An Essay from Siemens Mobility
In Conjunction with *The Meeting of the Minds*
"Connecting the Dots" Conference
Omaha, Nebraska
June 16-18, 2010

High-Speed Trains Running on Freight Line Tracks: The Experience of Germany

Introduction

In January 2010, the U.S. federal government distributed $8 billion from the American Recovery and Reinvestment Act (ARRA) to state transportation departments as a down payment on the Obama Administration's vision to build a high-speed rail network connecting large urban areas across America. Another $2.5 billion was allocated from the fiscal 2010 budget for this initial work.

Although 13 projects in 31 states received stimulus money, the lion's share of the funds went to three main "corridors" in California, Florida and the Midwest. The plans in California and Florida call for systems that will operate at speeds from 150 mph to more than 200 mph, which is the category the Federal Railroad Administration defines as "Express High-Speed Rail." The world's leading high-speed networks in Europe and Asia travel at the upper end of these velocities.

Express high-speed rail requires, as per FRA, dedicated, stand-alone track and prohibits any crossings or cross-traffic. California and Florida, which have large expanses of open land, are the only states to have asked for funds to build new Express high-speed rail lines.

The Challenge in the Midwest

But the picture is more complicated in the Midwest, a region which for the purposes of the high-speed rail project comprises nine states with Chicago as the hub. The Midwest received the largest portion of the ARRA funds, about $2.6 billion. The larger proposals include $1.1 billion for Chicago-St. Louis; $810 million for Madison to Milwaukee; and $71 million for the Detroit to Chicago line.

The majority of that funding will be for track upgrades and improvements to signaling systems and rail automation, station construction, and safety systems. In terms of train speeds, the improvements to the Chicago to St. Louis line will enable the trains to run up to 110 mph, a speed that qualifies this route for the FRA's "Emerging high-speed rail" designation.

There is discussion in Illinois about creating a new high-speed system from Chicago to St. Louis that would run at the higher speeds, ie, Express high-speed rail, but that is a separate issue and at any rate would, most likely, come well after the other upgrades are completed.

But since the Midwest is the center of the U.S. freight rail industry -- and Chicago is its capital – whatever affects the passenger rail industry will have an impact on the freight industry and vice versa. In fact, most passenger traffic in the Midwest and elsewhere share the track with freight trains – about three-quarters of all Amtrak service runs on tracks shared by the freight rail industry. As Edward Hamberger, President of the American Railroad Association, said in congressional testimony in October 2009:

"That's why great care must be taken to ensure that there is enough capacity for current and future freight and passenger rail service, and that partnerships between host freight railroads and high-speed rail operators protect the business needs and address the responsibilities of both parties."

Moreover, the FRA has said that states in the Midwest considering using the ARRA funds to upgrade tracks and rail infrastructure must sign agreements with the respective freight railroads that own the lines.

In most countries with developed high-speed rail systems, such as Spain, Japan and France, the trains run on dedicated tracks and do not share with freight lines. But in Germany, which is densely populated and the EU's largest economy, freight trains have always shared track with their high speed and commuter / regional passenger rail counterparts. Similar to Chicago's role in the Midwest, Germany is also the freight hub of Central Europe, the transit point by rail for 341 billion tons of goods annually. Effective mixed use of freight and passenger tracks is therefore a serious economic necessity.

Is there anything that the Midwest, and the two high speed express corridors, could learn from the German experience of mixed-use of freight and passenger rail?

German Experience of Mixed-Use Rail for Freight and Passenger

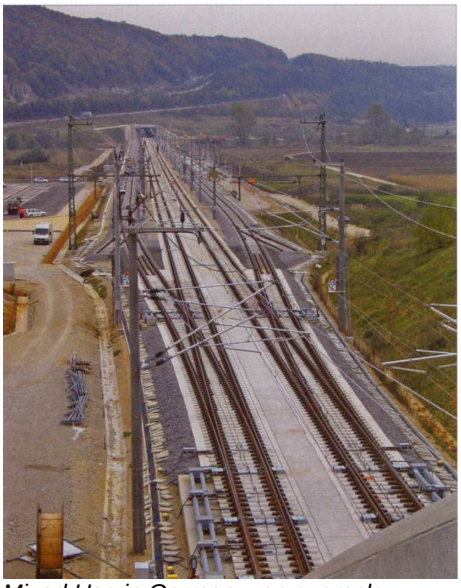
The German railway network can be characterized as dense and homogenous, with short distances between stops necessitating passing lanes for higher-speed passenger rail. The German high-speed track was adapted to the existing rail network from the start. So, freight and commuter trains travel on the high-speed tracks as well in Germany, with certain exceptions like the Frankfurt-Cologne high-speed line.

In Germany, most of the high-speed lines are used by four classes of trains.

- Two types of passenger trains that operate at speeds from 125 mph to 200 mph, including regional commuter trains and the high-speed ICE model.

- Two types of freight trains of varying weights with a minimum speed of 75 mph

In Germany, the freight trains move their cargo usually in the off-peak evening hours when passenger rail traffic is less dense. Daytime rail traffic in Germany is almost exclusively passenger trains. So, traditionally, passenger and freight trains are separated in Germany by scheduling.



Mixed Use in Germany, an example: Nuremberg-Ingolstadt passing station for freight and high-speed trains.

But freight and passenger also share tracks during peak periods and in heavy traffic areas. Moreover, regional and commuter trains also run on the high-speed lines. Improved, upgraded infrastructure and technology play important roles in helping passenger and freight rail share these tracks in Germany.

The roughly 160-mile Hamburg-Berlin line is a good example. This line connecting the international port city of Hamburg with the German capital runs 24/7 as a mixed use track, including freight and passenger. This feat is accomplished through three things.

First, major investments have been made to upgrade the overall transportation infrastructure in this corridor. Everything from the tracks and catenaries (overhead electric wires) to security systems on bridges and in tunnels have been made state-of-the-art. Curves have been straightened where necessary and passing loops installed.

The second area is rail automation. Operation control systems have been improved and automatic train control systems installed. Interlocking signaling systems, which allow trains to advance only when the track is clear and secure, have been upgraded. This

also enables mixed passenger modes to travel on the same lines, thus allowing commuter and high speed service to run parallel.

Third, computer models simulate the mixed traffic so that effective timetables can be designed and validated. Theory and practice come together here to create a realistic and efficient schedule.

It should be noted that the freight railroad industry in North America has often led the way on innovation, developing many of the technologies described above to deal with the issues of increasing traffic and service optimization on tracks shared by freight and passenger/commuter rail. But the U.S. freight industry is also looking at innovative operation control systems based on platforms deployed in German rail networks; systems that could be—and are starting to be—adapted to North American standards.

It should also be emphasized that the investment in this innovative technology not only serves to create an effective, efficient mixed used rail network in Germany, but makes it safe. Like in the U.S. and elsewhere, the top priority for the German freight and passenger rail industry is safety.

Conclusion

As the U.S. gears up to build its world-class high-speed rail system, operators will look beyond the country's borders for best practices.

Each region and corridor will have its own specifications and requirements. For the Midwest, a major priority will be ensuring that any future passenger rail system is compatible with, and acceptable to, the freight rail industry. In the high-speed express corridors, future demands of intermodal traffic on the high-speed lines will be a requirement and should be incorporated in the technology, safety standards and signaling systems right from the start.

The experience of mixed use rail in Germany could provide a starting point for the deliberations of those in the Midwest who are working hard to bring world-class passenger service to an area that already enjoys a world-class freight rail system.

For more information: www.usa.siemens.com/highspeedrail