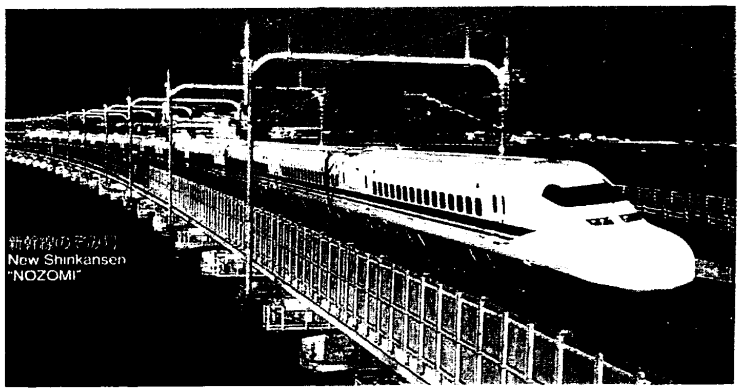


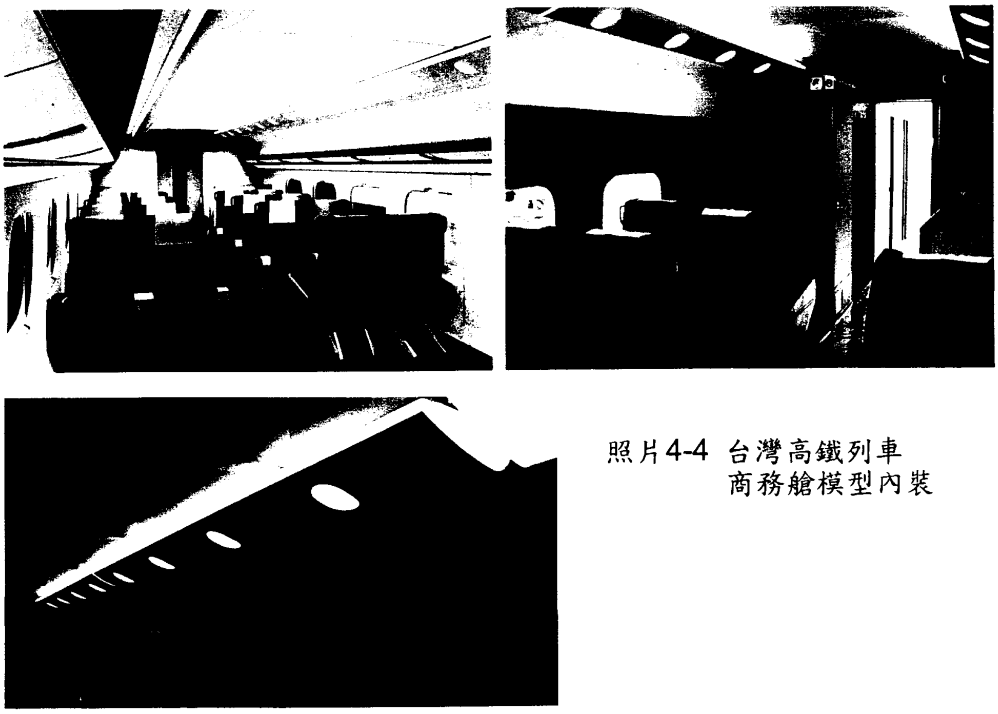

圖4-2 日本新幹線700型列車

台灣高鐵公司之高鐵列車客艙實體模型（如照片4-3所示），已就車輛內裝及配置作進一步改善，在空間規劃上，以商務及標準艙空間設計為主，並提供無障礙空間規劃及相關公共設施空間設計（如乘務人員室等）。有關客車車廂足尺寸之實體模型（mock - up）客艙，在該車廂模型內區隔商務艙與標準艙，商務艙採2+2座位數，而標準艙採2+3座位數，詳如照片4-4及照片4-5圖示。

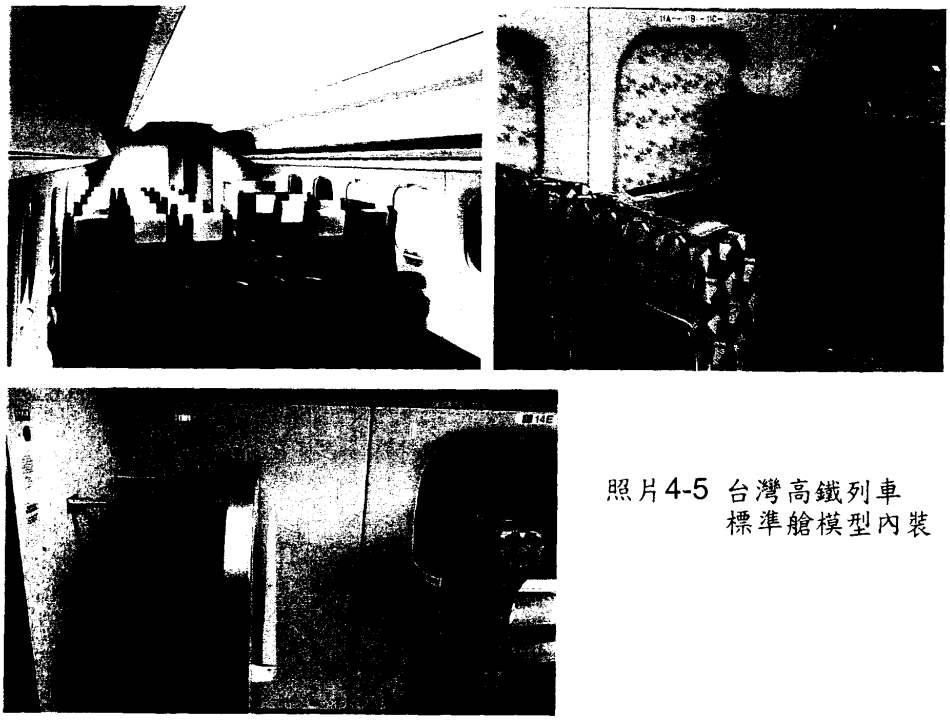
另為提供無障礙環境，台灣高鐵公司特別進行修改車廂設計，包括兩位殘障輪椅區位，對無障礙空間作最大運用，以有效改善環境問題，

詳如照片4-4。

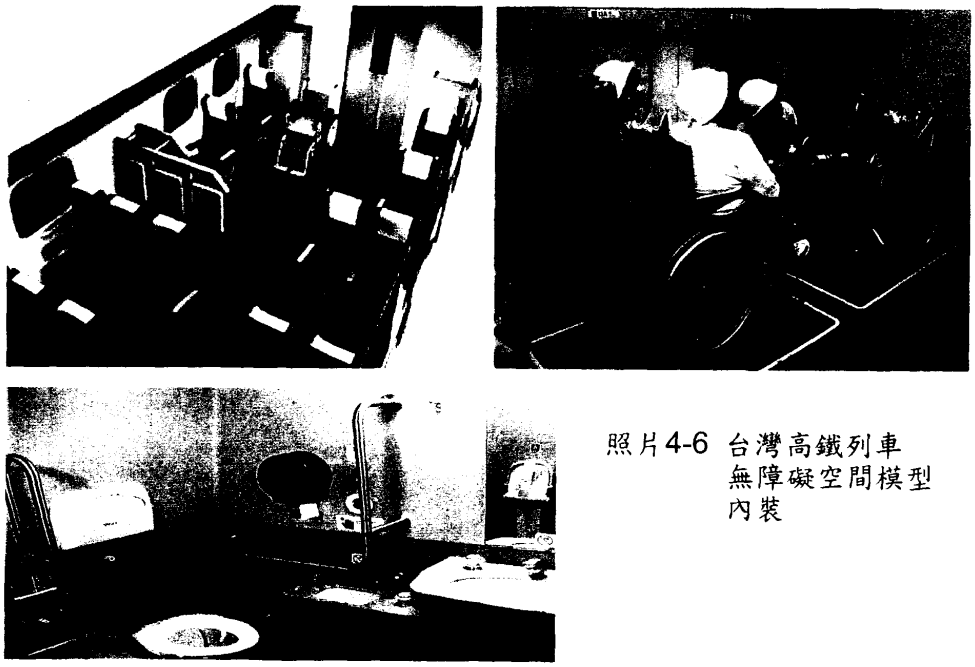
照片4-3 台灣高鐵列車模型外觀



照片4-4 台灣高鐵列車
商務艙模型內裝



照片4-5 台灣高鐵列車
標準艙模型內裝



照片4-6 台灣高鐵列車
無障礙空間模型
內裝

# 伍、參訪日本鐵路客運公司

## 5.1 日本國鐵改制為鐵路客運公司歷程

日本國鐵在60年代以前，在運輸市場上具有相當之獨佔地位。但隨著經濟高度成長、公路系統服務品質改善、汽車運輸發展與小客車持有人數的增加，以及航空運輸業的普遍發展，使得國鐵的優越性在市場中快速消失。客貨無論是在短、中、長程運輸上，面臨了劇烈的競爭，市場佔有率不斷下降；再加上公營企業組織制度之影響，使得營運策略受到限制，管理亦缺乏效率，所以在1964年開始虧損。

在日本國鐵時代因係採用全國一元化的組織管理方式，舉凡人員之任用與退休撫卹則如同公務員，受到政府的規範與保障，而且營運事業項目因具有高度之公共性與獨佔性，所以有關預算、人事、運價及重要設備之投資等決策，均受到國會或政府嚴格的監督、管制及廣泛的干預，使得國鐵的營運方針、事業體之經營自主權受到相當大的限制。因此日本國鐵在營運出現虧損後，十餘年間先後實施四次之營運改善措施，內容包括精簡用人、廢除營運不佳路線車站、減少營運支出、處理事業資產等，惟仍無法遏止國鐵財務赤字之惡化，這也使政府瞭解到在國營架構下，無法使國鐵恢復正常營運，改造國鐵的希望惟有寄望於民營化。

## 5.2 日本國鐵民營化的因素

**一、 外在環境的改變**

1. 國營事業民營化之趨勢—為發揮企業化經營效率，應將政府經營之事業予以民營化；而政府應致力於行政性事務。
2. 運輸市場結構改變—國鐵面臨來自公路、航空競爭，在組織制度上及經營策略不得不作變革。

**二、 國鐵公營制度之缺失**

1. 外來過高的期望與干預—國會與政府對國鐵之預算、費率、管理者

人選、投資計畫及營業項目等均可加以廣泛的干預，且常以政治手段來謀求解決，忽略了國鐵財務負擔，導致經營成效不彰。

2. 經營自主權喪失，對市場反應遲鈍

3. 工作紀律喪失，勞資關係惡化

4. 附屬事業範圍之限制

**三、 全國單一組織的問題**

1. 事業組織超過經營管理能力限度—國鐵之龐大組織已超過經營管理能力的限度，經營者的理念難以徹底貫徹至基層，組織運作難有效率。

2. 營運策略未能因地制宜—費率及營運管理未能配合地域性之實際狀況，作最有利決策。

3. 無法推動競爭意願

## 5.3 日本國鐵民營化之變革

**一、國鐵組織之變革**

有關國鐵之分割，在策略上應考慮到組織規模適宜以確保經營效率，並達符合地域實際情況及營運之要求，排除事業部門間不合理的依存關係（交叉補貼），以提升競爭意識與增進管理效率等。在執行技術上考慮到列車運行之適合性，使部門間之干擾最小化，以降低營運成本。最後決議分割成六家客運公司，一家貨運公司及其他法人或事業單位，並設國有鐵路清算事業團，處理國鐵時代之財產，償還所繼承國鐵長期債務之本息以及人員年金負擔，促進剩餘人員之重新就業等。

**二、人員安置**

1. 以優惠措策，鼓勵員工自願退職。

2. 由舊國鐵暫時繼續僱用過剩人員。

3. 轉業之職業訓練—辦理集體性職業講習，定期給予個別之生活指導及職能上的輔導，並從教育訓練著手來提高其知識與技能，幫助員工取得各種資格，增加轉業之機會。

4. 就業機會之提供—（1）原外包業務收回自營；（2）洽各級政府機構地方公共團體及其他公家部門，提供某一比率之就業機會予國鐵人員再就業；（3）與行政機關、事業團體間保持密切連繫，以蒐集就業之資訊、有組織有系統地就業介紹，或向其他機構推荐；（4）設立獎金，鼓勵員工早日重就職。

而在執行民營化的過程中，上述之相關人員安置對策，都應在事前與勞動工會充分溝通，並使全體國民瞭解，使得人員安置工作能順利推動，並將反面效果降至最低。

**三、資產與債務之處理**

民營化前之龐大債務費用原則上由分割後各法人機構承擔。各機構在繼承債務之同時，對國鐵留下之資產亦加以分割繼承。其主要方式如下：

1. 新成立之各鐵路客運公司（JR）所繼承為經營事業所必須之最小限度的土地等資產；並要求其應在最高限效率經營之前提下，做到收支平衡，若有盈餘則可適度分攤長期債務。
2. 各 JR 公司及新幹線未繼承之資產及長期債務部分，則由國鐵清算事業團承受，授權其以合理方式處分資產，償付長期債務。

## 5.4 JR 東海公司車站開發計畫與財務概要

JR 東海公司為日本國鐵改制後六家鐵路客運公司之一，其營業項目除了運輸本業之外，亦十分注重附屬事業之經營。

為實地瞭解 JR 東海公司之營業開發情形，本次計畫參訪重點為 JR 東海公司名古屋車站站區及品川新站之開發計畫。綜觀 JR 東海公司在附屬事業發展上之努力方向，可歸納為下列六項：

1. 不斷提出各車站新開發構想方案，積極參與包括車站周圍在內的市街地再開發活動；
2. 在市中心開設飯店；
3. 參加體育俱樂部，戶外業餘活動事業；
4. 強化鐵道區域的自然環境，開發自然與人文共存的觀光、療養地；

5. 興建高度複合型大樓；

6. 開發高機能、高品質之超高層建築等。

### 5.4.1 名古屋 JR Central Nagoya Tower

JR東海公司以名古屋車站站區土地作為開發基地方式進行，大樓內部分空間與車站連結。該大樓主要分成Office Tower及Hotel Tower兩部分，分別為樓高51、53層大樓及地下4層之高層建築，高度為245m及226m，總樓地板面積為41萬平方公尺，提供大型百貨、商店街、旅館、辦公空間及觀景台等服務，並可容納1,500部車輛之停車場。

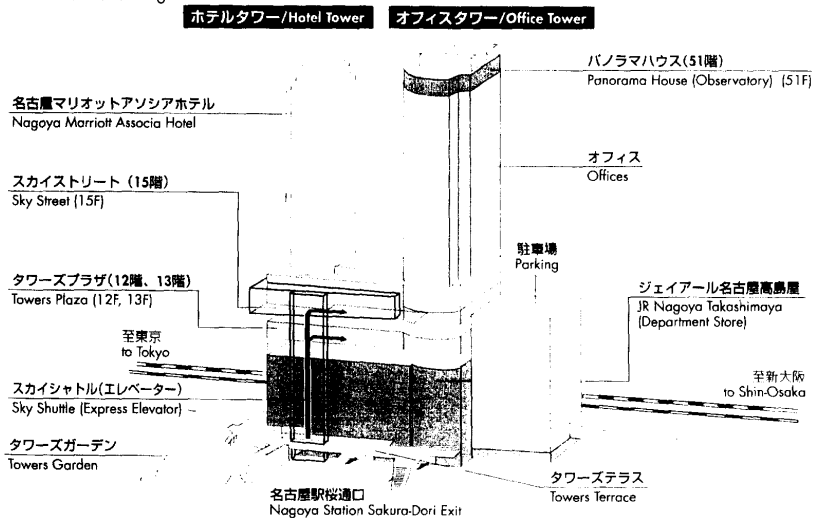
圖 5-1 JR 東海公司名古屋車站開發實

本址位於名古屋市中心，與 JR東海道本線、新幹線及民鐵之名古屋車站連結，提供往來東京、京都及大阪等城際客運，以及市內各種社會商業活動之需。

此次考察夜宿Marriott Associa Hotel，並由JR東海公司總合企業本部梅本薰副部長與TOWERS取締役山口昭彥分別講解開發案例與現況解說（詳如附表）。對高鐵及台鐵未來車站站區各種土地利用及基地開發均有許多可供借鏡之處。

# JRセントラルタワーズ JR CENTRAL TOWERS

## ■ ビル概要図 Diagram




**延床面積** ……約**417,000 m²** (Approx. 417,000 m²)
Total Floor Area

- **オフィス(賃貸面積)** ……約**60,000 m²** (Approx. 60,000 m²)
  Offices (Rental Office Area)
- **百貨店(店舗面積)** ……約**65,000 m²** (Approx. 65,000 m²)
  Department Store (Shop Area)
- **ホテル(客室数)** ……**780室** (780 rooms)
  Hotel (Guest Rooms)
- **駐車場(駐車台数)** ……約**1,500台** (Approx. 1,500 cars)
  Parking

**高さ** ……**245 m** (245 m)
Highest Point

**階数**
Floors

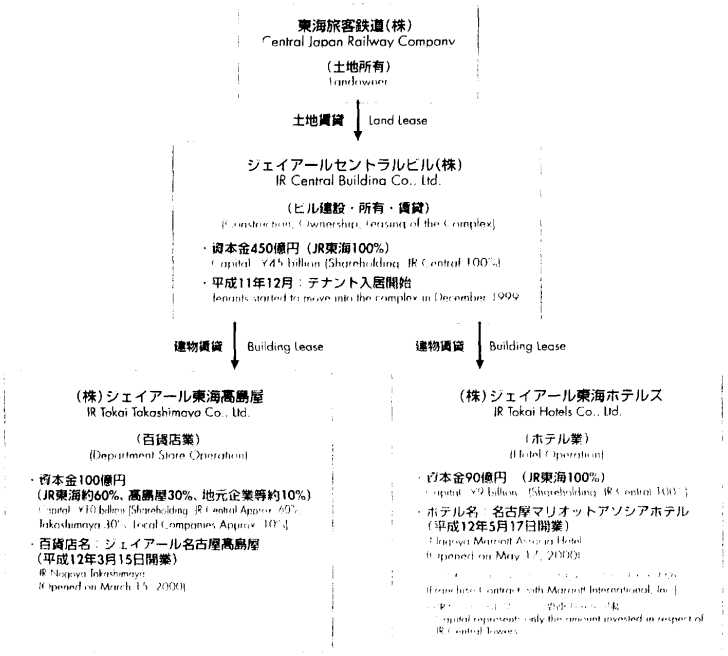
- **ホテルタワー** ……**53階** (53 Floors)
  Hotel Tower (aboveground)
- **オフィスタワー** ……**51階** (51 Floors)
  Office Tower (aboveground)
- **地下** ……**4階** (4 Floors)
  Underground

**着工** ……**平成6年8月** (August 1994)
Commencement of Construction

**竣工** ……**平成11年12月(ビル本体)** (December 1999)
Completion of Construction

**総事業費** ……約**2,000億円** (Approx. ¥200 billion)
Total Investment

## ■ 運営の枠組み Operating Framework




## ■ JRセントラルタワーズ主要事業会社平成14年3月期業績
Fiscal 2002 Performance of Three Main Subsidiaries Associated with JR Central Towers

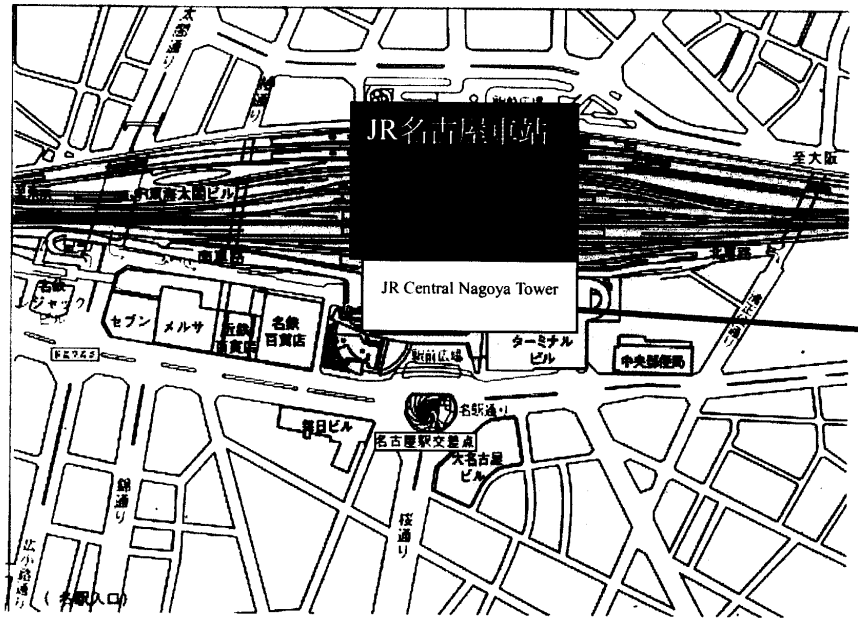
(100億円 ¥ billion)

| 事業会社 Company Name | 営業収益 Operating Income | 経常利益 Ordinary Income | 当期利益 Net Income |
|---|---|---|---|
| ジェイアールセントラルビル(株) ※1 JR Central Building Co., Ltd. | 20.6 | 0.4 | 0.4 |
| ジェイアール東海高島屋 ※2 JR Tokai Takashimaya Co., Ltd. | 69.0 | 2.4 | 2.1 |
| ジェイアール東海ホテルズ ※3 JR Tokai Hotels Co., Ltd. | 20.5 | 0.2 | 0.2 |

注 1.(株)ジェイアール東海高島屋については、平成14年2月期実績
2.(株)ジェイアール東海ホテルズの実績には、ホテルアソシア豊橋、ホテルアソシア高山リゾートを含む。

Notes: 1. JR Tokai Takashimaya's fiscal year under review ended February 28, 2002.
2. Performance figures for JR Tokai Hotels Co., Ltd. include figures for Hotel Associa Toyohashi and Hotel Associa Takayama Resort.

地理位置




Hotel Tower
(53 F, 226m)

Office Tower
(51 F, 245m)

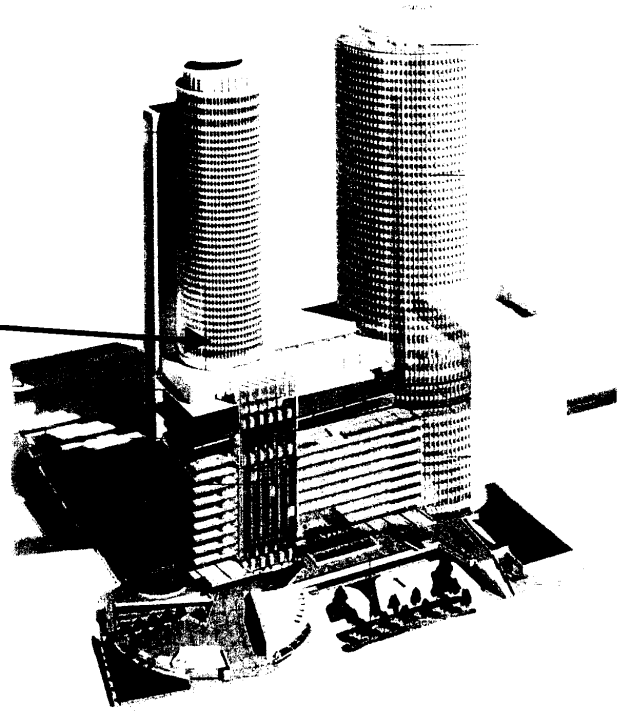
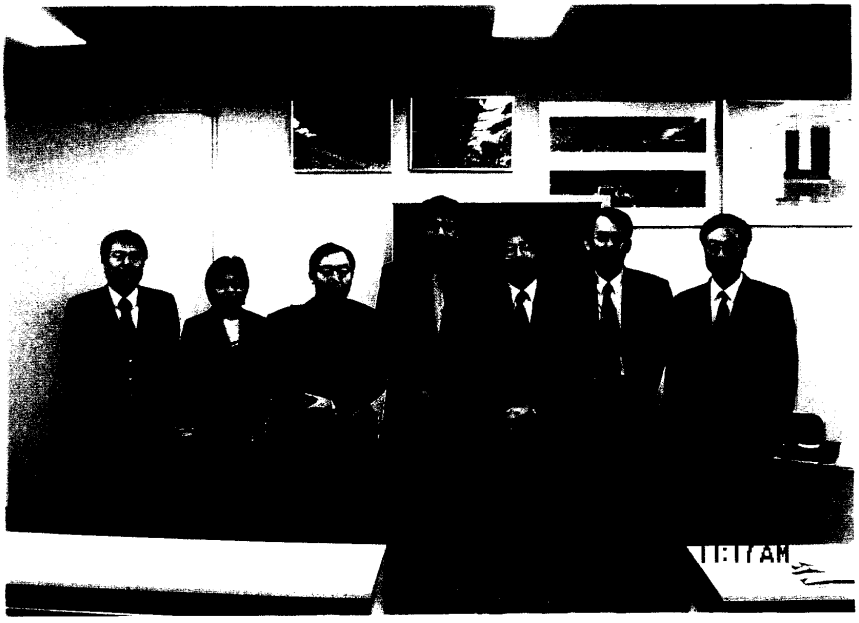


圖5-2 JR東海公司名古屋車站開發配置圖

照片5-1 名古屋車站站前考察與解說實況




照片5-2 名古屋車站站區開發簡報後團員合影

照片5-3 名古屋車站TOWERS展望台鳥瞰名古屋城實景


照片5-4 名古屋車站月台新幹線列車標示牌

### 5.4.2 JR 東海-品川新站及站區開發

#### 一、品川車站概況

品川新站介於東京及新橫濱車站間，離東京車站約 6.78 公里之位置，於現有之JR Central品川車站旁（如圖5-3），而品川新站係於1997年5月動工，預計於2003年10月完成。此次安排觀摩車站規劃及實際開發建設，主要瞭解JR東海公司如何將舊國鐵的貨運場及調車場等土地進行綜合商業開發，並能配合未來發展辦理品川新站之開發作業。

另因JR東海公司考量東京車站每小時發車11班，已無法滿足未來每小時15班之發車需求，為確保列車營運的服務水準及排班彈性，而著手規劃新建品川新站，以作為東京之輔助車站。同時從東京市內連結觀點，擬與航空競爭，而將該站作為進出東海道及西日本列車之主要處所。

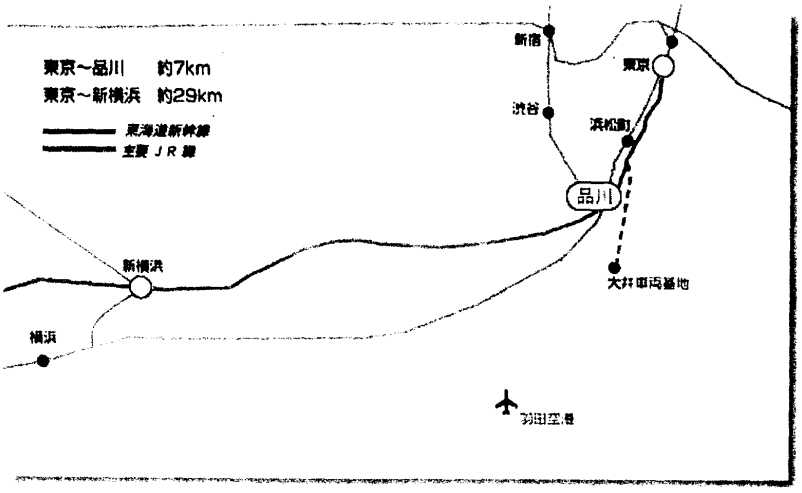



圖5-3 JR東海公司品川車站位置圖

照片5-5 JR品川車站原貌

照片5-6 JR品川車站貨場-A1基地舊址

照片5-7 JR品川站及新站鳥瞰

## 二、品川新站之開發

日本國土交通省兼負軌道資源整合建設之責，對於現有車站及站區土地之規劃發展均有相關推動工作，也獲致一定成果與經驗。品川新站之週邊站區開發，係由國土交通省統籌規劃及指揮辦理，針對未來都市發展、大型土地開發計畫作長期性規劃並擔任實際開發業務之整合協調單位。

品川站區計分成A1及B1之基地開發部分，其中A1基地由興和不動產、住有生命、大林組等組成開發集團進行建設，於1999 年11 月完成，目前已開始營運。另外於JR Central 品川新站旁之B1基地開發，仍在進行施工作業，預計2003年完成。此次實地參訪工地現場（如照片5-8），同時瞭解各基地開發對現有車站及週邊都市發展之互動關係。

照片5-8 品川車站工地參訪與解說

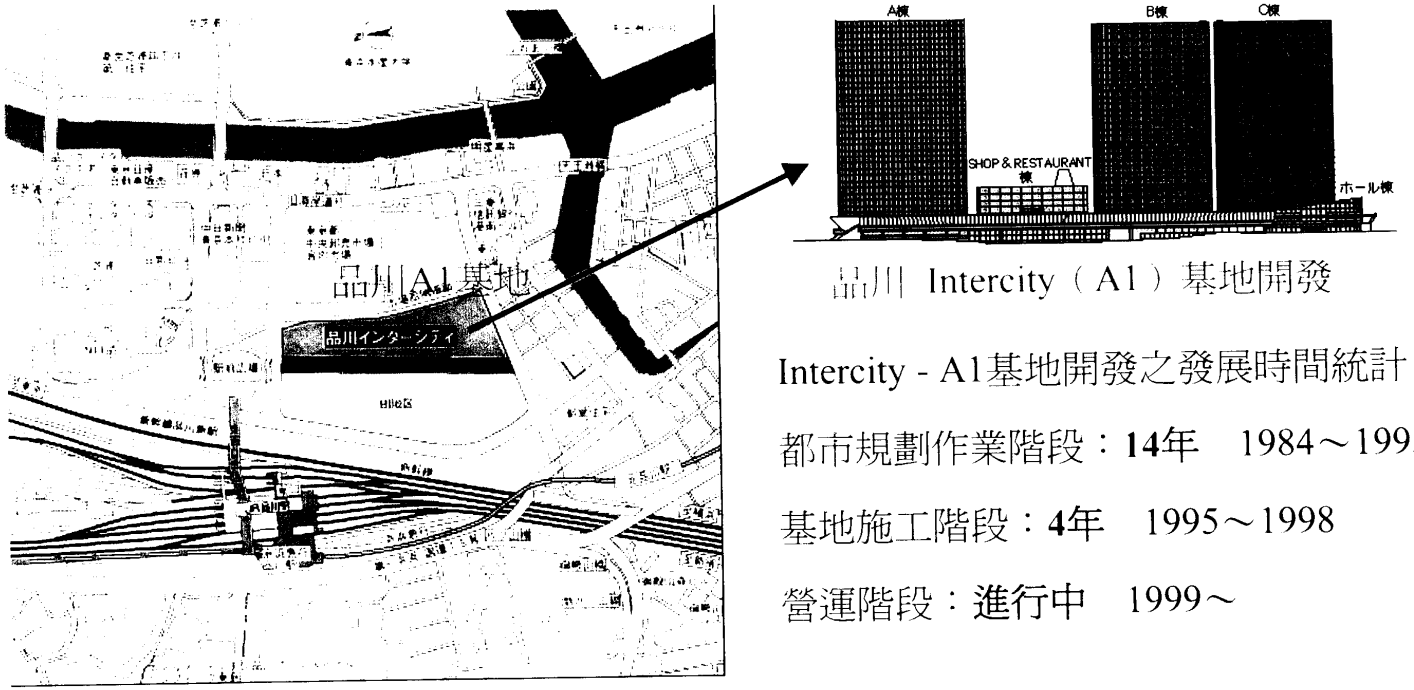



圖5-4 JR東海公司品川新站A1基地開發配置圖

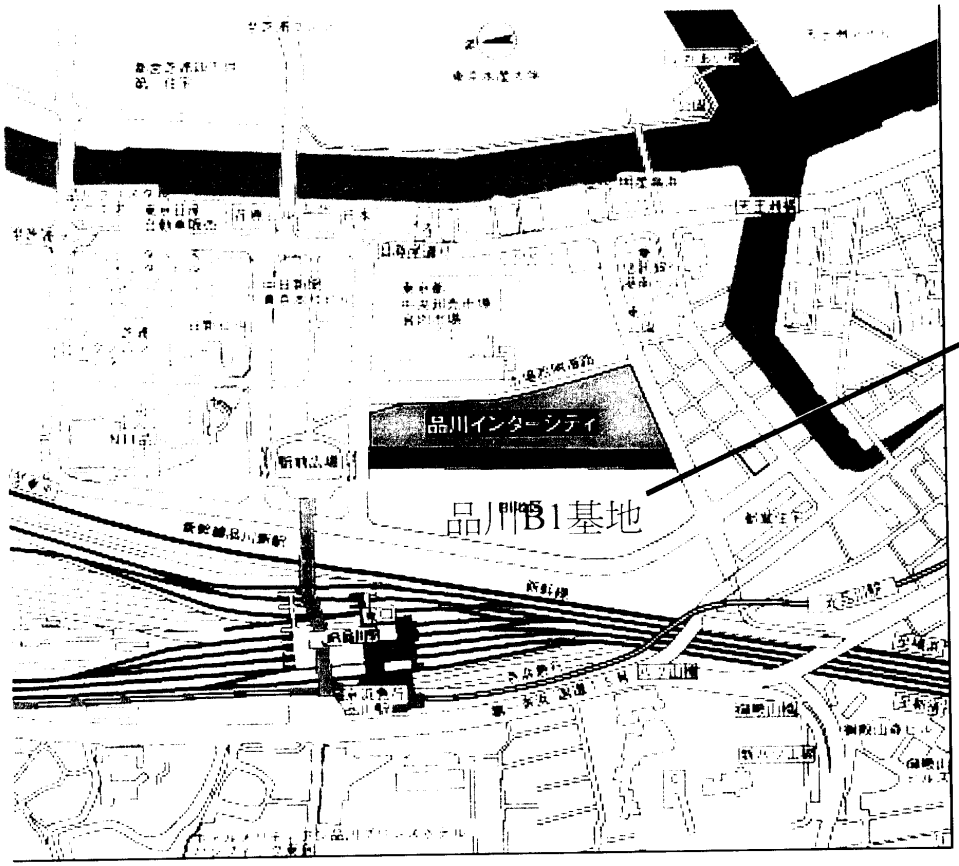
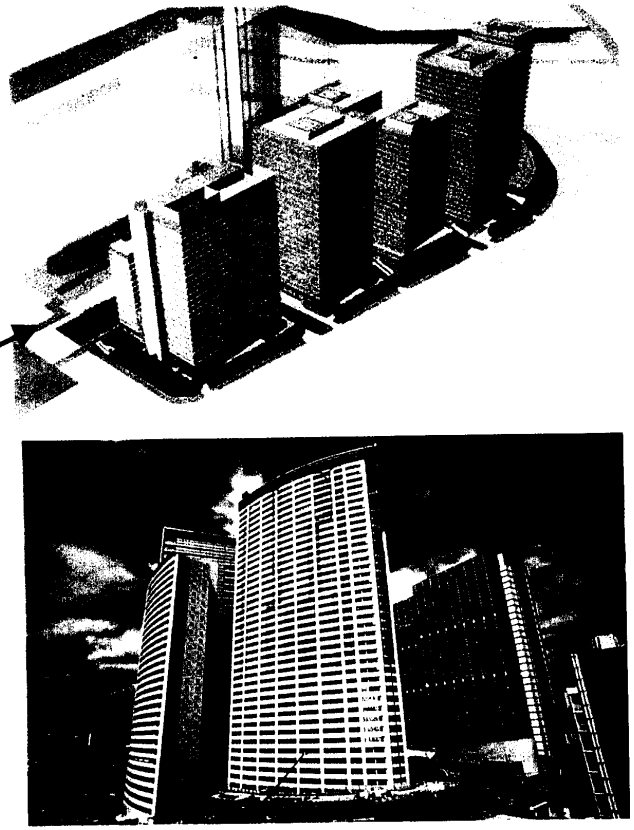
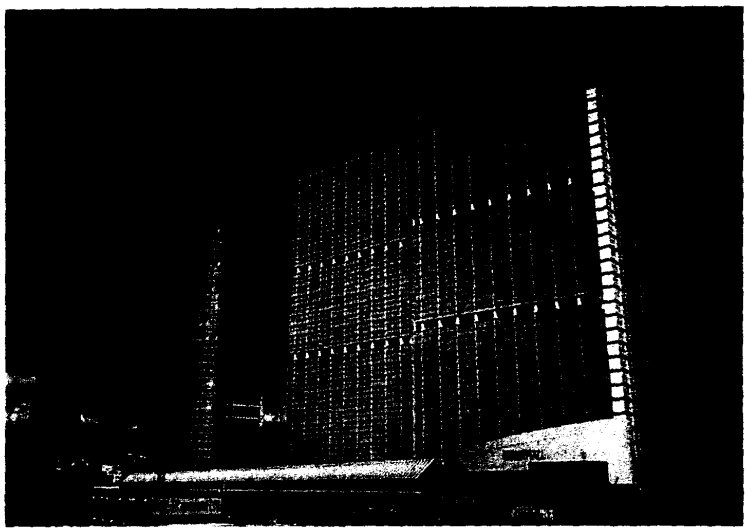


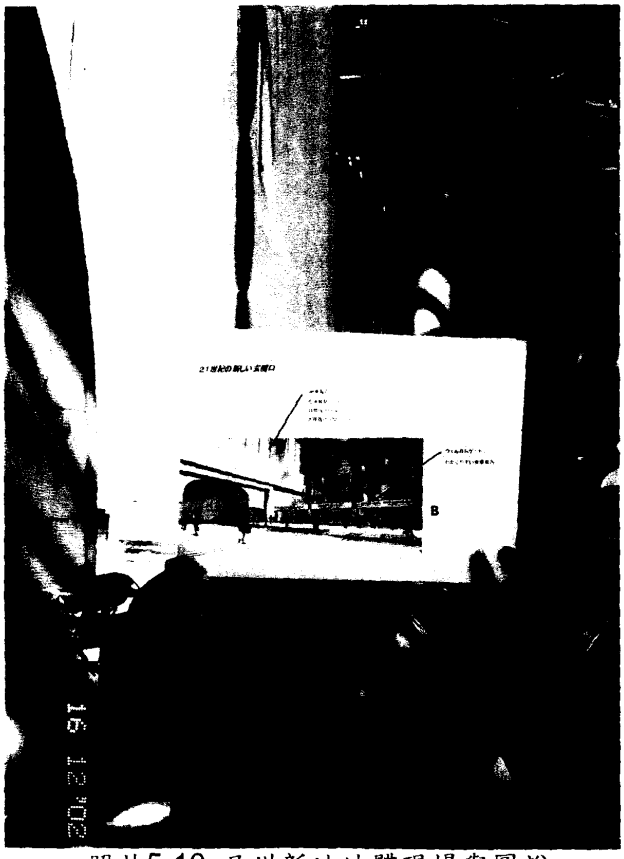

圖5-5 JR東海公司品川新站B1基地開發配置圖



品川 Intercity（B1）基地開發

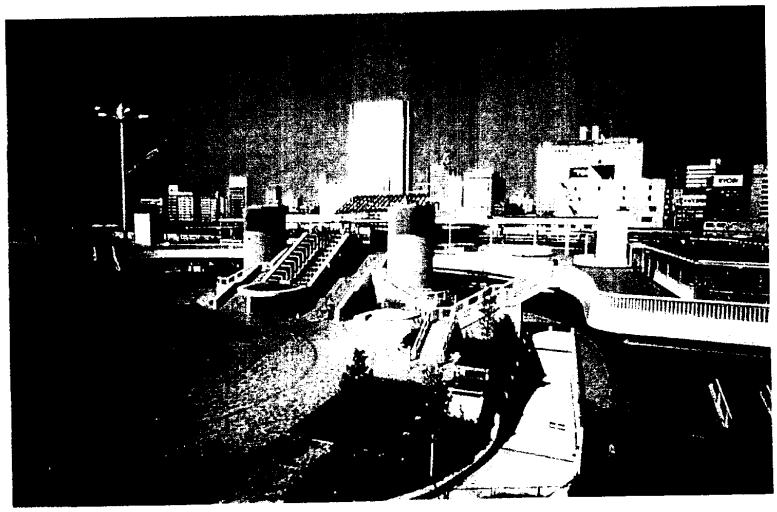


照片5-9 JR品川新站Intercity - A1基地開發現況



照片5-10 品川新站站體現場與圖說

照片5-11 品川新站工地現場與開發基地



照片5-12 JR東海-品川新站後站發展現況

### 5.4.3 JR東海公司財務概要

日本國鐵民營化以來，在客運公司方面，只有三家賺錢（JR東海公司、JR東日本公司、JR西日本公司）且承擔過去國鐵負債，另三家虧損（JR九州公司、JR四國公司、JR北海道公司）現仍由政府補貼。針對鐵路事業經營觀點，「經營權」與「所有權」區分後，對鐵路基礎建設部分，考量公用性及國防需求，由政府投資仍有其需要，但對經營主體可引進民間經營活力。JR東海公司是日本國鐵民營化公司中，營運績效最好的公司，同時每年負擔1987年以前的國鐵債務最多，每年仍負擔三兆日幣之債務，逐年依計畫償債，實值得鐵路運輸業認真看待與細心考察之客運公司。

**一、全線營業損益與人力配置**

JR東海公司1997年全線鐵路營業收益約為1兆1391.36億日幣，在旅客收入方面，約為1兆782.11億日幣，比例高達94.7%（新幹線收入為9612億日幣，佔89.1%，在來線收入為1170.11億日幣，佔10.8%），運輸附業收入為568.45億日幣，佔5%，其他則為0.3%。

在人力配置方面，工務維修人員1932人（新幹線1185人、在來線747人）；電務維修人員1278人（新幹線967人、在來線311人）；機務維修人員2739人（新幹線1290人、在來線1449人）；運務人員3709人（新幹線839人、在來線2870人）；行車人員4369人（新幹線2381人、在來線1988

人)；調度人員1192人(新幹線690人、在來線502人)；運輸管理人員1343人(新幹線537人、在來線806人)；行銷及衛生等人員5065人(新幹線771人、在來線4294人)。共計2萬1627人，其中新幹線8660人，約佔40%，在來線1萬2967人，約佔60%。

## 二、東京至新大阪間營業損益

東京至新大阪間運輸需求是日本最為繁忙的運輸走廊，也是日本JR東海公司最主要之鐵路營業收益所在。在1997年約9770.6億日幣，在旅客收入方面，約為9612億日幣，而運輸附業收入為158.6億日幣。

營業費用，包括路線維修費、車輛成本、運輸費用、管理費及人事費，以及折舊費等，約為4072.91億日幣，攤提折舊後，營業收支約為41.7%。此一結構可作為我國台灣鐵路管理局將來改制為台灣鐵路公司之參考，未來台鐵公司仍應適當兼負路線維修費與車輛成本等項目在內為宜。

# 陸、考察心得與建議

一、基於高鐵建設計畫為民間參與投資交通建設案，政府與民間應以「夥伴關係」共同推動建設。此次考察能對韓國正進行高鐵計畫作一察訪，得以瞭解韓國高鐵建設公團目前就高鐵列車營運前之試車及列車維修生產等作業事項，包括KTX總機場及車輛製造廠參訪及實地試車，對韓國積極之作為留有深刻印象。同時，也要特別感謝高鐵工程局與台灣高鐵公司對此次行程之安排。

二、鑑於車站開發不僅對營運公司（JR東海公司）的財務效益有所益，而且對都市發展亦具有相當程度之重要影響，特別觀摩日本車站站區開發實例。尤其名古屋車站於二〇〇〇年完成開發計畫之成功實例。由JR東海公司籌資以站區土地作為開發基地，興建雙子塔與車站連結，是較具規模及成功的車站開發案例。在名古屋車站與市區地下鐵路網整合之發展經驗中，JR東海扮演舉足輕重角色，從原始構想開始到場站開發附屬事業規劃，也是頗費週章一一協調與研議因應策略。此一案例對未來高鐵車站或台鐵車站之站區各種土地利用或基地開發，可參酌日本實際推動業務成果。

三、日本國鐵民營化以來，在客運公司方面，有三家公司賺錢（JR東海、JR東日本、JR西日本）且承擔過去國鐵負債，另三家公司虧損（JR九州、JR四國、JR北海道）現仍由政府補貼。針對鐵路事業經營觀點，「經營權」與「所有權」區分後，對鐵路基礎建設部分，考量公用性及國防需求，仍需由政府作必要之投資，但對經營主體可引進民間經營活力。然而對JR東海公司能在償還1987年國鐵債務壓力下，仍不錯的營運收益，確實在運輸業中不是一件容易的事業挑戰。

四、有關鐵路列車與相關設施之考察，除乘坐體驗新幹線七〇〇系列車外，本次考察為實地瞭解車輛製造情形與流程，特別安排參訪日本車輛豐川製作所，該工廠已完成台灣高鐵公司所需之高鐵列車客艙實體模型（mockup），正進行車輛內裝及部分配置作進一步改善修改。未來台灣高鐵列車在空間規劃上，將區分商務艙（採2+2座位數）及標準艙（採2+3座位數），並提供無障礙空間規劃及相關公共設施，以充分利用空間設計達到舒適旅運環境之目的。

五、針對品川新站之週邊站區開發，係由國土交通省統籌規劃及指揮辦理，就未來都市發展、大型土地開發計畫作長期性規劃，並擔任實際開發業務之整合協調單位。JR東海-品川新站也是為因應東京車站軌道容量與班次不足所需之建設，本計畫對於現有車站及站區土地規劃發展之相關推動工作，已有一定成果。同時，在參訪該路段股道切換工程中，體認在營運中進行切換工程之難度，此對本部鐵路改建工程局辦理市區鐵路地下化工程亦值得觀摩之處。

六、由於各種運輸工具之快速成長，經營管理方式之僵化，我國台鐵現正面臨著客源流失，營業虧損日益擴大之窘境，而未來在面對高速鐵路競爭之下，更可能喪失西半部之長程運輸優勢。如何改善經營體質，提高經營效率已成為刻不容緩的課題，而日本國鐵在改制之前所面臨之困境與台鐵有異曲同工之處。因此藉由日本國鐵改制經驗及 JR 東海公司民營化後經營成功之實例，似可提供台鐵未來改革方向。

七、由 JR 東海公司的營運項目中，我們可以發現客貨運之收入並不是鐵路經營者唯一收入，相反地，鐵路很難僅藉由運輸本業票價和運費收入賺錢，多元化的經營事業才是獲利來源。因此，舉凡如：附屬關連事業的創立（如百貨公司、飯店、餐館、旅遊業….）、具特色、生活化車站之經營（如購物、飲食街、車站畫廊…）、舉辦各項新產品促銷活動、新遊樂場開發等，均能吸引旅客並增加營收。因此台鐵應建

立多元化之營運理念，以充分利用其資源，提供全方位之服務。

八、台鐵車站大多位於都市精華區，而隨著時代的不同，車站所扮演的角色亦必須加以轉變。如場站站區、閒置或低度使用土地之多目標使用，將可整合地區運輸系統之服務功能，並能更新台鐵車站形象，提供旅客綜合性的行旅服務。

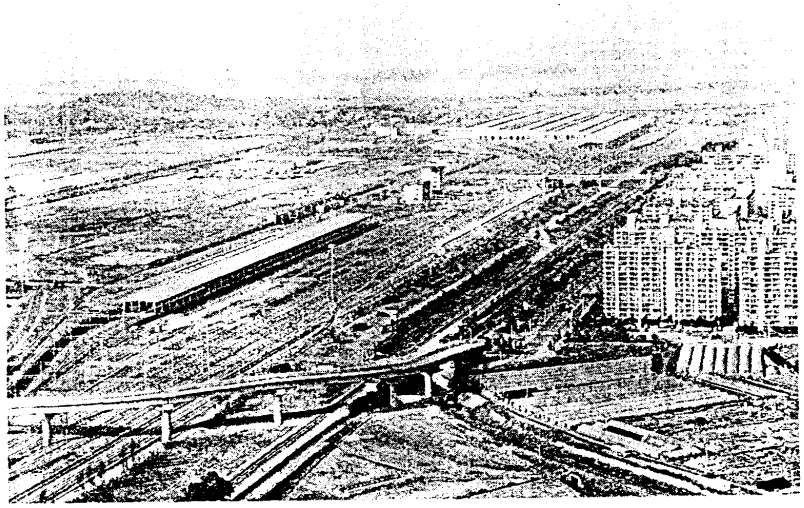
附件一　韓國高鐵建設公團高陽機廠簡介

KTX

Korea Train eXpress

# 고양차량기지 건설개요

(Overview of Koyang Rolling Stock Depot)



2002. 12.

고양차량시험정비사무소

(Koyang R/S Test & Maintenance Office)

# Briefing Order

1. Purpose of Construction

2. Location of Site

3. Organization & Personnel

4. Scope of Construction

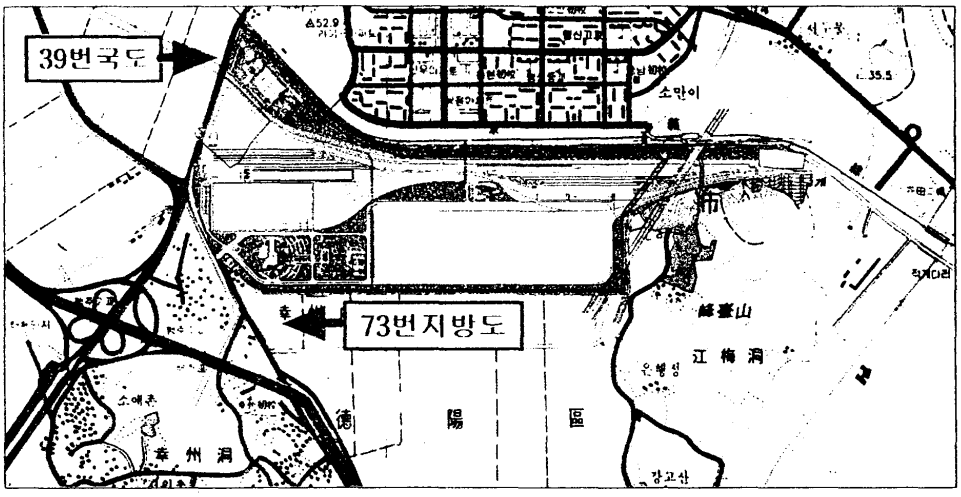
5. Construction Work

## 1. Purpose of Construction

The purpose of construction is to provide the most advanced and high-tech **Inspection and Maintenance System** which offers operation efficiency and safety of Seoul Pusan High Speed Rail(HSR).

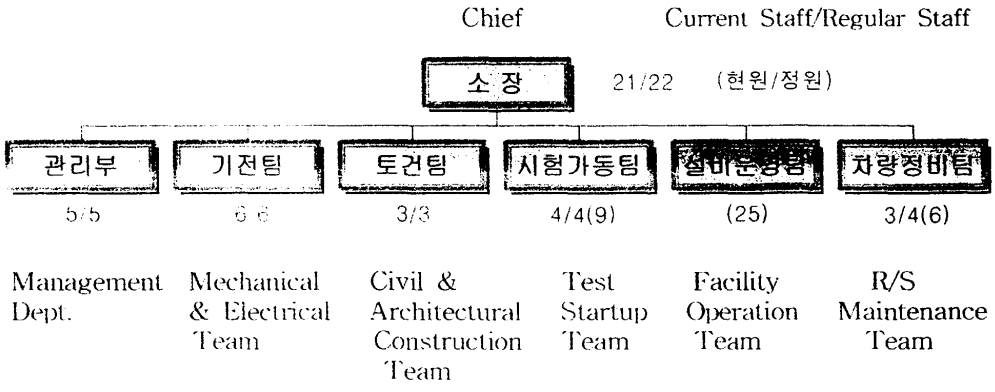
## 2. Location of Site

Kangmae Dong & Hangjunae-Dong, Dukyang-Ku, Koyang City, Kyunggi-Do




(13.5 Km away from Seoul station)

## 3. Organization and Personnel



※ 40 Staff from KNR (25 Facility Operation Work,
15 Test Startup & Maintenance Work)

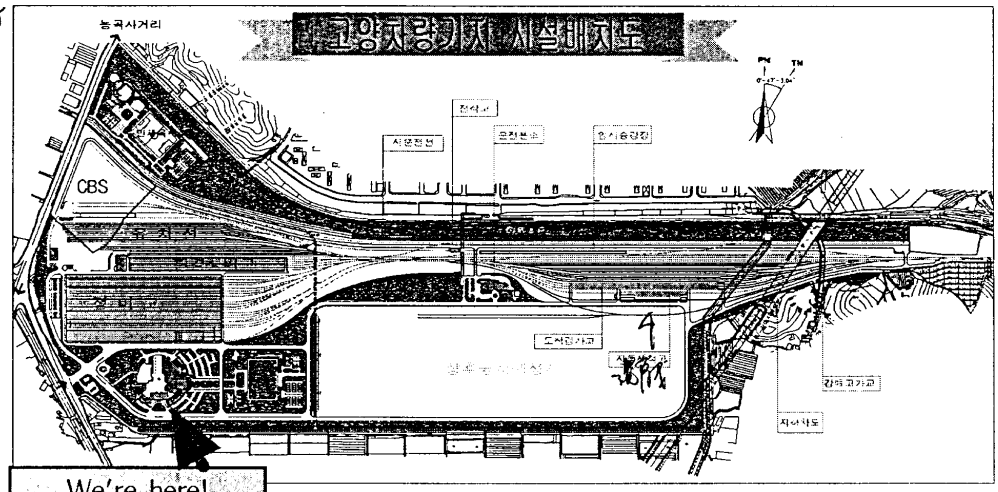
※ 70 Core contractors (62 Preparation for commissioning,
8 Maintenance and Supervision)

## 4. Scope of Construction

1) **Total Site Area** : 1,422,420㎡

2) **Size of Facility** : Staying and maintenance for **56 trainsets** in the completion of 1st and 2nd Phase of the project. Currently, we just completed 1st phase, that is staying 24 trainsets and 44 trainsets for the maintenance.

3) **Layout**




1. Commissioning Track
2. Wheel Reprofiling Shop
3. Control Center
4. Temporary Platform
5. Arrival & Inspection Shed
6. Automatic Train Washing Shed
7. Automatic Wheel Measuring Shed
8. Warehouse (Storage)
9. Cleaning shed
10. Inspection and Repair Shop
11. Planned area for future Construction

### 4) Main Construction Work

☐ **Civil Work**

▷ Area of leveling the ground : 1,422,420㎡ (430,282평)

▷ Traffic Lane in depot : 10 Km

▷ Landscaping in depot

▷ At the entrance of Kangmae village, we built an over-**bridge** (2 lane road for two ways)

▷ To enhance friendly relationship with residents who live around this depot, we built **sports facilities** such as soccer field, tennis courts and playground for children.

☐ **Architectural Work**

▷ There are 16 buildings including Inspection & Repair Shop, Cleaning Shop, Arrival & Inspection Shop, Welfare house etc.

▷ Total sequential building area : 126,061㎡
Building bottom area : 118,695㎡

☐ **Length of Track** : 34Km

☐ **Catenary : Simple catenary method** 32Km,

☐ **Signaling · Communication**

▷ Signaling facilities: SSI(Solid State Interlocking), AF, Track Circuit Device, global panel(LDP) and so forth.

▷ Communication facilities : Fiber optic transmission system, Signaling control system and interchange facility.

☐ **Maintenance facility**

▷ Simultaneous lifting facility: It lifts 1 trainset(20 cars) simultaneously and separates bogies(23):
twelve 35t/jack for power car,
thirty-four 20t/jack for motor car and trailer

▷ Wheel Inspection Facility: Capable of automatic inspection while running the trainset. It automatically detects wheel cracks and profiles. Measures wheel wear and wheel diameter.

▷ Wheel Profiling Facility: Simultaneous lathing of 2 wheel sets of 1 bogie (Type of lathe process - CNC controlled )

▷ Automatic Washing Facility: It washes the body of the trainset.
Washing time per trainset : about 15 minutes.

▷ Dropping table: Exchange facility for 1 bogie
Disassemble and exchange the bottom part of the train

## 5. Depot Construction Project

☐ **Total Budgets: ₩235,476,000,000**
- Construction Cost : ₩214,979,000,000
- Underpass lane Cost : ₩15,674,000,000
- Supervision Cost : ₩4,823,000,000

☐ **Period of construction** : 1998. 12. 4 ~ 2002. 11. 30 (48months)

☐ **Participated Industry**
Constructor : Samsung Engineering Co., LTD.
Designer: Daewoo Engineering Company
Supervision: Ushin Corporation

☐ **Progress Status: 100% completed**(November 30, 2002).

# 附件二　韓國 ROTEM 公司簡介

Rotem

## Background

- **1964** Started Rolling Stock Production in Korea
- **Jul., 1999** Consolidated to KOROS (Korea Rolling Stock Corporation)

| | |
|---|---|
| Hyundai - Rolling Stock Division | Share (40%) |
| Daewoo - Rolling Stock Division | Share (40%) |
| Hanjin - Rolling Stock Division | Share (20%) |

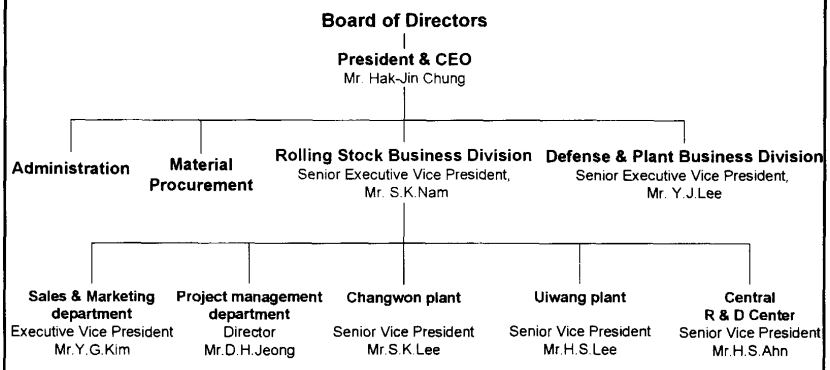
- **Sep., 2001** Hyundai Motor Group acquired the share of Daewoo. (Hyundai: 80%, Hanjin: 20%)
現代
- **Jan., 2002** Company name was changed from KOROS to **'Rotem Company'**

Rotem is an affiliated Company of Hyundai Motor Group.



Rotem

## Organizational Structure



## General Status, Rolling Stock Business Division


- **Seoul office as a Headquarters**
  - Administration
  - Sales & Marketing
  - Material Procurement
- **Uiwang plant & Central R&D center**

- Site Area : 275,542 m² (66.1 acre)
- Production Capacity : 500 EMU/year

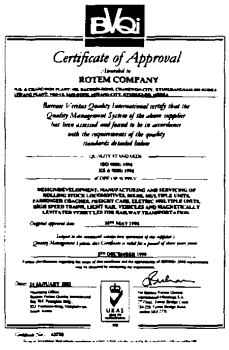
- **Changwon plant**

- Site Area : 290,295 m² (69.7 acre)
- Production Capacity : 500 EMU/year



## ISO 9001 / ISO 14001

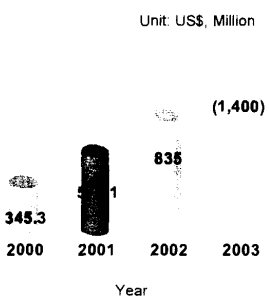
**ISO 9001**
Quality Management System



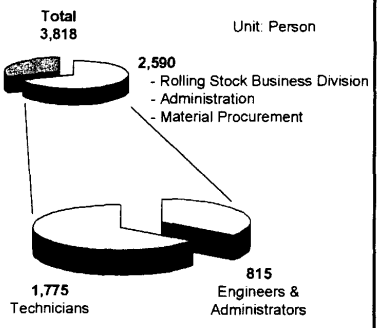

**ISO 14001**
Environmental Management Systems

## **Sales & Personnel,** Rolling Stock Business Division

• **Sales (2000~2003)**




• **Personnel (Oct, 2002)**






## **Business Activities,** Rolling Stock Business Division

**Railway Vehicles (Rolling Stock)**
- EMU (Electric Multiple Unit) – Metro, Commuter, etc.
- DMU (Diesel Multiple Unit) – Commuter, Intercity, etc.
- LRV (Light Rail Vehicle)
- Passenger Coach
- Locomotive – Diesel Electric Locomotive, Electric Locomotive, etc

**Electric Equipment**
- Electric Propulsion Equipment (Inverter & Traction Motor)
- Auxiliary Power Supply Equipment
- Signaling Equipment (On-board ATC Equipment)
- Train Control & Monitoring Equipment

**E&M System**
- E&M System Supply and Engineering including depot facilities
- Maintenance Service

**Engineering Service**
- Feasibility Studies for Rail Transportation

**Finance Service for the Project**

## Supply Record, Rail Vehicle

**Total 32,584 cars**

| | |
|---|---|
| EMU (Metro,Commuter) & LRV | 7,176 cars |
| DMU (Commuter, Intercity) | 547 cars |
| Locomotive (Electric, Diesel Electric) | 603 cars |
| Coach (first class & second class) | 3,003 cars |
| Wagon (Freight car) | 21,255 cars |

**Domestic & Overseas**

| | | |
|---|---|---|
| Domestic | 23,131 cars | 71% |
| Overseas | 9,453 cars | 29% |



## Supply Record, EMU including LRV

| Propulsion system | |
|---|---|
| Rheostatic Control | 659 cars |
| Chopper | 1,830 cars |
| GTO VVVF | 3,051 cars |
| IGBT VVVF | 1,636 cars |

| Material of Carbody Structure | |
|---|---|
| Mild Steel | 2,059 cars |
| Stainless Steel | 5,109 cars |
| Aluminium | 8 cars |

| Bogie Type | |
|---|---|
| Bolster, Coil+Coil Spring | 907 cars |
| Bolster, Coil+Air Spring | 1,662 cars |
| Bolsterless, Rubber+Air | 4,607 cars |

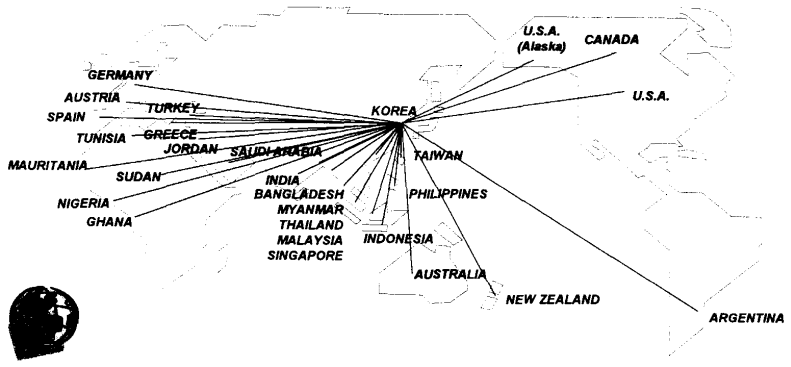




Cumulative Quantity of EMU

## Where exported to

**Total 27 Countries**






## Major On-hand Order, Domestic

| Clients, Project | Type | Quantity (cars) | Delivery | Remarks |
|---|---|---|---|---|
| **Korean High Speed Train, KTX** | - | 920 | Oct., 2003 | TGV-K |
| **Main Line & Seoul Metro Line 1** Korean National Railroads (KNR) | EMU | 284 | Dec., 2003 | Stainless Steel Carbody |
| **Kwang-Joo City Subway Line 1** | EMU | 92 | May, 2003 | Aluminum Carbody |
| **Dae-Gu City Subway Line 2** | EMU | 168 | Apr., 2005 | Stainless Steel Carbody |
| **Dae-Jeon City Subway Line 1** | EMU | 84 | Jun., 2004~ | Aluminum Carbody |
| **Incheon International Airport Rail** | EMU | 144 | Sept., 2005~ | Aluminum Carbody |

## Major On-hand Order, Overseas

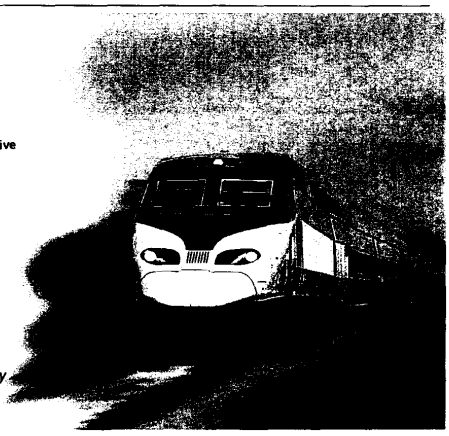
| Clients, Project | Type | Quantity (cars) | Delivery | Remarks |
|---|---|---|---|---|
| **MTRC TKE C651**<br>MTRC, **Hong-Kong** | EMU | 104 | 09.2001<br>~ 09.2002 | UIC & BS<br>Stainless Steel Carbody |
| **Commuter EMU Series 600**<br>TRA, **Taiwan** | EMU | 56 | 09.2001<br>~ 09.2002 | Stainless Steel Carbody |
| **Manila Metro Line2**<br>LRTA, **Philippine** | EMU | 72 | 12.2002<br>~ 12.2003 | UIC & NFPA<br>Stainless Steel Carbody |
| **DMRC RS1**<br>DMRC, New Delhi, **India** | EMU | 240 | 08.2002<br>~ 05.2005 | EN & BS<br>Stainless Steel Carbody |
| **Istanbul Metro Extension**<br>Istanbul Metropolitan Municipality, Istanbul, **Turkey** | EMU | 92 | 12.2003<br>~ 12.2004 | Contract on Dec.2001<br>E&M system<br>Stainless Steel Carbody |
| **Athens Metro Line 2&3 Extension**<br>Attiko Metro, Athens, **Greece** | EMU | 126 | 12.2003<br>~ 05. 2004 | DC, DV (AC+DC)<br>Stainless Steel Carbody |



# Major Products

## Korea High Speed Train, KTX

| | |
|---|---|
| Train Composition | : PMC-M-16T-M-PMC |
| Max. Speed | : 300 Km/h |
| Main Power Supply | : 25,000V AC |
| Max. Weight (PMC) | : 74 tons |
| Train Control | : ATC |
| Traction Rating | : 1,130kW |
| Brake System | : Pneumatic + Regenerative + Rheostatic |
| Delivery | : 2001~2003 |
| Quantity | : 680 cars (34 train-set) |
| | - PMC 68 cars |
| | - M 68 cars |
| | - Trailer 544 cars |



*Authority*
*Korea High Speed Rail Construction authority (KHRC), Korea*

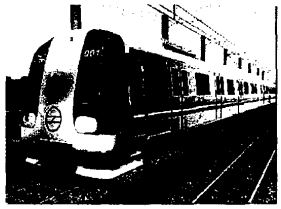


## MTRC TKE C651 EMU, Hong Kong

| | | |
|---|---|---|
| Dimension | | |
| Carbody length | | 22,000 (22,000~23,000)mm |
| Max. Carbody Width | | 3,120 mm |
| Carbody Height above Rail | | 3,600 mm |
| Delivery | | 2001~2002 |
| Quantity | | 104 cars |
| Line Voltage | | 1,500V DC |
| Max. Speed | | 80 km/h |
| Carbody | | Stainless Steel 301L |
| Bogie | | Bolsterless Bogie, Rubber & Air Spring |
| Formation | | 6M2T |
| Strength Criteria | | UIC |
| Crashworthiness | | 22.5 km/h without damage |
| Noise | Stationary | Driver's Cab : max.60 dB |
| | | Saloon Door Open : max.77dB |
| | Moving | Driver's cab : max.73dB (tunnel:+9dB) |
| | (Open Section) | Bogie Area : 70dB (tunnel :+9dB) |
| Ride Comfort | | Vertical : av.95dB, max.101.4dB |
| | | Lateral : av.97.9dB, max 103.9dB |
| Fire Safety & Control | | BS 6853 |

*Authority*
*Mass Transit Railway Co (MTRC), Hong-Kong*

## DMRC RS1 EMU, India

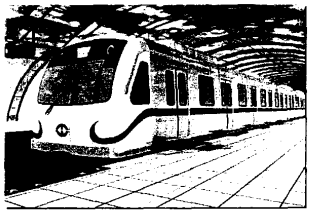


*Authority*
*Delhi Metro Rail Corporation (DMRC),*
*Delhi Metro & Rail Corridor,*
*Delhi, India.*

| Dimension | |
|---|---|
| Length Over Coupler | : 22,240 mm |
| Max. Carbody Width | : 3,200 mm |
| Carbody Height Above Rail | : 3,950 mm |
| Year of Delivery | : 2002 ~ 2005 |
| Quantity | : 240 cars |
| Max. Speed | : 90 km/h |
| Formation | : DT-M-M-DT |
| Line Voltage | : DC 1.5kV, AC 25kV |
| Carbody | : Stainless Steel |
| Traction Motor | : 220kW, AC motor |
| Auxiliary Power supply | : SIV 400V 50Hz<br>110V DC |
| Bogie | : Bolsterless Bogie,<br>Rubber & Air Spring |
| Signaling | : ATP, ATO |
| Strength Standard | : UIC |
| Noise Level | : inside 72 dB(A)/80kph<br>outside 80 dB(A)/80kph |



## Manila Metro Line2 EMU, Philippine



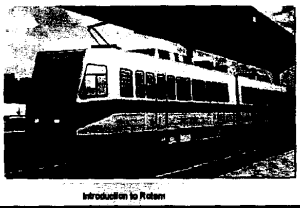
*Authority*
*Light Rail Transit Authority (LRTA),*
*Manila, Philippine.*

| Dimension | |
|---|---|
| Length Over Couplers | 23,300 mm |
| Max. Carbody Width | 3,200 mm |
| Carbody Height above Rail | 3,700 mm |
| Delivery | 2002~2003 |
| Quantity | 72 cars |
| Line Voltage | DC 1.5kV |
| Max. Speed | 80 km/h |
| Carbody | Stainless Steel |
| Bogie | Bolsterless Bogie, Rubber<br>+ Air Spring |
| Auxiliary Power Supply | 160 KVA, AC 380V, IGBT |
| Formation | Mc1-M1-M2-Mc2 |
| Noise Level<br>(Requirement in Spec.) | Stationary : 68dB(A)<br>Running : 78dB(A) |

## Light Rail Vehicles , Adana & Manila

| | |
|---|---|
| Numbers built | : 7 Train-sets (28 Cars)<br>12 Train-sets (36Cars) |
| Year delivered | : 1998 ~2000 |
| Train Composition | : Mc-M-M-Mc, Mc-Mc-Mc |
| Max. Speed | : 80 Km/h |
| Main Power Supply | : 750V DC |
| Carbody Material | : Stainless Steel 301L |
| Bogie | : Resilient Wheel<br>Articulation Section |

*Light Rail Transit Authority (LRTA), Manila, Philippines*



*ADANA City, Turkey*



## KTMB EMU, Kuala Lumpur, Malaysia

| | | |
|---|---|---|
| Vehicle Dimension | | |
| Length | | 22,600 mm |
| Width | | 2,730 mm |
| Height from top of rail | | 3,600 mm |
| Delivery | | 1996 |
| Quantity | | 66 cars |
| Capacity | Seating | 48 persons |
| | Standing | 65 persons |
| Line Voltage | | AC 25KV 50Hz |
| Max. Speed | ( Design ) | 150 km/h |
| | (Operating) | 120 km/h |
| Train Composition | | Mc-T-Mc, Multiple |
| Acceleration | | 0.8 m/s$^2$ |
| Brake System | | EP Blended |
| Propulsion System | | GTO, VVVF Control |

*Authority*
*Malaysian Railway (KTMB)*



客室数↑

## TRA EMU 500 & 600 Series

| | |
|---|---|
| **Dimension** | |
| Length Over Couplers | 20,330 mm |
| Max. Carbody Width | 2,853 mm |
| Carbody Height above Rail | 2,595 mm |
| **Delivery** | 1995~2002 |
| **Quantity** | 344 cars + 56 cars |
| **Line Voltage** | AC 25kV |
| **Max. Speed** | 110 km/h |
| **Carbody** | Stainless Steel (TRA Design Criteria) |
| **Bogie** | Bolsterless Bogie, Rubber + Air Spring |
| **Brake System** | Rheostatic + Pneumatic Brake |
| **Traction Motor** | 250 kW, AC Motor |
| **Auxiliary Power Supply** | 150 KVA, AC 380V, GTO |
| **Formation** | EMC-EP-ET-EM |
| **Signalling** | ATP |
| **Strength Standard** | UIC |
| **Noise Level** | Running : 73-74dB(A) |

*Authority*
*Taiwan Railway Administration (TRA), Republic of China (Taiwan)*



## Istanbul Metro Extension EMU, Turkey

| | |
|---|---|
| **Dimension** | |
| Corbody Length | 19,500 mm |
| Max. Carbody Width | 2,853 mm |
| Carbody Height above Rail | 3,519 mm |
| **Delivery** | 2002~2004 |
| **Quantity** | 92 cars |
| **Line Voltage** | 900V DC |
| **Max. Speed** | 85 km/h |
| **Carbody** | Stainless Steel |
| **Bogie** | Bolsterless Bogie, Rubber + Air Spring |
| **Brake System** | Dynamic and Pneumatic |
| **Traction Motor** | AC Motor |
| **Auxiliary Power Supply** | IGBT |
| **Formation** | Mc-M-T-Mc |
| **Signalling** | ATC/ATO |
| **Strength Standard** | UIC |
| **Noise Level** | 80 dBA up to 80 km/h |

*Authority*
*Istanbul Metropolitan Municipality (Istanbul Buyuksehir Belediyesi) ,Turkey*

## Seoul Metro Line4 EMU (Mass Rapid Transit)

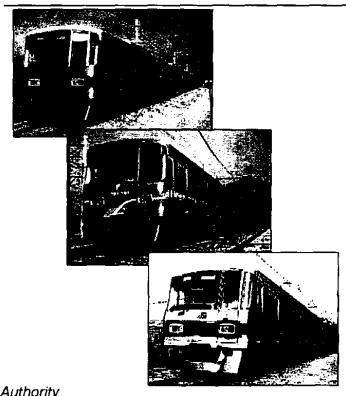
Seoul Metro Line 4

| | |
|---|---|
| **Dimension** | |
| Length Over Couplers | 20,000 mm |
| Max. Carbody Width | 3,120 mm |
| Carbody Height above Rail | 3,750 mm |
| **Delivery** | 1993~1999 |
| **Quantity** | 260 cars |
| **Line Voltage** | DC 1.5kV |
| **Max. Speed** | 100 km/h |
| **Carbody** | Stainless Steel |
| **Bogie** | Bolsterless Bogie, Roll rubber + Air Spring |
| **Brake System** | Rheostatic + Regenerative + Pneumatic Brake |
| **Traction Motor** | 200 kW, AC Motor |
| **Auxiliary Power Supply** | 180kVA, AC 200V, 60Hz |
| **Formation** | Tc-M1-M2-M1-M2-T-T-M1-M2-Tc |
| **Signalling** | ATC |
| **Strength Standard** | KRS/JIS |

*Authority*
*Seoul Metropolitan Subway Corporation (SMSC), Seoul, Korea*



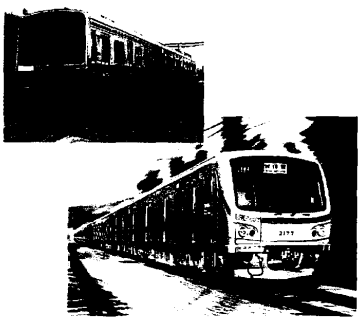
## Seoul Metro Line 5, 6, 7&8 EMU (Mass Rapid Transit)



| | |
|---|---|
| **Dimension** | |
| Length Over Couplers | 20,000 mm |
| Max. Carbody Width | 3,120 mm |
| Carbody Height above Rail | 3,600 mm |
| **Delivery** | 1995~2000 |
| **Quantity** | 1598 cars |
| **Line Voltage** | DC 1.5kV |
| **Max. Speed** | 100 km/h |
| **Carbody** | Stainless Steel |
| **Bogie** | Bolsterless Bogie Rubber + Air Spring |
| **Propulsion Control** | VVVF Speed Control |
| **Traction Motor** | 200 kW, AC Motor |
| **Auxiliary Power Supply** | 170kVA, AC 380V, 60Hz GTO/STATIC Inverter |
| **Formation** | 4M4T |
| **Signalling** | ATC/ATO |
| **Strength Standard** | KNR/JIS |
| **Noise Level** | Stationary : 62-67dB Running : 80dB (Tunnel) |

*Authority*
*Seoul Metropolitan Rapid Transit Corporation (SMRT), Seoul, Korea*

## Seoul Metro Line1 & Gwacheon-Line EMU (Mass Rapid Transit)

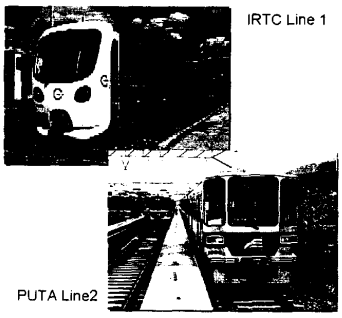


| | |
|---|---|
| **Dimension** | |
| Length Over Couplers | 20,000 mm |
| Max. Carbody Width | 3,120 mm |
| Carbody Height Above Rail | 3,760 mm |
| **Delivery** | 1994~2002 |
| **Quantity** | 420 cars |
| **Line Voltage** | AC 25kv / DC 1.5kV |
| **Max. Speed** | 110 km/h |
| **Carbody** | Stainless Steel |
| **Traction Motor** | 200kW, AC motor |
| **Auxiliary Power Supply** | 190kVA, AC 440V, GTO Chopper + PTR |
| **Signaling** | ATS |
| **Strength Standard** | KNR/JIS |

*Authority*
*Korean National Railroad (KNR), Korea*



## PUTA Line2 & IRTC Line 1 EMU



IRTC Line 1

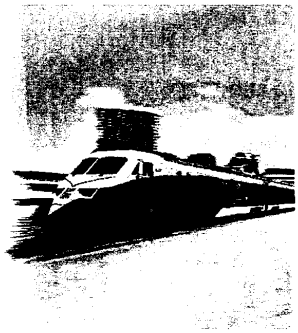
PUTA Line2

| | |
|---|---|
| **Dimension** | |
| Length Over Couplers | 18,000 mm |
| Max. Carbody Width | 2,750 mm |
| Carbody Height above | 3,600 mm |
| **Delivery** | 1995~2001 |
| **Quantity** | 550 cars |
| **Line Voltage** | DC 1.5kV |
| **Max. Speed** | 100 km/h |
| **Carbody** | Stainless Steel |
| **Bogie** | Bolsterless Bogie, Rubber + Air Spring |
| **Brake System** | Analogue Command, Regenerative + Pneumatic Brake |
| **Traction Motor** | 210 kW, AC Motor |
| **Auxiliary Power Supply** | 170 KVA, AC 380V, IGBT |
| **Formation** | Tc1-M-M-T1-T1'-M-M-Tc2 |
| **Signalling** | ATC,ATO (Driverless Operation or One Man Operation) |
| **Strength Standard** | KNR/JIS |
| **Noise Level** | Stationary : 60-65dB(A) Running : 77dB(A) |

*Authority*
*Pusan Urban Transportation Authority (PUTA),*
*Incheon Rapid Transit Corporation (IRTC)*

## Diesel Multiple Unit (Push-Pull Type)

| | |
|---|---|
| Dimensions (PMC) | |
| Length | 23,565 mm |
| Width | 3,000 mm |
| Height | 3,700 mm |
| Delivery | 1987 ~ 2000 |
| Quantity | 275 cars |
| Engine Output | 1,500 / 2,000 HP |
| Max. Speed (Operating) | 150 km/h |
| Weight | 68 Ton/PMC |
| Train Composition | PMC+6 Pass.+PMC |
| Brake System | Electro-pneumatic |
| Carbody | Stainless Steel |



*Authority*
*Korean National Railroad (KNR), Korea*

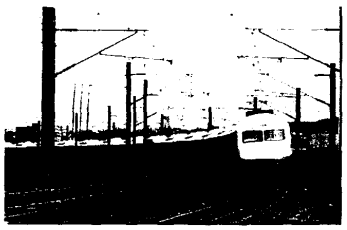


## SRT DMU(Diesel Multiple Unit) for Intercity train , Thailand

| | |
|---|---|
| Year delivered | 1995~1996 |
| Quantity | 80 cars |
| Max. Speed | 120 km/h |
| Formation | DMR-ITR-DMR |
| Passenger Capacity | Daytime 208<br>Night 168 |
| Carbody | Stainless Steel |
| Power | 350 HP x 2 |
| Auxiliary | 112 HP x 2, 80KVA, |
| Power supply | 380V AC |
| Bogie | Bolsterless Bogie,<br>Rubber Spring + Air-spring |
| Brake System | Pneumatic |
| Strength Standard | UIC |

*Authority*
DMUs for State Railway of Thailand (SRT), Thailand

## Electric Push-Pull Train

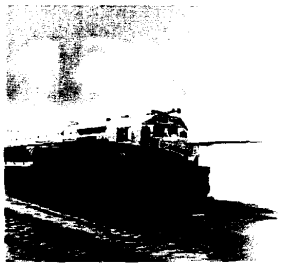


| | |
|---|---|
| Quantity | 32 Train-sets<br>400cars |
| Delivery | 1996 ~ 1998 |
| Max. Speed | 130 Km/h |
| Carbody Material | Light Weight Stainless Steel |
| Door | Automatic Sliding Door |
| Bogie | Bolsterless |
| Brake System | Electro-Pneumatic Brake |
| HVAC | Roof Mounted Package |

*Authority*
Taiwan Railway Administration (TRA), Taiwan



## Diesel Electric Locomotive



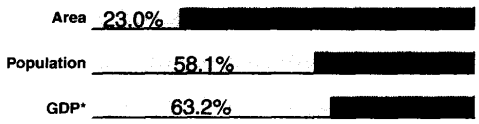
| | |
|---|---|
| Year Delivered | 1979 ~ 2001 |
| Quantity | 482 cars |
| Max. Speed | 150 km/h |
| Carbody | Mild Steel |
| Dimension(L x W x H) | 20778 x 3315 x 4254(mm) |
| Power | 3,300 HP |
| Wheel arrangement | Co - Co |
| Brake System | Pneumatic |

*Authority*
*Korean National Railroad (KNR) , Korea*

# 附件三　日本 JR 東海公司簡介

## 1 JR Central's Market Area

While JR Central's market area covers just 23.0 percent of Japan's land area,it accounts for 58.1 percent of the country's population and 63.2 percent of the gross domestic product.




**JR Central's Market Area**
**Other**

Note: JR Central's market area includes the following prefectures: Tokyo, Kanagawa, Chiba, Saitama, Ibaraki, Shizuoka, Yamanashi, Nagano, Aichi, Mie, Gifu, Shiga, Osaka, Kyoto, Hyogo, Nara

*Sources: Population-*Residential Register* (Data: End of March 2001). Local Administrative Bureau, Ministry of Home Affairs
GDP-*Annual Report on Prefectural Accounts* (Data: FY 2000.3). Economic Reserch Institute, Economic Planning Agency




## 2 Major Events in the History of Railway Operations in Japan

**1872** Japan's first railway service starts between Tokyo and Yokohama.

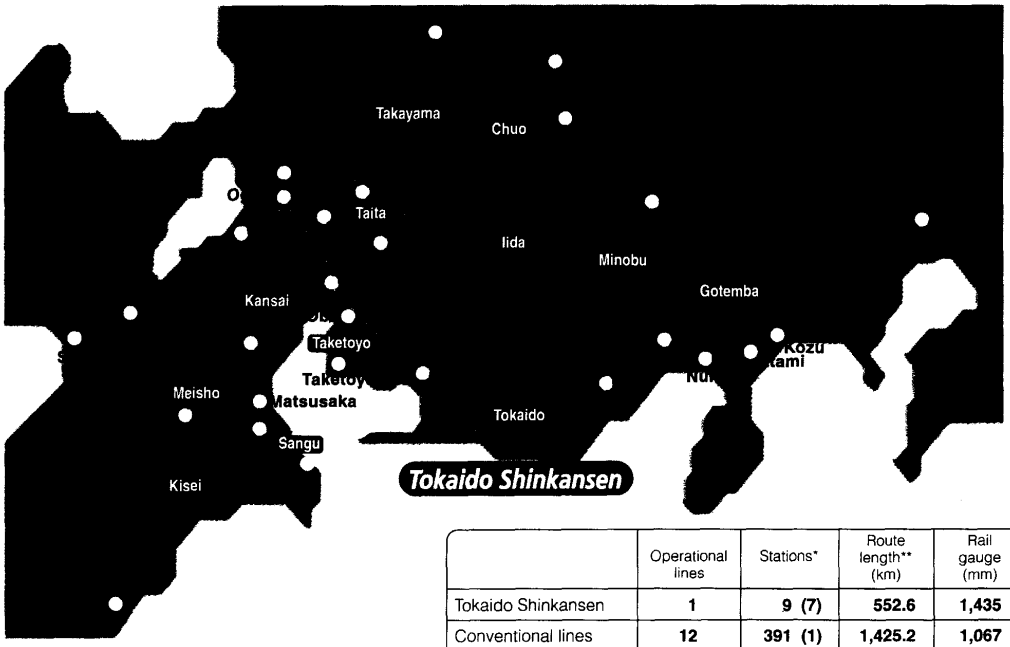
**1964** The Tokaido Shinkansen between Tokyo and Osaka starts its operation.

**1975** The section between Okayama and Hakata on the Sanyo Shinkansen starts its operation, expanding through-service between Tokyo and Hakata.

**1987** Central Japan Railway Company is established.

## 3 JR Central Line Network

The core of JR Central's operations is the Tokaido Shinkansen, linking Tokyo, Nagoya, and Osaka.
The company also operates a network of conventional lines.




| | Operational lines | Stations* | Route length** (km) | Rail gauge (mm) |
|---|---|---|---|---|
| Tokaido Shinkansen | **1** | **9 (7)** | **552.6** | **1,435** |
| Conventional lines | **12** | **391 (1)** | **1,425.2** | **1,067** |
| Total | **13** | **400 (8)** | **1,977.8** | — |

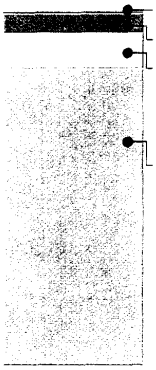
*The figures in parentheses show stations serving more than one line and are not included in the total.
**Route length figures are those used in rail fare calculations.

## 4 Revenue Sources

JR Central's earnings are constituted of 99.3% from railway operations, 84.8% from Tokaido Shinkansen and 9.6% from conventional lines.

For the Year Ended March 31, 2002

*JR Central ¥1,129 ($8,485)* Billions of Yen (Millions of U.S. Dollars)



- **Other Operating Revenues*** 0.7% ¥ 8 ($ 62)
- **Other Railway Revenues*** 4.9% ¥ 55 ($ 417)
- **Conventional Lines** 9.6% ¥108 ($ 812)
- **Tokaido Shinkansen** 84.8% ¥957 ($ 7,194)

*JR Central Group ¥416 ($3,131)* Billions of Yen (Millions of U.S. Dollars)

**39 Companies**
**¥416 ($ 3,131)**

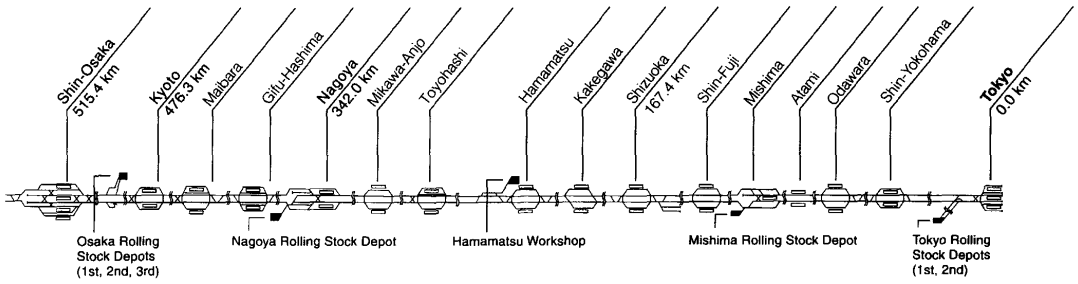
Note: Yen figures have been converted into U.S.dollars at the rate of ¥133=US$1, the approximate exchange rate at March 29, 2002

* Other railway revenues comprise miscellaneous transportation revenues, such as track usage fees, land leasing fees at stations, usage fees from store operators at stations, and advertising fees that are included in the "Railway" operating revenues of the financial statements.

## 5 Station and Track Layout on the Tokaido Shinkansen

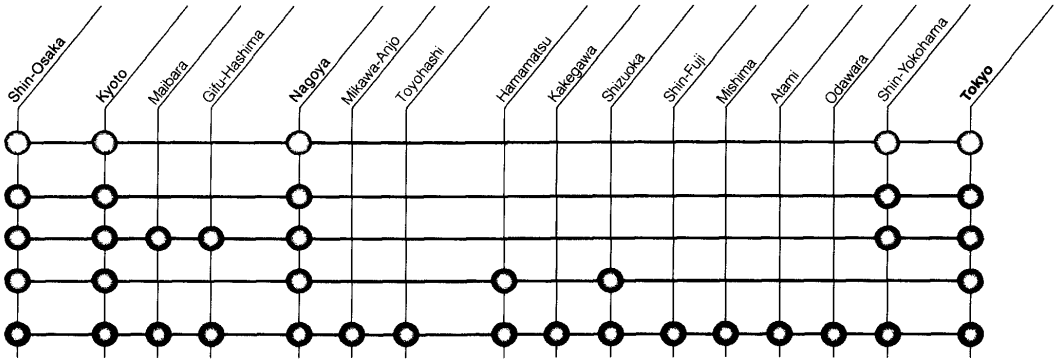
The Tokaido Shinkansen is adopting a double track line with a sidetrack at each station enabling easy railway scheduling.

| | |
|---|---|
| **Power supply** | 25 kV AC 60Hz |
| **Rail gauge** | 1,435 mm |
| **Level crossings** | 0 |
| **Stations** | 16 |




## 6 Major Stopping Patterns

"Nozomi" stops at main stations, "Kodama" at each station and "Hikari" fills in the gaps in the distribution of Shinkansen stations.




— ***Nozomi:*** Stops at main stations (270 km/h)
— ***Hikari:*** Stops at selected stations (220 km/h)
— ***Kodama:*** Stops at all stations (220 km/h)

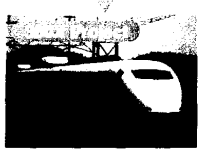
## 7 Rolling Stock

JR Central has been investing in new rolling stock such as Series 300 and Series 700 trains. These trains fully meet energy saving criteria, lightening the environmental burden of the earth.

| | Series 700 | Series 300 | Series 100 | Series 0 |
|---|---|---|---|---|
| *Inauguration* | 1999 | 1992 | 1985 | 1964 |
| *Type of service* | Principally *Nozomi*, also *Hikari* | Principally *Hikari*, also *Kodama* | Principally *Kodama* | Withdrawn from service |
| *Maximum speed (km/h)* | 270 (Tokyo - Shin-Osaka)<br>285 (Shin-Osaka - Hakata) | 270 | 220 | 220 |
| *Passenger capacity* | 1,323 | 1,323 | 1,321 | 1,391 |
| *Weight (tons/trainset)* | 708 | 711 | 925 | 970 |
| *Body material* | Aluminum alloy | Aluminum alloy | Steel | Steel |
| *Bogie* | Bolsterless type, no end beams | Bolsterless type, no end beams | Bolster type, with end beams | Bolster type, with end beams |
| *Configuration* | 12M4T | 10M6T | 12M4T | 16M |
| *Power control system* | VVVF (Variable Voltage, Variable Frequency) Control | VVVF (Variable Voltage, Variable Frequency) Control | Thyristor continuous phase control | Low-voltage tap changing control |
| *Traction motor* | AC asynchronous motor, 48motors/trainset 13,200kw/trainset | AC asynchronous motor, 40motors/trainset 12,000kw/trainset | DC series motor, 48motors/trainset 11,040kw/trainset | DC series motor, 64motors/trainset 11,840kw/trainset |
| *Number of Pantographs* | 2/trainset | 2/trainset | 3/trainset | 8/trainset |

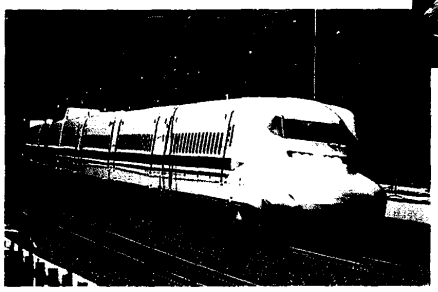
## 8 Series 700

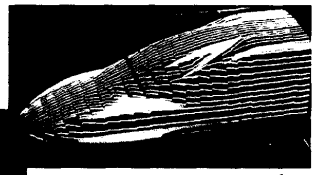
Series 700 trains, jointly developed by JR Central and JR West as the successor to Series 300, utilize their technologies and accumulated know-how to achieve various functional improvements while keeping rolling stock costs at the Series 300 levels.



*JR WEST*

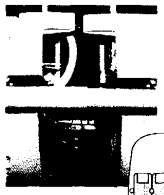

*Series 700*

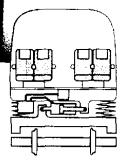




*Aerostream form*

*Damper between cars*





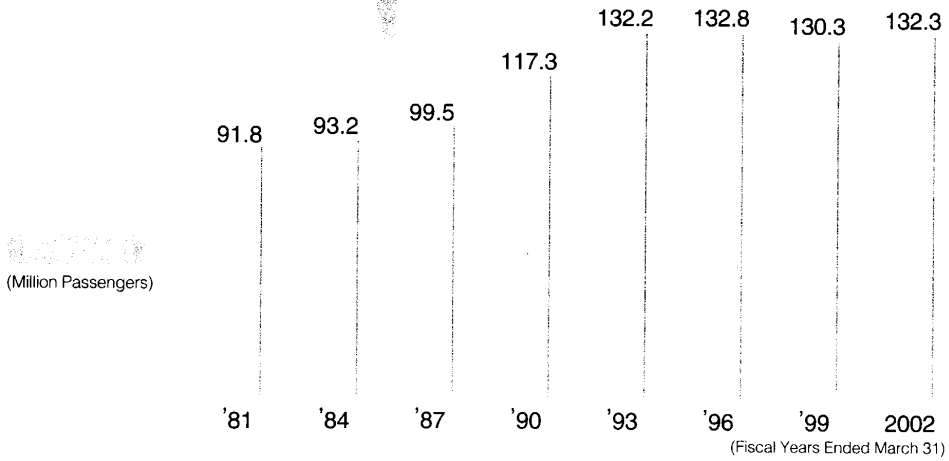
*Semi-active damper*

- Provision of comfortable passenger cabins
- Consideration of harmony with environment
- Improvement of rolling stock performance
- Reduction of total costs

*Double-skin structure*

## 9 Tokaido Shinkansen Ridership

Traffic volume of the Tokaido Shinkansen has continued to increase.




## 10 Tokaido Shinkansen Characteristics and Performance

Tokaido Shinkansen embodies the ideal characteristics of railway operation.

**Safety**
- ATC system
- No level crossings
- Special law prohibiting trespassing
- Guard fence along the line
- No passenger fatalities or injuries due to train accidents such as derailment or collision in commercial train operations during 37 years of service

**Reliability**
- Annual average delay—0.3 minutes/train

**High Speed**
- 270 km/h
- 2 hours 30 minutes to cover 515.4 km between Tokyo and Shin-Osaka station

**High Volume**
- 11 trains/hour from Tokyo
- 287 trains/day
- 362,000 passengers/day
- 132 million passengers/year

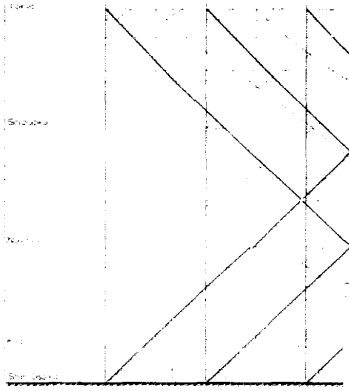
**Environmental Adaptability**

**Low Energy Consumption**

**Low Cost**

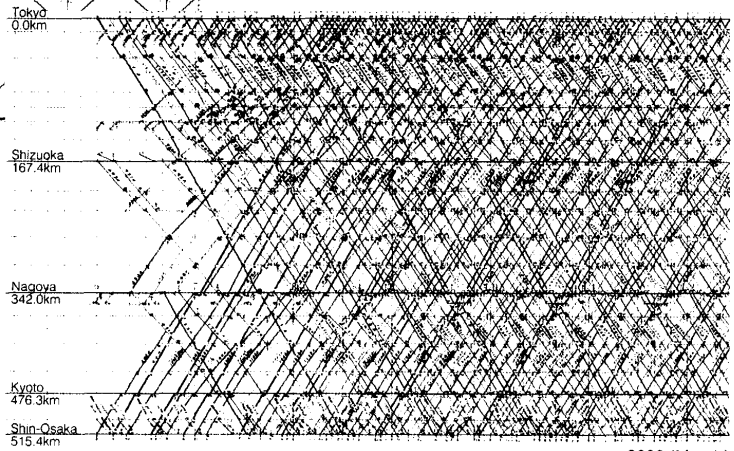
## 11 Train Diagrams

Service between Tokyo and Shin-Osaka offered only two trains per hour when first started in 1964 and now the number of trains per hour has increased to eleven.



**1964** (Inauguration of Shinkansen Service)

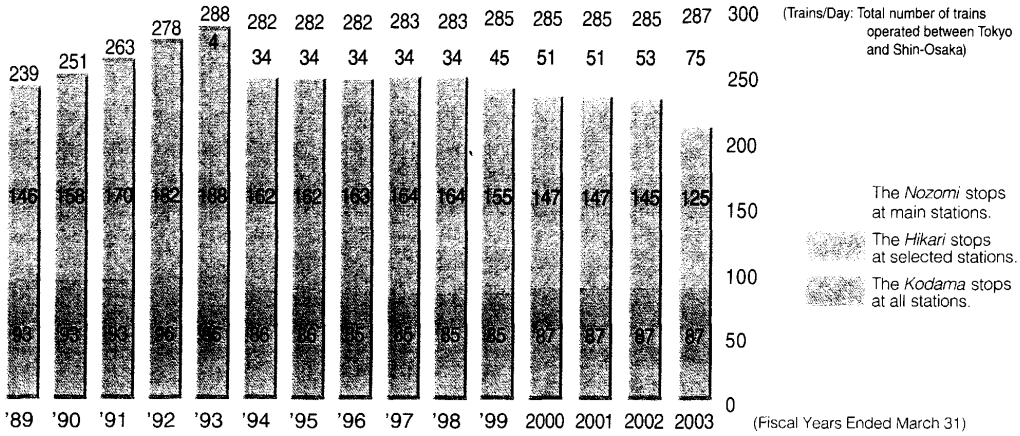
| | 1964 (Inauguration of Shinkansen service) | 2002 (March) |
|---|---|---|
| **Travel time** | 4 hours | 2 hours and 30 minutes |
| **Trains per hour from Tokyo** | 2 | 11 |
| **Trains per day** | 60 | 287 |
| **Ridership per day** | 61,000 | 362,000 |




**2002** (March)

## 12 Number of Tokaido Shinkansen Train Departures

To meet the needs of Tokaido Shinkansen passengers, JR Central is taking action with an increased number of Nozomi trains.



## 13 Train Punctuality

Punctuality is also a significant feature of the Tokaido Shinkansen. The average delay per train throughout the year is 0.3 minutes.

### Annual Average Delay

**0.3**

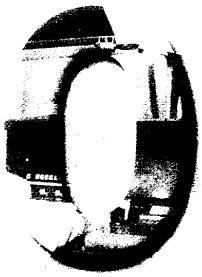
**minutes/train**

Note: Average of total time of late departures and arrivals of one minute or more from/to Tokyo and Shin-Osaka stations, including delays caused by uncontrollable reasons such as heavy rain, typhoons, and heavy snowfall.

## 14 Safety

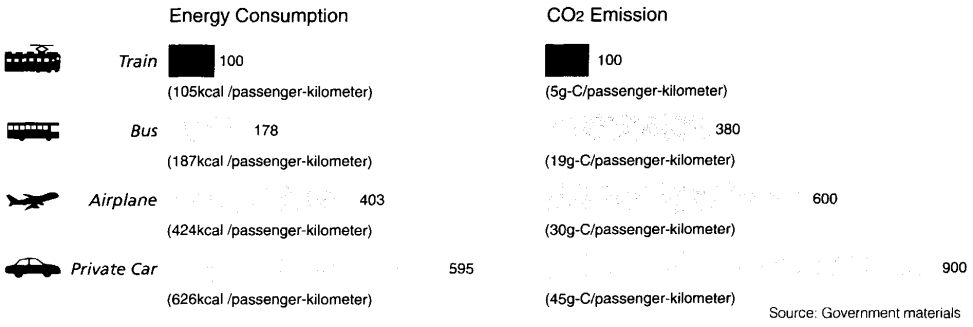
Throughout its 37 years of commercial train operations the Tokaido Shinkansen has maintained a flawless record of no passenger fatalities or injuries due to train accidents such as derailment or collision.

### No Passenger Fatalities or Injuries due to Train Accidents such as Derailment or Collision in Commercial Train Operations During 37 Years of Service



## 15 Environmental issue

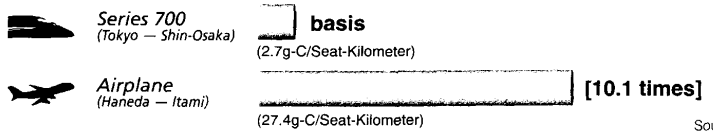
### Comparison with respect to transportation mode




Source: Government materials

Compring the energy reguired to carry a passenger 1 km, a train needs only one-fourth that of an airplane, and one-sixth that of private car. Also, $CO_2$ emissions per passenger-km generated by trains are only one-sixth that of an an airplane and one-ninth that of a private car. Thus, railways are highly efficient transport systems and giving low impact on the environment.

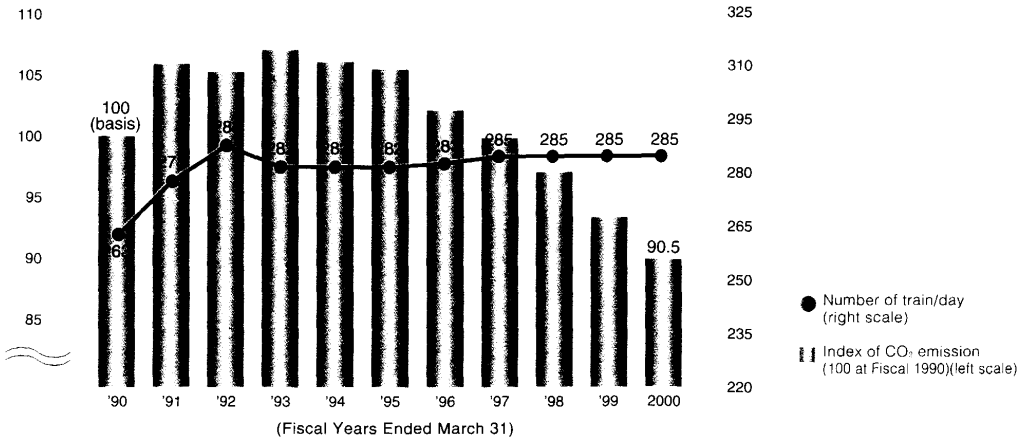
### Comparison of series 700 and Airplane regarding $CO_2$ emission




Source: Government materials

On the high-density, long-distance Tokyo-Osaka corridor, $CO_2$ attributable to the Series 700 train is around one-tenth that of an airplane. This is the supremacy of railways as an environmentally-friendly transportation mode.

### $CO_2$ emission of the Tokaido Shinkansen



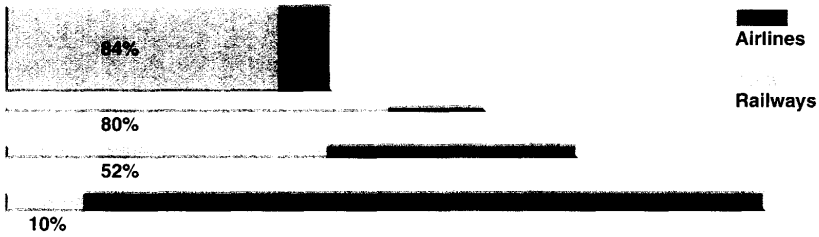

JR Central has actively replaced older Shinkansen cars with new energy-saving types such as the series 700 and effectively reduced $CO_2$ emissions. The Series 700 will continue to be introduced until all older Shinkansen cars have been replaced with energy-saving types by around the year 2003.

## 16 Comparison of Intercity Transportation Service

We are responding to market challenges by strengthening our schedule and service frequency in which the Tokaido Shikansen has a competitive advantage.

| Between Tokyo and . . . | | Osaka (515 km) | Okayama (676 km) | Hiroshima (821 km) | Fukuoka (1,069 km) |
|---|---|---|---|---|---|
| Shinkansen | Travel time | 2 hours and 30 minutes | 3 hours and 16 minutes | 3 hours and 51 minutes | 4 hours and 53 minutes |
| | Departures per day | 218 | 103 | 67 | 45 |
| Airplane | Travel time | 1 hour (2 hours and 38 minutes) | 1 hour and 10 minutes (2 hours and 55 minutes) | 1 hour and 15 minutes (3 hours and 18 minutes) | 1 hour and 40 minutes (3 hours and 2 minutes) |
| | Departures per day | 70 | 10 | 32 | 86 |

Market share and Volume

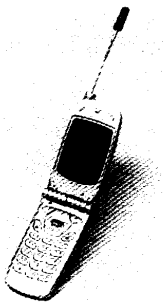



Notes: 1. Travel times in parentheses include transfer and access times from airports and Shinkansen stations to city centers, based on the most advantageous service.
2. Departures per day of the Shinkansen and airline are based on current timetables.
3. Market share is the percentage of all railway and airline services based on the inter-prefectural data of the *Inter-Regional Passenger Mobility Survey* (FY 2000.3), published by the Ministry of Transport.
4. Railway stations and airports each destination—

| | | |
|---|---|---|
| Tokyo: | Tokyo Station | Haneda Airport |
| Osaka: | Shin-Osaka station | Itami Airport/Kansai International Airport |
| Hiroshima: | Hiroshima station | Hiroshima Airport |
| Fukuoka: | Hakata station | Fukuoka Airport |

## 17 New Reservation Service

JR Central has developed new services that will allow customers to book and purchase reserved-seat tickets via wireless Internet service by mobile phone.

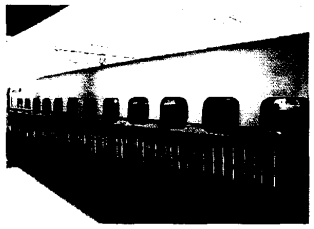


reserve a seat via the internet

anytime,anywhere

receive a ticket at a station

no need to wait in a line with no cash

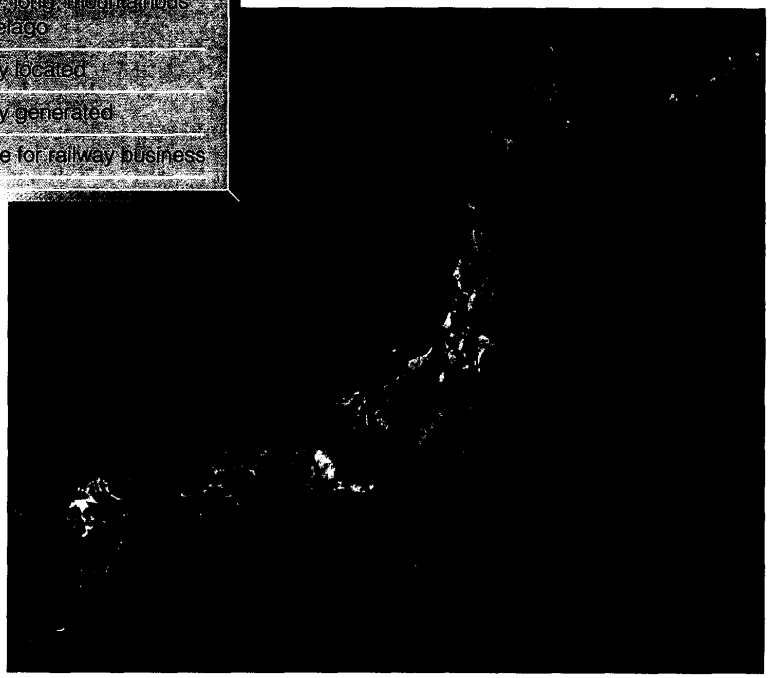


get on a train with the ticket

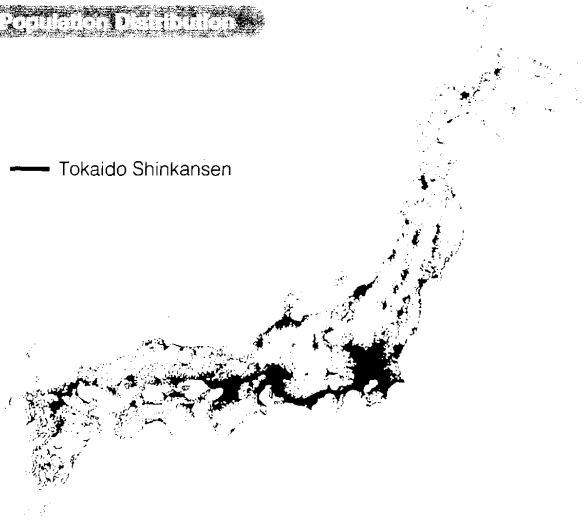
## 13 Characteristics of Japan

As Japan stretches from south to north with major cities located in a straight line, population centers follow along this line resulting in a suitable market for the railway industry.

| | |
|---|---|
| **Topography** | Narrow, long, mountainous archipelago |
| **Major cities** | Linearly located |
| **Traffic demand** | Linearly generated |
| **Market conditions** | Suitable for railway business |

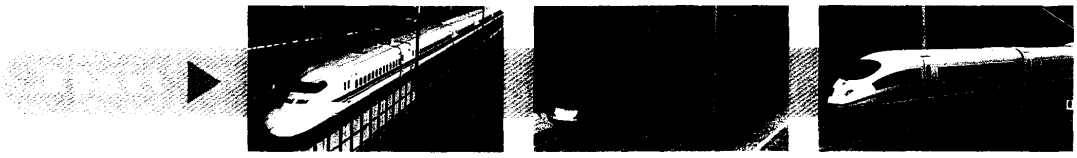


**Population Distribution**



## 19 High-Speed Railways

Tokaido Shinkansen achieved the world's first high speed railway operations when first started in 1964 and takes pride in holding the highest standards in comparison with high speed railway systems which were subsequently developed in Europe.



| | Tokaido-Sanyo Shinkansen | TGV(France) | ICE(Germany) |
|---|---|---|---|
| *Inauguration* | 1964 (Tokaido), 1975 (Sanyo) | 1981 | 1991 |
| *Section* | Tokyo - Shin-Osaka - Hakata | Paris - Lyon | Hamburg - Munich |
| *Distance* | 1069.1 km | 431 km | 814 km |
| *Departures per day* | 287 (Tokaido), 281 (Sanyo) | 241 | 107 |
| *Maximum operating speed* | 300 km/h (Sanyo), 270 km/h (Tokaido) (206 km/h average commercial speed, Tokyo - Shin-Osaka, 243km/h, Shin-Osaka - Hakata) | 300 km/h (205 km/h average commercial speed, Paris - Lyon) | 280 km/h (133 km/h average commercial speed, Hamburg - Munich) |
| *Traction* | EMU | EL | EMU |
| *Power supply* | 25 kV AC 60 Hz | 25 kV AC 50 Hz & 1.5 kV DC | 15 kV AC 16 2/3 Hz |
| *Axle load* | 11.4 t | 17 t | 17 t |
| *Seat pitch (2nd class)* | 1,040 mm | 920 mm | 1,025 mm |
| *Passenger capacity* | 1,323 | 516 | 391 |

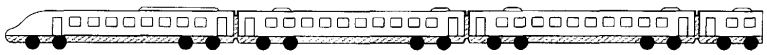
Note : The figures for TGV and ICE are based on Thomas Cook (June 2002)

## 20 Characteristics of the EMU (Electric Multiple Unit) System

Distributed motor power is inherently more capable than centralized motor power.

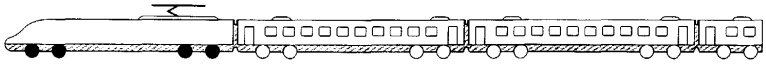
| Characteristics | Advantage |
|---|---|
| Low axle load | Reduction of construction cost and track maintenance cost<br>Low noise and ground-borne vibration |
| Stable adhesion performance | High acceleration and deceleration<br>Reliable service in bad weather condition |
| Effective regenerative braking | Energy saving<br>Reduction of brake maintenance |
| Effective use of floor | Large capacity |
| Redundancy of traction system | High reliability |

**EMU System**



axle load

**Locomotive-Hauled System**



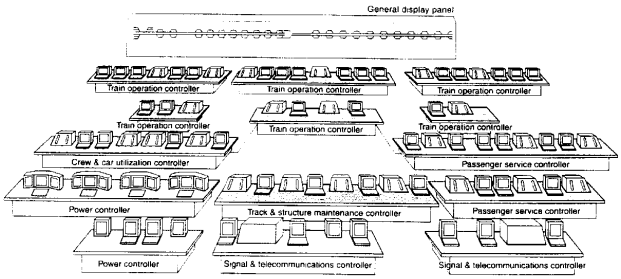
axle load

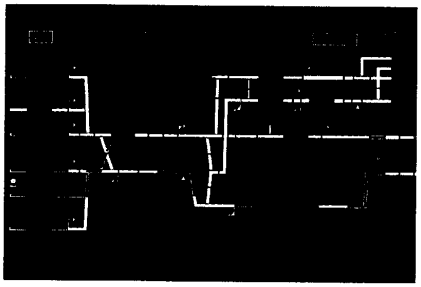
● driving axle ○ trailing axle

# 21 Tokaido-Sanyo Shinkansen General Control Center

The Tokaido-Sanyo Shinkansen General Control Center houses the most advanced operating management systems to ensure safety and reliability.

## Layout



Monitor screen

## Controllers

**Crew & car utilization controller**

**Train operation controller**

**Passenger service controller**

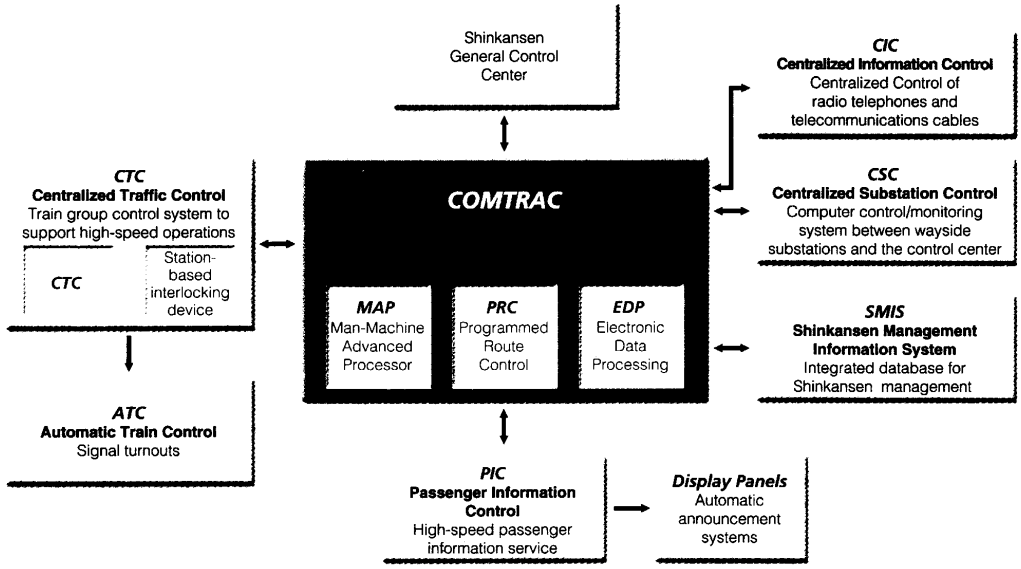
**Power controller**

**Track & structure maintenance controller**

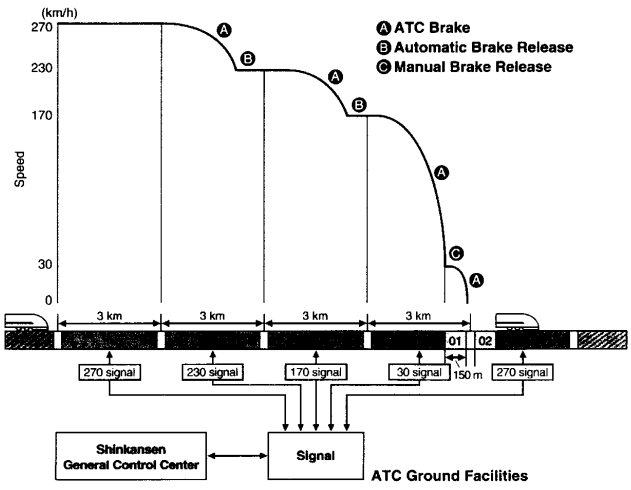
**Signal & telecommunications controller**

## 22 COMTRAC (COMputer-aided TRAffic Control)

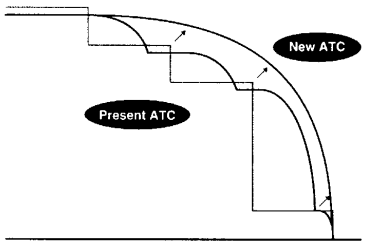
COMTRAC is a Shinkansen control system that allows around-the-clock status monitoring of all trains currently in operation.




## 23 ATC(Automatic Train Control)



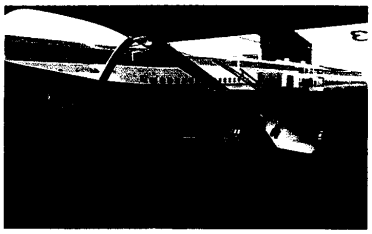

• **ATC(Automatic Train Control):** The ATC signal, indicating the maximum speed allowed for the train, according to the distance to the preceding train and the conditions of the route ahead, is continously displayed on the speed meter panel. The train is automatically decelerated to an appropriate speed by the ATC when traveling too fast.

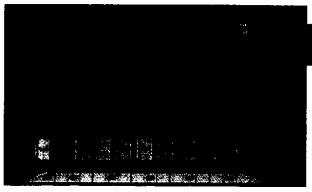



• **New ATC system is now under development.**
**(Effects of the system)**
- Higher reliability
- Better passenger comfort
- Higher flexibility of train schedules

(Planned to be operated from 2005)

## 24 Nozomi Driver's Cabin





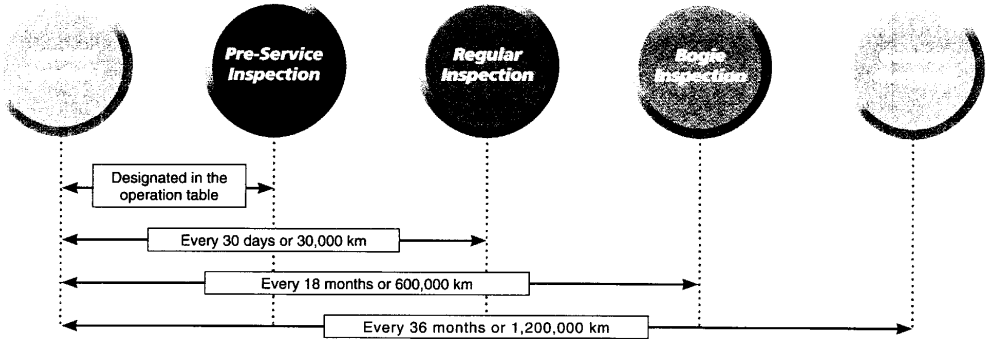


- **Navigation Device:** In Series 300 and 700 trains, the navigation screen displays information to assist the driver such as slopes and speed restrictions ahead, distance remaining and time to the next station, and deviation from schedule.

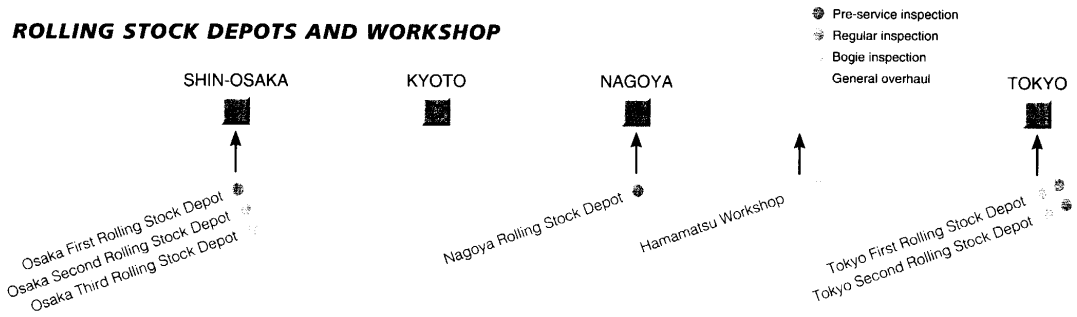
## 25 Maintenance Management of Shinkansen Rolling Stock

As a preventative maintenance measure, a periodic inspection and repair system are incorporated into the train management schedule to maintain the safety of Shinkansen rolling stock.

### TYPE AND INTERVAL OF INSPECTION




### ROLLING STOCK DEPOTS AND WORKSHOP



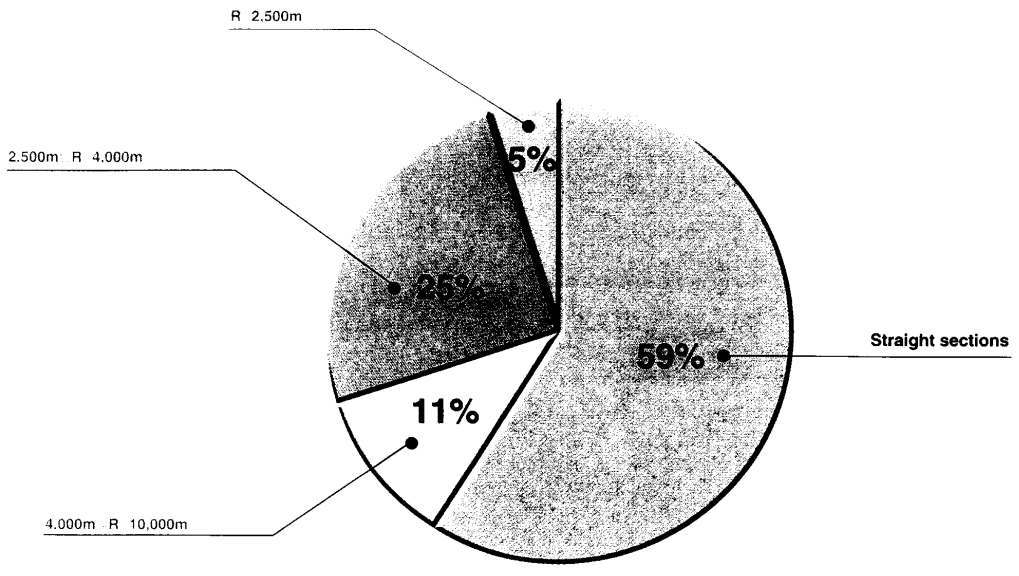

Note : *No regular inspections at Mishima Rolling Stock Depot*

## 26 Structural Specifications

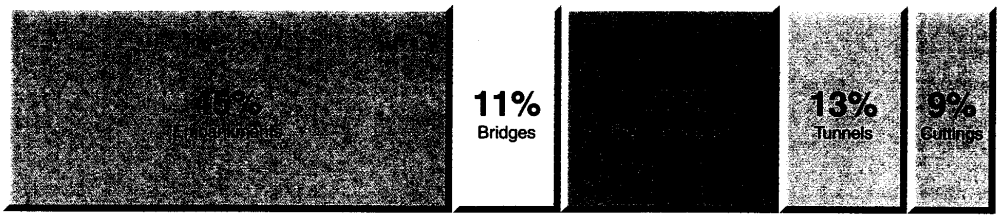
Tokaido Shinkansen is distinguished by its minimized curve radius in comparison with the Sanyo, Tohoku and Jyoetsu Shinkansen because it was constructed in earlier days, resulting in being twisted in the metropolitan area.

| | Tokaido Shinkansen | Sanyo Shinkansen | Tohoku-Jyoetsu Shinkansen |
|---|---|---|---|
| **Commencement of operations** | 1964 | 1972 | 1982 |
| **Gauge (mm)** | 1,435 | 1,435 | 1,435 |
| **Maximum operating speed (km/h)** | 270 | 300 | 275 |
| **Maximum gradient (‰)** | 20 | 15 | 15 |
| **Minimum curve radius (m)** | 2,500 | 4,000 | 4,000 |
| **Minimum vertical curve radius (m)** | 10,000 | 15,000 | 15,000 |
| **Cant (mm)** | 200 | 180 | 180 |
| **Distance between track centers (m)** | 4.2 | 4.3 | 4.3 |

## 27 Ratio of Curves by Length

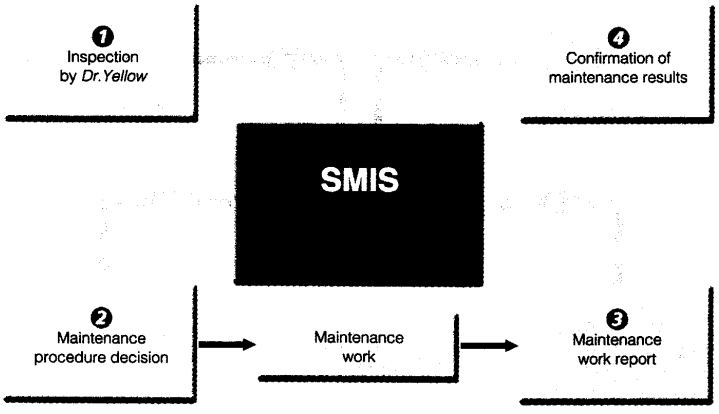


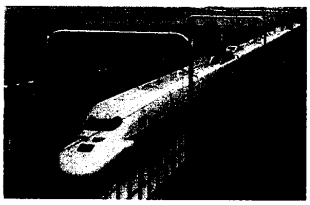
## 28 Ratio of Structure Types by Length




## 29 Maintenance System with Dr. Yellow

SMIS manages various data for streamlining daily operations and improving reliability, and also receives and stores data from measurements performed by the multipurpose inspection train, "Dr. Yellow."



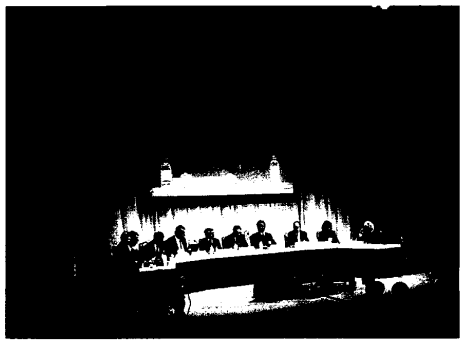
***Dr.Yellow:* Multiple Inspection Train**
- 7-car EMU train
- Inspects tracks,catenaries,and signaling and telecommunications facilities
- Conducts inspections at 270 km/h during operating hours
- Runs every 10 days

**SMIS:Shinkansen Management Information System**
- Manages data of rolling stock, track, and electrical facilities
- Receives and stores data from *Dr.Yellow*

**Maintenance Work**
- Performed after midnight to 6:00 a.m.
- No disruption to regular train operations

## 30 International High-Speed Railway Conference 2000

In Novemver 2000, JR Central and JR West co-hosted International High-Speed Railway Conference 2000.
16 (14 overseas) railway operators made a strong appeal to the world about the role of railways in addresing global enviromental issues.



**16 Railway Operators**

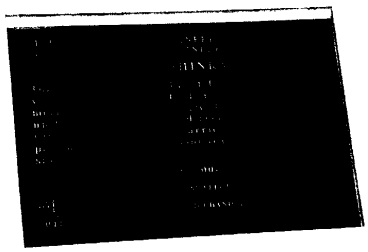
Beigian National Railways (SNCB)
Ministry of Railways, P.R. CHINA
VR-Group Ltd. (Finnish Railways)
French National Railways (SNCF)
German Railways (DB AG)
Italian Railways (FS spa)
Korean National Railroad
Spanish National Railways (RENFE)
Swedish State Railways (SJ)
Taiwan High Speed Rail Corporation
Virgin Trains
Railtrack PLC
Amtrak - National Railroad Passenger Corporation
International Union of Railways (UIC)
West Japan Railway Company
Central Japan Railway Company

**Concluding Statement**

"Environmental issues are the world's common and significant themes for the 21st century, for which the transportation sector also has great responsibilities.
In order for the railway sector to carry out this responsibility, it will be necessary to have both policy efforts so that each mode of transportation is used in accordance to its most favorable characteristics and efforts from railway operators such that railways, which are superior in regard to the environment-friendly qualities will be chosen by even more passengers.
We, high-speed railway operators will make every effort to improve so that passengers will more than ever choose high-speed railways."

## 31 The Electrical Engineering Milestone and The Landmark in Mechanical Engineering

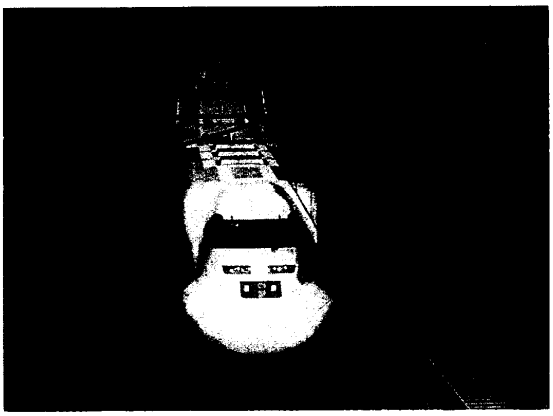
On July 13, 2000, the Tokaido Shinkansen has received two honorable awards, "Electrical Engineering Milestone" by the institute of Electrical and Electronics Engineers(IEEE), and "Landmark in Mechanical Engineering" by the American Society of Mechanical Engineers(ASME). This double award signifies the international recognition bestowed on the advanced technology applied to the Tokaido Shinkansen.

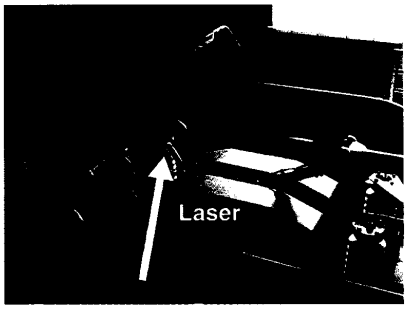
# 3-2 Recent Technological Developments

## New High-Speed Multiple Inspection Train

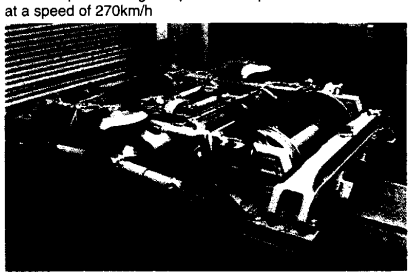
In September 2001, we introduced the T4 trainset, the first in the world able to inspect the electrical facilities while traveling at speeds of up to 270km/h.



●Direct measurement of contact wire condition by laser




●Track inspection bogie capable to inspect the rail condition at a speed of 270km/h



**The design concepts are the following four points:**

( i ) Increase of the maximum speed to 270km/h in order not to constrain the efficient diagram of commercial trains.

( ii ) Adoption of cutting-edge measurement technology and its extention.

( iii ) Realization of a comfortable labor environment for long working hours.

( iv ) Reduction of the total cost , including that of the production and the maintenance work.

## New Maintenance Car for Reballasting of Track

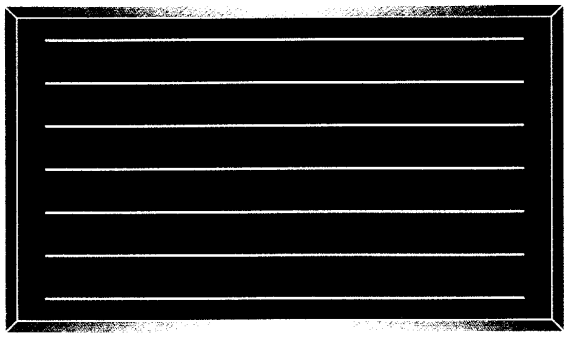
New maintenance car for reballasting of track can manage all the reballasting work on a single track.

Since about 90% of the Tokaido Shinkansen Line consist of ballast track, ballast work is very important factor for maintenance. Among many kinds of mechanization, JR Central introduced the new maintenance car for reballasting of track in April 2002 for further work efficiency and safety.

**Features:**
Collecting old ballast, installing new ballast and conveying them can be done with one trainset
→Work efficiency and safety can be improved.

## 33 Outline of Conventional Lines

JR Central operates a network of 12 conventional lines, which form a common network with the Tokaido Shinkansen. These lines have contributed substantially to the regions' socioeconomic prosperity.



* Percentage of conventional lines using ATS:This system operates the emergency brakes by sending a stop signal through the ATS ground coil when a stop sign has been ignored for some reason.
**Kanayama Station,indicated by the number in parenthesis,serves both the Tokaido Line and the Chuo Line and is counted twice.

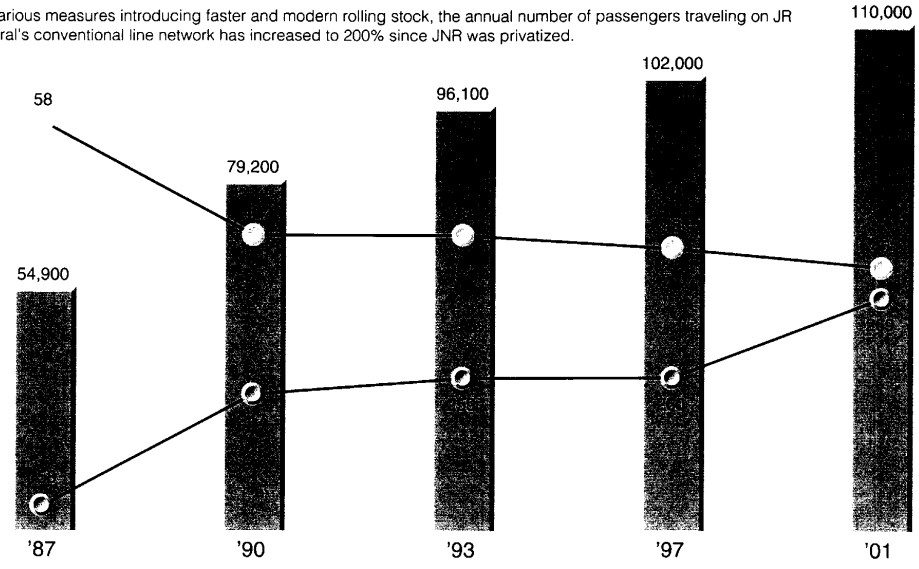
## 34 Rolling Stock

JR Central has introduced faster and more modern rolling stock, which has not only raised passenger comfort but also reduced per-car operating and maintenance expenses.

| | Series 383 Express EMU | Series 313 Suburban EMU | Series 85 Express DMU | Series 285 Sleeping Car Express EMU |
|---|---|---|---|---|
| *Inauguration* | 1995 | 1999 | 1989 | 1998 |
| *Type of service* | *Shinano* | *Rapid train service* | *Hida , Nanki* | *Sunrise Express* |
| *Maximum speed* | 130 km/h | 120 km/h | 120 km/h | 130 km/h |
| *Passenger capacity* | Second class:311<br>First class:44 | Seats:236<br>Standing:314 | Second class:212<br>First class:32 | Second class:150<br>(with 2 persons)<br>Single/twin room:158 |
| *Weight (tons/trainset)* | 233 | 127.9 | 162.9 | 305 |
| *Bogie* | Bolsterless type with controlled tilting and self-steering system | Bolsterless type | Bolsterless type | Bolsterless type with antirolling mechanism |
| *Configuration* | 3 M 3 T | 2 M 2 T | — | 2 M 5 T |
| *Power control system* | VVVF (Variable Voltage, Variable Frequency) control | VVVF (Variable Voltage, Variable Frequency) control | — | VVVF (Variable Voltage, Variable Frequency) control |
| *Traction motor* | Asynchronous motor,<br>12 motors/trainset<br>1,860kw/trainset | Asynchronous motor,<br>8 motors/trainset<br>1,480kw/trainset | 4 engines/trainset,<br>350 ps/2,000 rpm/engine,<br>U.K. manufacture<br>Cummins Engine Co.,Ltd<br>1,400ps/trainset | Asynchronous motor,<br>8 motors/trainset<br>1,760kw/trainset |

## 35 Improvement in Operations (Nagoya ⟷ Toyohashi(72.4km))

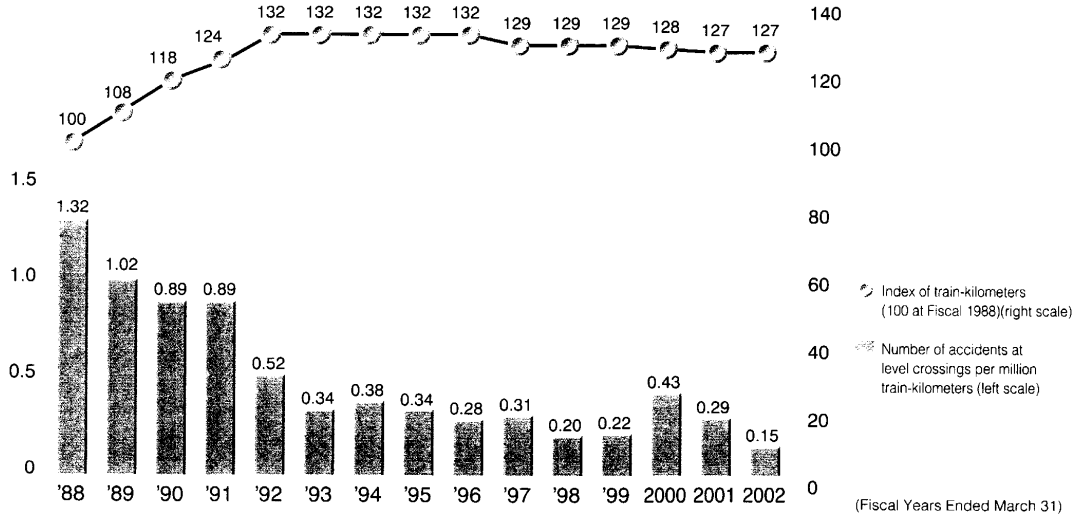
By various measures introducing faster and modern rolling stock, the annual number of passengers traveling on JR Central's conventional line network has increased to 200% since JNR was privatized.




Travel time (minutes)
Number of trains per day  Ridership per day
Note : Number of trains per day and travel time is as of April 1 of each year.
Ridership per day is for the fiscal year ended the following March 31.

## 36 Accidents at Level Crossings

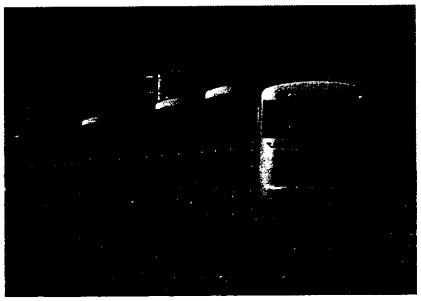
JR Central utilizes a myriad of safety technologies incorporating equipment such as railway crossing obstruction radar and crossing safety failure warning systems to prevent level crossing accidents.




(Fiscal Years Ended March 31)

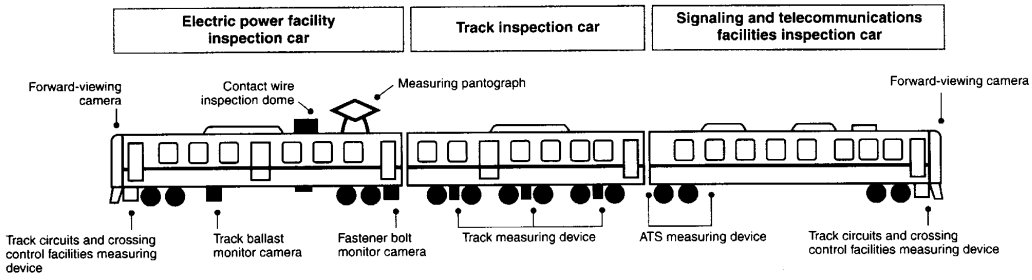
## 37 Multiple Inspection Train

JR Central has introduced Doctor Tokai, a multiple inspection train dedicated to comprehensive testing of tracks and electricity facilities.

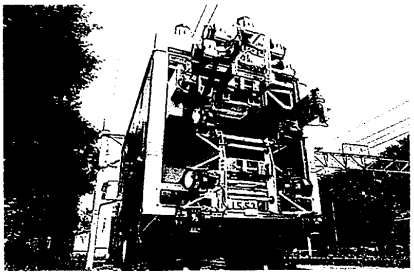


**Dr.Tokai**

- World's first multiple inspection DMU train
- Inspests both electrified and nonelectrified conventional lines
- Inspects tracks and electric power, signaling, and telecommunications facilities

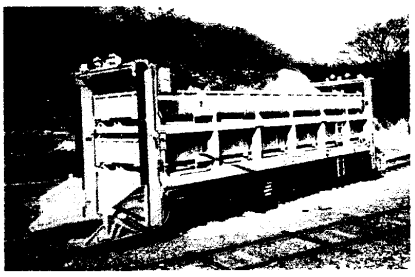



## 38 Recent Technological Developments



**Tunnel Lining Inspection**

This new inspection equipment uses CCD (Charge-Coupled Device) cameras mounted on road/rail vehicles to record images of cracks and other irregularities on the domed surfaces of tunnels.Through the use of digital data, the efficiency of regular inspections has been significantly enhanced, resulting in improved safety and better working environments.

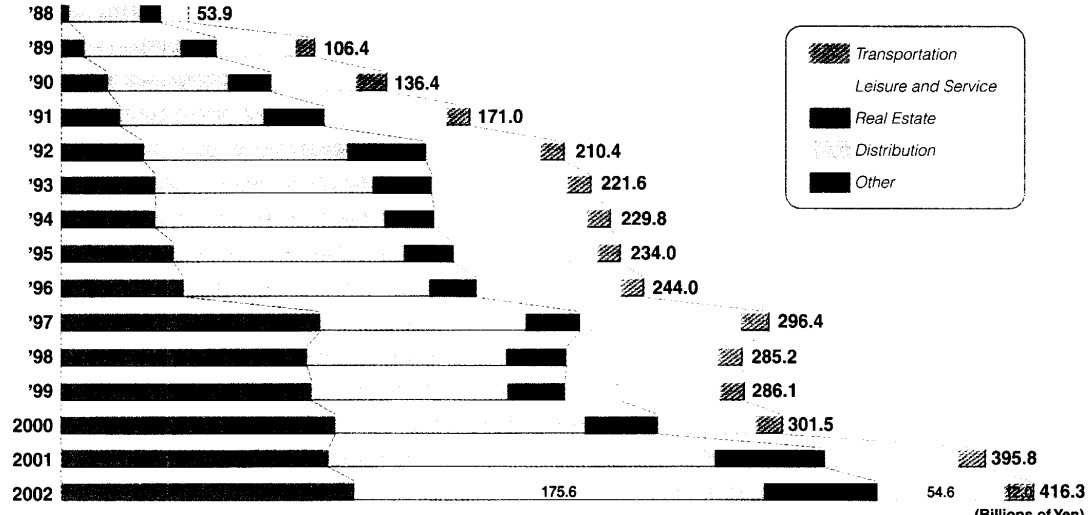


**Ballast Renewal System**

Maintenance work of the conventional line is restricted due to limited working time available between the running of the commercial trains.
In order to reduce maintenance costs and manual maintenance work and to increase operation productivity of ballast renewal, a ballast renewal machine has been developed.
This new machine is capable of uplifting the old ballast while simultaneously laying a new one all in a compact unit to contribute to the vast reduction of the advance preparation and an increase in operation output.

## 39 Operating Revenues of Group Companies

JR Central promotes many affiliated business through its subsidiaries to maximize operating efficiency and flexibility.




(Fiscal Years Ended March 31)

(Billions of Yen)

*Note: 39 Group Companies as of March 31,2002*

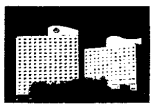
## 40 Group Companies

All Group companies are actively pursuing business strategies that broaden the operating foundation of the entire group.

**Transportation**

Tokai Transport Service Company
JR Tokai Bus Company
First Air Transport Co.,Ltd.
JR Tokai Logistics Company

**Leisure and Service**



JR Tokai Tours
Eki Rent-A-Car Chubu Co.,Ltd.
JR Tokai Hotels Co.,Ltd.
Shizuoka Terminal Hotel Co.,Ltd.
Nagoya Terminal Hotel Co.,Ltd.
Hida Forest City Planning Co.,Ltd.
JR Tokai Agency Co.,Ltd.
Wedge Inc.

**Real Estate**

JR Central Buidling Co.,Ltd.
Shin-Yokohama Station Development Co.,Ltd.
Nagoya Station Area Development Corporation
JR Development and Management Corporation of Shizuoka
JR Development and Management Corporation of Kansai
JR Tokai Real Estate Co.,Ltd.
Toyohashi Station Building Co.,Ltd.
Nagoya Terminal Station Building Co.,Ltd.
Hamamatsu Terminal Development Co.,Ltd.
Shizuoka Terminal Development Co.,Ltd.
Numazu Station Building Co.,Ltd.

**Distribution**

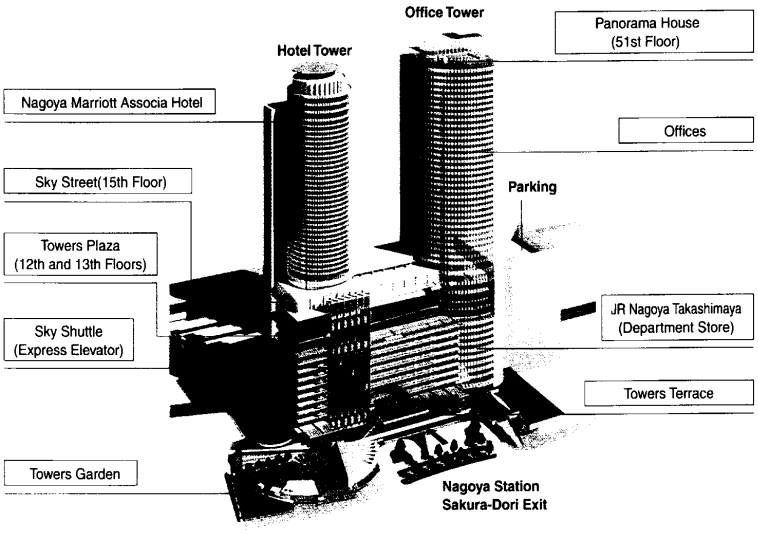
J・Diner Tokai Co.,Ltd.
JR Tokai Food Service Co.,Ltd.
Passengers' Service Co.,Ltd.
JR Tokai Takashimaya Co.,Ltd.
Tokai Kiosk Company
JR Tokai Corporation

**Other**

JR Tokai Construction Co.,Ltd.
JR Central Consultants Company
Shinsei Technos Co.,Ltd.
Shinkansen Engineering Co.,Ltd.
The Japan Mechanised Works and Maintenance of Way Co.,Ltd.
Tokai Rolling Stock & Machinery Co.,Ltd.
JR Tokai General Building Maintenance Co.,Ltd.
Chuo Linen Supply Co.,Ltd.
JR Tokai Information Systems Company
JR Tokai Partners Co.,Ltd.

## 4-1 JR Central Towers

JR Central Towers, the core project of the JR Central Group's affiliated business diversification plan, houses rental office units, a department store, a hotel, and other facilities.




**Location**
Nagoya Station

**Site area**
Approximately 82,000 sqm

**Primary uses**
Station facilities, department store, hotel, rental office space, and parking area

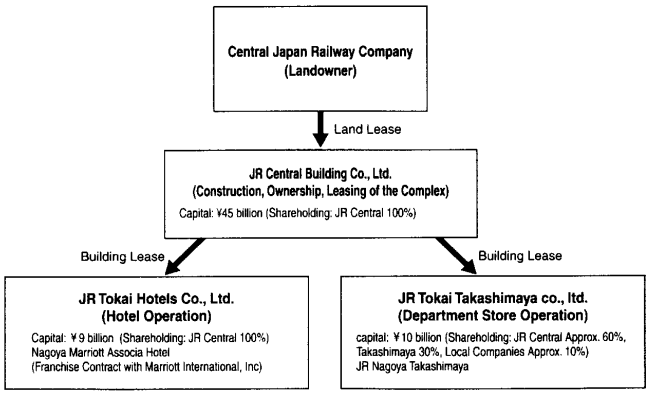
**Floors**
Office tower: 51 aboveground floors
Hotel tower: 53 aboveground floors
4 underground floors

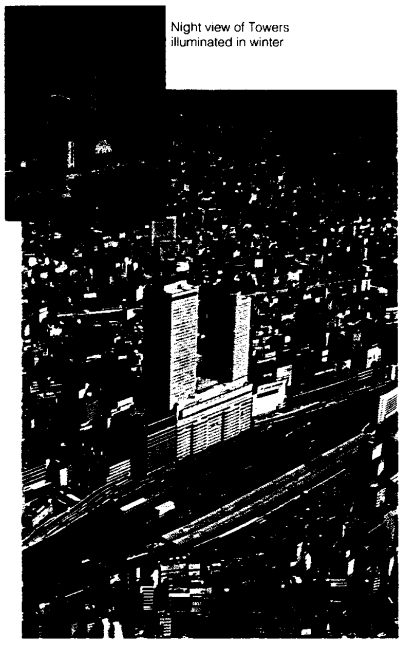
**Highest point**
Office tower: 245m
Hotel tower: 226m

**Floor area**
Approximately 410,000 sqm

**Parking capacity**
1,500 automobiles

### Project Scheme



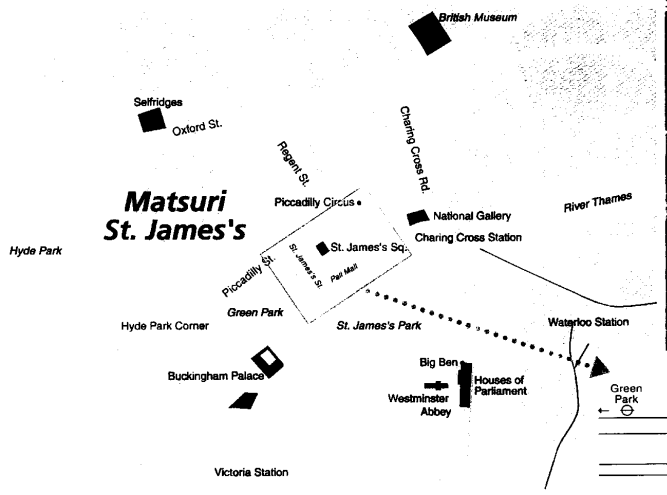



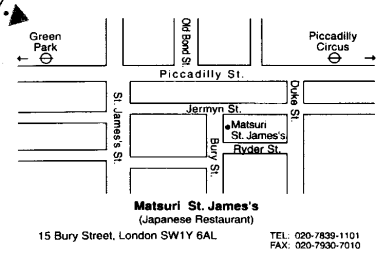
Night view of Towers illuminated in winter

## 42 Overseas Business

Since 1988, JR Central has opened three overseas offices to expand into new business fields. A successful example of a new business is our highly regarded restaurant Matsuri St. James's in London.

### *Matsuri St. James's* (Japanese Restaurant in London)

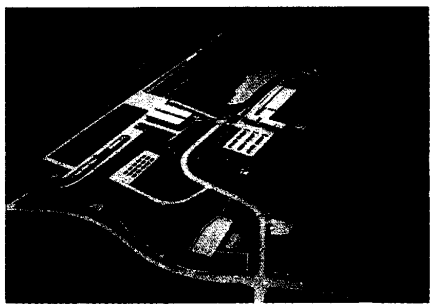


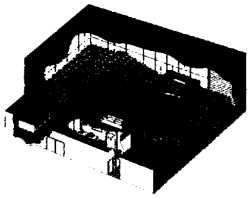




**Matsuri St. James's**
(Japanese Restaurant)
15 Bury Street, London SW1Y 6AL
TEL: 020-7839-1101
FAX: 020-7930-7010

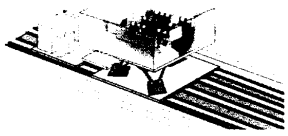
## 43 JR Central Research Institute

We opened our own dedicated R&D facilities in July 2002 to further enhance technology.





**Low-Noise Wind Tunnel**
- for aerodynamics research



**Vehicle Dynamic Simulator**
- for making train ride more comfortable

**Main areas of research and development**

1. Further improving high-speed railway systems
   - Research and development to increase the level of Tokaido Shinkansen passenger comfort, to improve environmental sustainability in the field of energy saving, etc., and to increase the speed of Shinkansen.
   - Research and development to innovate the maintenance technology for the tracks and contact wires with a view to reducing the energy and operating costs.
2. Research and development of superconductivity technology that is pioneered at our institute to be utilized and adapted in other fields.

## 4-4 Further Improving Convenience, Speed and Comfort

JR Central has launched a strategy to improve competitiveness by augmenting the service advantages of the Tokaido Shinkansen, focusing particularly on *Nozomi*.

**2001**

- Operate Nozomi every 30 minutes between Tokyo and Osaka
- Start Tokaido Shinkansen seat reservation service via mobile phone

**New Shinagawa Station**

- Improve transportation capacity
- Increase the number of access points in the Tokyo metropolitan area
- Ensure flexibility in timetable




**2003**

- **Open new Shinagawa Station**
- **Complete replacement of all trains with high-speed, environmentally-friendly types**
- **Drastically revise timetables**
  (Max of 7 Nozomi trains/hour)

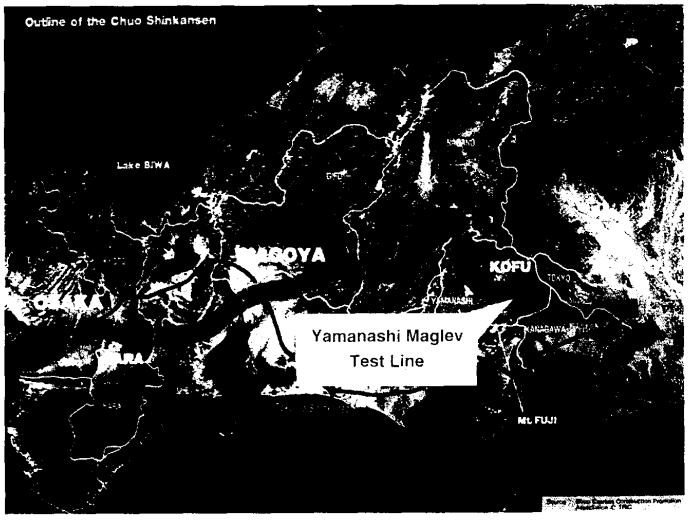
- Replace first generation trains with second generation capable of running at 270km/h
- Operate 117 trains, consisting of 56 Series 700 and 61 Series 300

## Enhance competitiveness

- All trains capable of running at 270 km/h
- Timetable flexibility
- Higher accessibility

## 45 Chuo Shinkansen

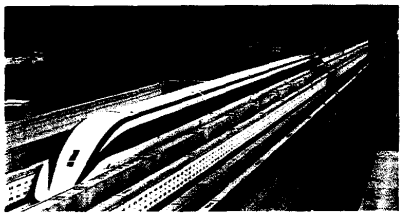
The Chuo Shinkansen is planned in accordance with the Nationwide Shinkansen Railway Development Law. JR Central is to concurrently manage both the Chuo Shinkansen and the Tokaido Shinkansen.

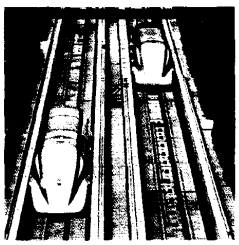



Linear Chuo Express Construction Promotion Federation © Copyright TRIC

## 46 Superconducting Maglev

JR Central has been engaged in the research and development of the superconducting Maglev system as a new transport method for the 21st century. As the future management entity of the Chuo Shinkansen, JR Central believes that the superconducting Maglev will realize the advanced performance and speed capabilities required of the Chuo Shinkansen.





### Brief History

**1962** Research started at JNR
**1977** The Miyazaki Maglev Test Track opened
**1979** Unmanned world-record speed of 517 kilometers per hour achieved (ML-500)
**1989** Decision to build the Yamanashi Maglev Test Line made.
**1997**[1] The Yamanashi Maglev Test Line opened. Basic running tests using a single trainset (MLX01) commenced.
**1998**[2] General functional tests started
**1999**[3] Manned world-record speed of 552 kilometers per hour achieved. Target for confirming the practicality of Maglev technologies. Passing at a relative speed of 1,003 kilometers per hour conducted.
**2000** General technical evaluation for practical use was confirmed by a committee established by the Ministry of Transport. The total distance covered in running tests since the start of the development exceeded 100,000 kilometers.
**2002** The total distance covered in runnnig tests exceeded 200,000 km.
The number of visitors the Maglev had carried reached 30,000.
The new-type test vehicle was sent in.

### The Five-year Test Plan
**(2001～2005)**

- Reliability and Durability Tests
- Cost Reduction
- Improvement of the aero-dynamic Characteristics

Notes: 1. Basic running tests: wheel running tests, levitation tests, acceleration tests, tests to confirm performance at a maximum speed of 550 kilometers per hour
2. General functional tests: high-speed passing tests, substation crossover operating tests, multiple train operating control tests
3. From April through the following March

## 47 Non-Consolidated Balance Sheet

For the Year Ended March 31, 2002

| Assets (Billions of Yen/Millions of U.S.Dollars) | | |
|---|---|---|
| **Total** | **¥5,479.0** | $41,196 |
| **Total Current Assets** | **105.1** | 790 |
| Cash and Cash Equivalents | **34.4** | 259 |
| Others | **70.7** | 531 |
| **Total Investments and Other Assets** | **311.6** | 2,344 |
| **Net Property and Equipment** | **5,062.3** | 38,062 |
| Railway Business Property | **6,965.9** | 52,376 |
| Other Business Property | **219.8** | 1,652 |
| Construction in progress | **106.5** | 800 |
| Accumulated Depreciation | **(2,229.9)** | (16,766) |

| Liabilities and Shareholders' Equity | | |
|---|---|---|
| **Total** | **¥5,479.0** | $41,196 |
| **Total Current Liabilities** | **465.0** | 3,496 |
| Trade Payables | **89.8** | 675 |
| Accrued Expenses | **17.2** | 129 |
| Others | **358.0** | 2,691 |
| **Total Long-Term Liabilities** | **4,351.7** | 32,720 |
| Long-Term Debts | **769.4** | 5,785 |
| Long-Term Payables | **3,304.6** | 24,847 |
| Liabilities for Employees' Severance Payments | **246.5** | 1,853 |
| Others | **31.2** | 235 |
| **Total Shareholders' Equity** | **662.3** | 4,980 |
| Common Stock | **112.0** | 842 |
| Capital Surplus | **53.5** | 402 |
| Legal Reserves | **12.5** | 94 |
| Retained Earnings | **481.4** | 3,620 |
| Unrealized Gain on Available-for-Sale Securities | **2.9** | 22 |

Note: Yen figures have been converted into U.S. dollars at the rate of ¥133=US$1, the approximate exchange rate at March 29, 2002.

## 48 Non-Consolidated Statements of Income

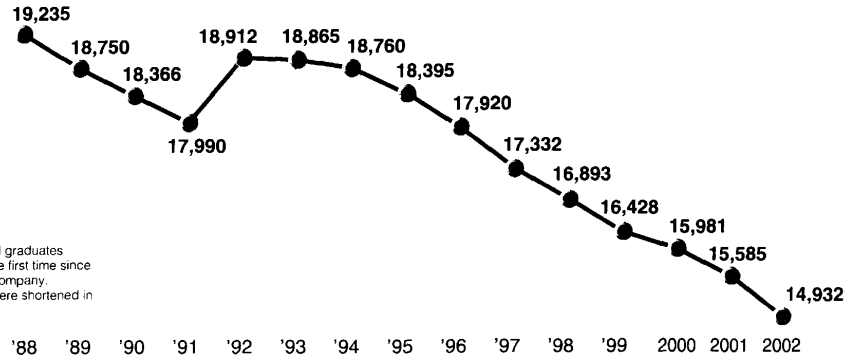
For the Year Ended March 31, 2002

| Revenues (Billions of Yen/Millions of U.S Dollars) | | |
|---|---|---|
| **Total Operating Revenues** | **¥1,128.5** | $8,485 |
| Railway | **1,120.2** | 8,423 |
| Others | **8.3** | 62 |
| **Expenses** | | |
| **Total Operating Costs and Expenses** | **771.6** | 5,802 |
| Railways | **765.8** | 5,758 |
| Others | **5.8** | 44 |
| **Other Expenses-Net** | **(277.3)** | (2,085) |
| **Income Taxes** | **37.9** | 285 |
| Current | **58.6** | 441 |
| Deferred | **(20.7)** | (156) |
| **Net Income** | **41.7** | 313 |

Note: Yen figures have been converted into U.S. dollars at the rate of ¥133=US$1, the approximate exchange rate at March 29, 2002.

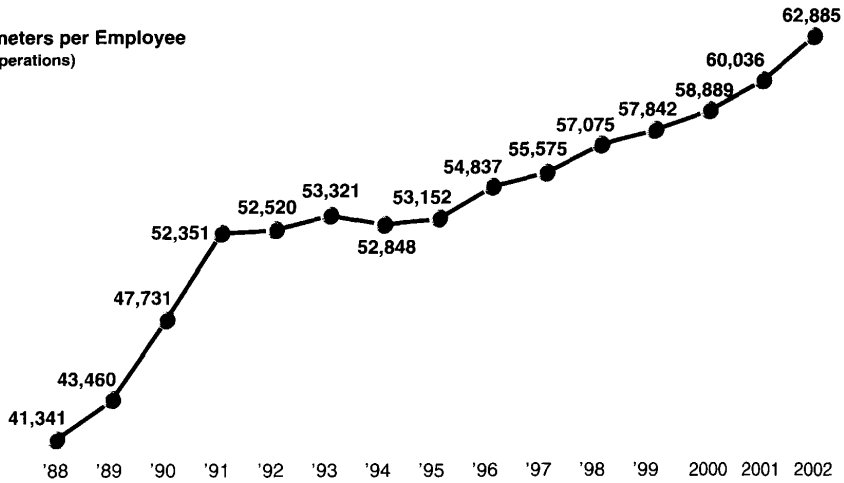
## 49 Performance Data (Fiscal Years Ended March 31)

### Number of Employees
**(Engaged in Railway Operations)**

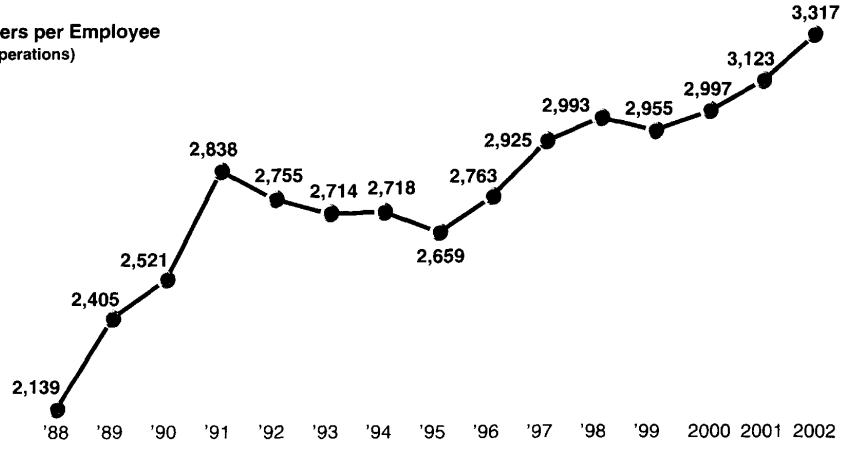



Notes: 1. Recruitment of high school graduates began in fiscal 1992 for the first time since the establishment of the Company.
2. Standard working hours were shortened in fiscal 1992 and 1996.

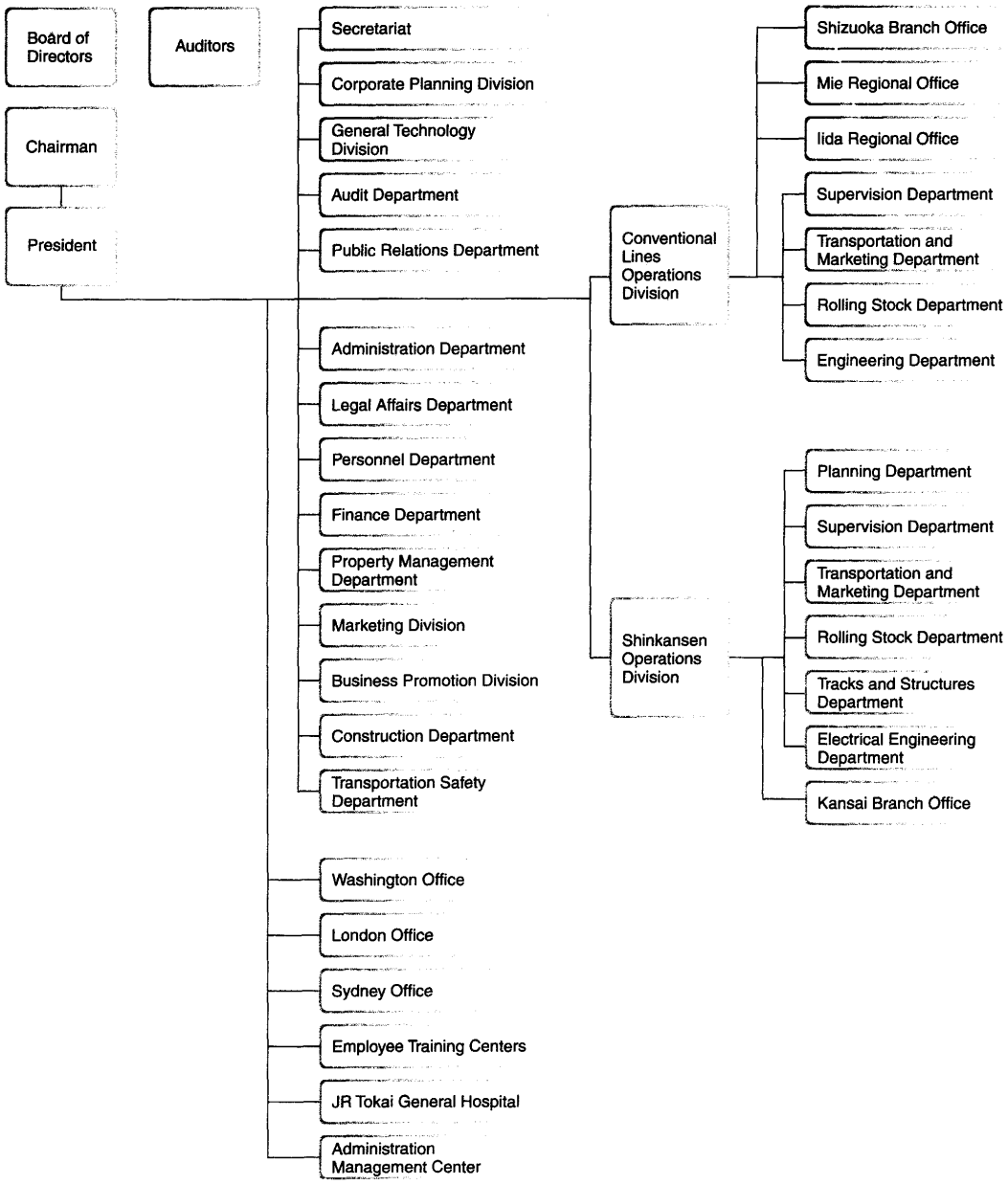
### Rolling Stock-Kilometers per Employee
**(Engaged in Railway Operations)**




### Passenger-Kilometers per Employee
**(Engaged in Railway Operations)**
**(Thousands)**



# Organization Chart




As of the end of July 2002

# 51 History of JR Central

**1987**

**April**
Central Japan Railway Company is established upon the privatization and division of JNR.

**1988**

**March**
New stations are established on the Tokaido Shinkansen: Shin-Fuji, Kakegawa, and Mikawa-Anjo.

**September**
*Otodoke* ticketing system is introduced.

**October**
JR Central establishes offices in Los Angeles, London, and Sydney.

**1989**

**March**
LCX wireless radio system is introduced on Tokaido Shinkansen trains.

**March**
Series 85 DMU *Wide View Hida* is introduced.

**June**
*JR Tokai Express Card* services are inaugurated.

**1990**

**February**
Minister of Transport orders topographical and geological surveys conducted along entire proposed route of the Chuo Shinkansen.

**May**
Tokaido Shinkansen serves a record 729,000 passengers in a single day.

**November**
Construction of the Yamanashi Maglev Test Line begins.

**1991**

**October**
The Shinkansen railway ground facilities leasing system is abolished.

**1992**

**February**
Automatic ticket gate system is introduced on conventional lines.

**March**
Series 300 *Nozomi* and Series 85 DMU *Wide View Nanki* start operations.

**March**
UrEDAS is brought into operation on the Tokaido Shinkansen.

**August**
JR Central issues ¥20 billion in Euroyen bonds in London.

**1993**

**March**
*Matsuri St. James's* Japanese *teppanyaki* restaurant opens in central London.

**March**
In a first for the Company, JR Central launches sales of units in *J-Heim Higashi Hamamatsu*, a condominium building.

**1994**

**January**
*Nozomi* carries 10-millionth passenger.

**July**
*Hotel Associa Takayama Resort* opens for business.

**August**
Construction begins on JR Central Towers in Nagoya.

**October**
Thirtieth anniversary of launch of Tokaido Shinkansen operations is marked with an international conference in Kyoto.

**1995**

**January**
Running tests of the Shinkansen Experimental Train 300X begin.

**April**
Series 383 tilting EMU is introduced for the Shinano Limited Express on the Chuo Line.

**July**
The first trainset of the three-car MLX01 Superconducting Maglev is delivered to the Yamanashi Maglev Test Line.

**1996**

**March**
New Series 373 EMU is introduced for the *Tokai* and *Inaji* Limited Express trains.

**July**
The Shinkansen Experimental Train 300X sets a new Shinkansen speed record of 443.0 kilometers per hour.

**1997**

**April**
Superconducting Maglev running tests begin.
*Dr.Tokai*, a multiple inspection DMU train for conventional lines, commences operation.

**May**
Construction of the new Shinagawa Station begins.

**October**
Shares are listed on the Nagoya, Tokyo, Osaka, and Kyoto stock exchanges.

**November**
The number of *Nozomi* departures, including the number of which serving Shin-Yokohama Station, is increased.

**1998**

**March**
Installation of automatic ticket gates is completed at all Tokaido Shinkansen stations except for Shin-Yokohama.

**July**
*Sunrise Express* commences operations.

**1999**

**February**
Construction of the Second General Control Center for the Tokaido and Sanyo Shinkansen is completed.

**March**
Series 700 Nozomi start operations.

**April**
Test train reaches a speed of 552 kilometers per hour in manned operations on the Yamanashi Maglev Test Line.

**November**
Passing test at a relative speed of 1,003 kilometers per hour is conducted on the Yamanashi Maglev Test Line.

**December**
Construction of JR Central Towers is completed.

**2000**

**March**
General technical evaluation for practical use of Superconducting Maglev is confirmed by a committee established by the Ministry of Transport.

**May**
All the facilities of JR Central Towers are opened.

**July**
The Tokaido Shinkansen has received two honorable awards,'Electrical Engineering Milestone' and 'Landmark in Mechanical Engineering'.

**November**
JR Central and JR West co-hosted International High-Speed Railway Conference 2000 in Nagoya.

**2001**

**September**
*Express Reservation* service via mobile phone or personal computer is launched.

**September**
*New Dr.Yellow*, a multiple inspection EMU train for Shinkansen, commences operation.

**December**
JR Company Law was revised.

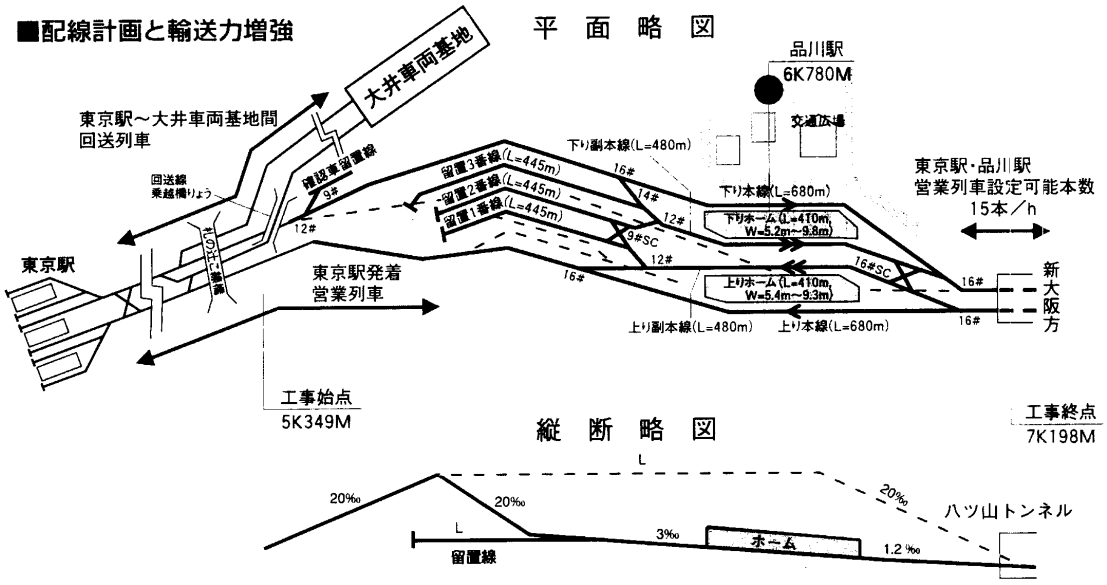
**2002**

**February**
The cumulative running distance of the JR Central's Maglev reached 200,000 km

# 日本の未来を切り拓く。2003年秋、東海道新幹線品川駅誕生。

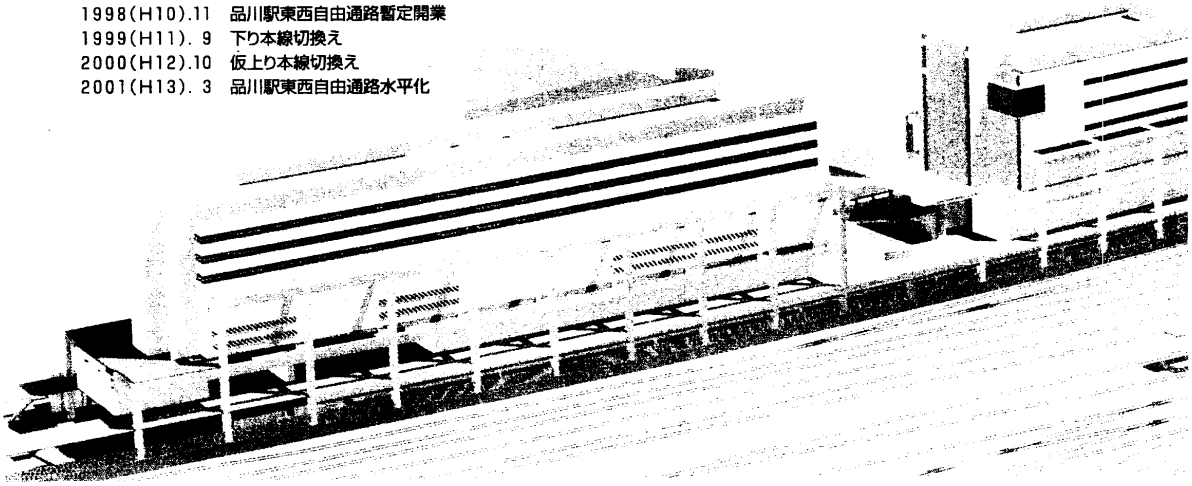
東海道新幹線は、日本の3大都市圏(東京ー名古屋ー大阪)を結ぶ大動脈として現在1日あたり約36万人のお客様にご利用いただいています。
1964年(昭和39年)の開業以来、輸送需要の増加に対応するため逐次設備増強を実施してまいりましたが、現行設備における輸送力はほぼ限界に達しております。現在、東海道新幹線は1時間あたり最大で11本のダイヤを基本に営業列車を運行しておりますが、これを1時間あたり最大で15本まで設定可能にする条件の一つが東海道新幹線品川駅です。また、品川駅を設置することにより、東京駅、新横浜駅とあわせて、首都圏における新幹線へのアクセス機能が拡充されることに加え、列車ダイヤの弾力性も高まり、将来を見据えた東海道新幹線の設備能力の向上、体質強化につながることになります。
現在、2003年(平成15年)秋の開業に向け着実に工事を推進しております。

## ■配線計画と輸送力増強



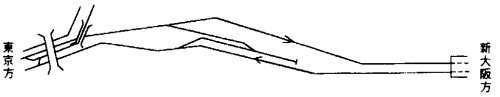

## ■東海道新幹線品川駅計画推進の経緯

1990(H 2).10 「東海道新幹線輸送力問題懇談会」設置(運輸省)
1991(H 3). 6 「運輸政策審議会」答申(「東海道新幹線の容量逼迫への対応」として「列車運行本数の増加方策等について検討し、輸送力増強のための有効な施策を推進する」)
1992(H 4). 6 品川駅東口地区都市計画(都市計画道路・交通広場及び再開発地区計画)の都市計画決定
「運輸政策審議会」答申(「東海道新幹線の列車運行本数の増加方策等の輸送力増強のための有効な施策の推進を急ぐ必要がある」)
7 東海道新幹線品川駅設置についての基本合意(鉄道側4者:国鉄清算事業団、JR東日本、JR貨物、JR東海)
8 鉄道側4者より、東京都、港区、品川区に都市計画と品川駅計画の調整を依頼
1995(H 7). 3 品川駅東西自由通路工事着工
4 品川駅東口地区都市計画変更(東海道新幹線品川駅計画を考慮)
1996(H 8). 3 品川駅設置に係わる事業基本計画の変更等について運輸大臣認可
国鉄清算事業団と土地売買契約の締結
10 JR貨物・JR東日本と土地売買契約の締結
1997(H 9). 5 東海道新幹線品川駅工事着工
1998(H10).11 品川駅東西自由通路暫定開業
1999(H11). 9 下り本線切換え
2000(H12).10 仮上り本線切換え
2001(H13). 3 品川駅東西自由通路水平化

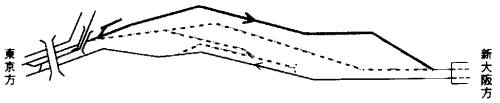


## 切換え順序図

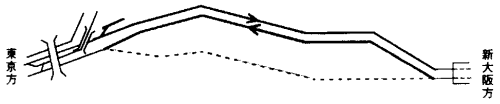
**①当初の状況**




**②下り本線切換え** 1999(H11)9.19～

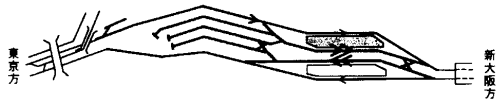



**③仮上り本線切換え** 2000(H12)10.15～



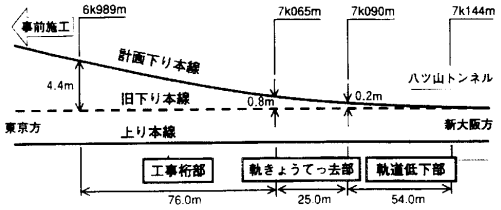

**④上り本線切換え** 2002(H14)初夏


**⑤副本線、留置線・完成** 2003(H15)秋

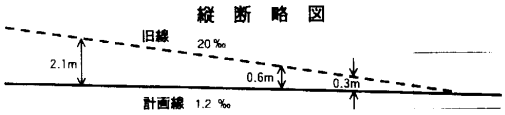


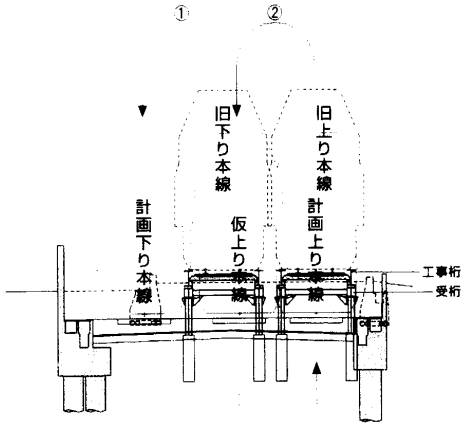

## 八ツ山付近 線路切換え概要

平面略図




縦断略図




下り線切換え時及び仮上り線切換えでは、平面(水平)で約4.4m、縦断面(鉛直)で約2.1m線路移動が必要で、切換え当日の作業量を低減させるため、工事桁を使用した。