CATCHING THE DRAGON

CHINA’S GOAL TO BE THE WORLD’S LEADER IN HIGH SPEED RAIL

WHAT CAN WE LEARN?

Robert H. Leilich
University of Illinois
Champaign-Urbana
August 26, 2011
China is an Amazing Country

- 1.3 billion people – 4 times size of US, 100 cities over 1 million, 47 percent live in urban areas
- 92 percent Han Chinese
- 9.6 million sq. miles - about same as US
- Climate varies from tropical to subarctic
- mostly mountains, high plateaus, deserts in west; plains, deltas, and hills in east
- Rich in natural resources
- Socialistic (Communist) government
China has 16 railway bureaus and 2 railway group companies under the Ministry of Railways, employing about 2 million people.

<table>
<thead>
<tr>
<th>Bureau or Agency</th>
<th>Railway Network in Provinces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beijing Railway Bureau</strong></td>
<td>Shijiazhuang, Tianjin, Taiyuan</td>
</tr>
<tr>
<td><strong>Chengdu Railway Bureau</strong></td>
<td>Chengdu, Chongqing, Nanchong, Guiyang, Lupanshui</td>
</tr>
<tr>
<td><strong>Guangzhou Railway Group Co.,Ltd.</strong></td>
<td>Guangzhou, Shenzhen, Meizhou, Hunan, Changsha</td>
</tr>
<tr>
<td><strong>Harbin Railway Bureau</strong></td>
<td>Inner Mongolia, Xiang'an</td>
</tr>
<tr>
<td><strong>Hohhot Railway Bureau</strong></td>
<td>Inner Mongolia</td>
</tr>
<tr>
<td><strong>Jinan Railway Bureau</strong></td>
<td>Shandong</td>
</tr>
<tr>
<td><strong>Kunming Railway Bureau</strong></td>
<td>Chengdu, Sichuan, Guizhou, Vietnam</td>
</tr>
<tr>
<td><strong>Lanzhou Railway Bureau</strong></td>
<td>Gansu, Ningxia</td>
</tr>
<tr>
<td>Bureau or Agency</td>
<td>Railway Network in Provinces</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nanchang Railway Bureau</td>
<td>Jiangxi, Hubei, Henan, Anhui, Fujian,</td>
</tr>
<tr>
<td>Nanning Railway Bureau</td>
<td>Nanning, Liuzhou, eastern Guangdong</td>
</tr>
<tr>
<td>Qinghai-Tibet Railway Group Co., Ltd.</td>
<td>Qinghai, Tibet, Sichuan</td>
</tr>
<tr>
<td>Shanghai Railway Bureau</td>
<td>Shanghai, Jiangsu, Anhui, Zhejiang, Henan</td>
</tr>
<tr>
<td>Shenyang Railway Bureau</td>
<td>Liaoning, Jilin, Jianzhou</td>
</tr>
<tr>
<td>Taiyuan Railway Bureau</td>
<td>Shanxi, Shandong, Henan</td>
</tr>
<tr>
<td>Wulumuqi Railway Bureau</td>
<td>Xinjiang, Gansu</td>
</tr>
<tr>
<td>Wuhan Railway Bureau</td>
<td>Hubei, Henan</td>
</tr>
<tr>
<td>Xi'an Railway Bureau</td>
<td>Shaanxi, Gansu, Sichuan, Chongqing, Ningxia, Hubei</td>
</tr>
<tr>
<td>Zhengzhou Railway Bureau</td>
<td>Hubei, Hebei, Shaanxi, Shandong</td>
</tr>
<tr>
<td>Nanchang Railway Bureau</td>
<td>Jiangxi, Hubei, Henan, Anhui, Fujian,</td>
</tr>
</tbody>
</table>
Ambitious Plans

- By the end of 2011, China will have about 8,100 miles of HSR (125 mph+)
- By end of 2015, plans are to have 16,000 miles of HSR – more than double the rest of the world combined¹.

¹ http://en.wikipedia.org/wiki/High-speed_rail_in_China
Ambitious Plans

• 1st HSR line was an improved conventional line between Guangzhou and Shenzhen in 1998 (125 mph, diesel powered)
• First all-new dedicated HSR completed in 2003
• Newest lines capable of 350 km/h (210 mph)
• In country manufacturing, using best of technologies from Siemens, Bombardier, Kawasaki (Japan).
Ambitious Plans

• Slab track on piers is preferred construction for 300 km/h + trains
• Ballasted concrete ties for lower HSR speeds.
• Train densities on some lines are on 15 minute headways
• Typical trains carry up to 1,000 people
• Beautiful, spacious stations (still, very crowded)
• Creating a culture that trains are the primary means of intercity travel
• Good local transportation service to/from stations
Deciphering Train Codes

• Every train has a code to indicate its type
  – K - Fast Express – up to 200m km/h (more stops)
  – T - Extra Fast Express
  – D - MU (Multiple Units) – up to 250 km/h (usually shorter trips)
  – N - Intra-Bureau Express similar to K (runs on one of
  – L - Temporary Slow Train
  – Z - Overnight Express
  – C - Intercity High Speed EMU (connects 2 major cities) up to 350 km/h
  – G - High Speed EMU – up to 350 km/h
  – number only - Inter-Bureau Service
Entrance to Beijing South Station
Inside Beijing South Station
Typical Security Screening
South Station Waiting Area
Some Things Haven’t Changed....

“Squatty Potty”
Looking Down on Train Platforms
Train Frequency, Little as 15 Minutes

Many signs in stations, on trains, and on the street are also in English. Most trainsets are bi-directional fixed consists of eight cars.
Typical Coach 3-2 Seating
Arriving at Tian Jin Station
Tian Jin Station
Railway Engineering Graduate Students at Northern Jiaotong University

- Lecturing to the students about the proposed Chicago – St. Louis study

- Students taking notes
A Visit to a Construction Site

- Piers for the elevated structure are driven as deep as 90 feet into the ground for stability.
- Bridge spans are poured in place and pre-stressed.
A Visit to a Construction Site

- Pre-cast beds to receive slab track panels are set in place and carefully aligned.
- Slab panels are then dropped in place by cranes.
A Visit to a Construction Site

- Catenary poles are laid adjacent to concrete fence posts
- Tools to precisely align track panels are set up
A Visit to a Construction Site

- Panels are jacked horizontally and vertically into perfect alignment

- A liquid mixture of sand, asphalt, cement, and water is poured into the voids under the panel for support and sound absorption
A Visit to a Construction Site

- Tie plates and rubber cushions are put in place, waiting for continuous welded rail

- Ministry of Rail officials inspect work progress
A Visit to a Track Panel Fabrication Factory

• View of pre-fab panel molds. Molds are kept clean with a light coating of oil.

• One of nine pre-fab plants in China.
A Visit to a Track Panel Fabrication Factory

- Rebars are tensioned prior to pouring of concrete.

- The bottom of each panel is smoothed by this machine after pouring.
A Visit to a Track Panel Fabrication Factory

- Panels are cured for about seven days, machined and equipped with hardware.
- Panels are moved outside and stacked for about a month before they are ready for installation.
General Observations

• Product quality appears impressively good
• Workers meticulous on precision, neatness, and cleanliness
• Crews are hard working and motivated
• Engineers have perfected design, but more engineering might reduce number of components and construction steps
• Too many people used, low productivity by US standards
• China is a quick learner from their mistakes
What I Learned From My Visit

HSR will likely never be built in the US:
• Without government (political) commitment
• Without public/private partnerships
• Without public education
• Without public support
• Without good local feeder transportation and parking
• Without a realistic, workable financing plan
• With endless studies and litigation by small interest groups
What I Learned From My Visit

• China has a “command” economy that gets things done compared to US ponderous approach of talk and study
• Political ideology, self-serving interests, flip-flopping government support, short term outlooks, aversion to change, and lobbying interests are severe handicaps to making HSR progress in the US
• While other countries do, we don’t
• Once you see and experience what others have done, you have a better appreciation of how HSR will work in the US
China’s Mistakes

• Perhaps too bold and aggressive
• Planning/studies not thorough or complete
• Alleged corruption in highest ranks
• Safety problems
• Over budget construction costs
• Technical problems (such as power supplies)

Will China learn from their mistakes?
YOU CAN COUNT ON IT!
The Convincing Case Requires that:

- Construction cost estimates are realistic
- Ridership, operating plan, financing plan, revenue estimates, operating cost estimates, and social/economic benefits are realistic, credible, and believable (the latter requires turning over more rocks – too many studies have not gone far enough)
- Safety and environmental benefits are quantified, realistic, and believable (safety benefits are often not touted enough)
- State and local government commitment exists
The Convincing Case

- Gets railroad, public, and industry support
- Convinces private industry to accept some of the risks
- Provides for appropriate means and/or investments required to move people from their origin point and final destination
- Makes creative use of idle capacity (night) and land rights and development opportunities
We need to make a better, more convincing case for HSR, and have a chance to do so in this IDOT study. Let’s get it right!