

## F1-21

## Air and Rail Travel Time Comparison Considering the Linear Chuo Shinkansen Debut

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Abstract: In this report the travel time by aircraft and railroad from Tokyo to seven of the cities in western Japan will be compared. The comparison predicts travel times for after the opening of the Linear Chuo Shinkansen to Nagoya in 2027. The results predict that the railroad travel time will be shorter than that of aircraft between Tokyo and Okayama after the Linear Chuo Shinkansen opens to Nagoya, and the railroad travel time will be shorter between Tokyo and Hiroshima once it opens to Osaka in 2045.

## 1. Introduction

The Linear Chuo Shinkansen which will connect Shinagawa Station in Tokyo to Nagoya Station in Aichi Prefecture will start operation in 2027. The fastest train is predicted to be able to make the trip between stations in 40 minutes. The line will be extended to Osaka in 2045 to connect Osaka Tokyo via a 67-minute ride <sup>[1]</sup>. This report compares the intercity travel times of railroad and aircraft to examine which one is most advantageous. Three comparison modes were carried out for estimation of intercity travel time through the selected modes. The transportation modes to be compared are the Shinkansen, a combination of the Linear Chuo Shinkansen and other Shinkansen, and aircraft. By comparing these transportation modes, travel time between cities was predicted.

## 2. Methods

In this reseach, terminal points in each of the following seven cities were selected: Osaka, Kobe, Okayama, Hiroshima, Yamaguchi, Kitakyusyu, and Fukuoka. The starting point was Tokyo Station and the terminal points were the main stations nearest to the prefectural offices of each city. In the case of Kitakyusyu, the main station closest to the city hall was selected. The Nozomi was the assumed Shinkansen train for this research. The time required values used were from September 2013, and they were rounded from the average to the nearest 5 minute increment (See Table 1). A 15 minute transfer time from the Linear Chuo Shinkansen to the Shinkansen was assumed, and it was assumed that the Linear Chuo Shinkansen will be connected at Shin-Osaka Station in Osaka. The Linear Chuo Shinkansen required travel time used was 40 minutes between Shinagawa and Nagoya, and 75 minutes including the time for a stop at Nagoya between Shinagawa and Shin-Osaka. In the case aircraft transportation, the use of monorail to Haneda Airport was assumed. For boarding the aircraft, the time required was set at 30 minutes and more for boarding procedures and safety inspection. Flight times from flight schedules in September 2013 were rounded to the nearest 5 minute increment (See Table 2).

**Table 1.** The average Shinkansen travel time  
Estimated by the reference [2]

	Tokyo (Average)	Nagoya (Average)	Shin-Osaka (Average)
Shin-Osaka	2h35min (2h33min)	50min (52min)	-
Shin-Kobe	2h50min (2h49min)	1h10min (1h08min)	15min (15min)
Okayama	3h25min (3h23min)	1h40min (1h42min)	50min (49min)
Hiroshima	4h (4h01min)	2h20min (2h20min)	1h25min (1h27min)
Shin-Yamaguchi	4h25min (4h27min)	2h45min (2h46min)	1h55min (1h54min)
Kokura	4h50min (4h48min)	3h05min (3h07min)	2h15min (2h14min)
Hakata	5h05min (5h05min)	3h25min (3h24min)	2h30min (2h32min)

**Table 2.** The average aircraft travel time from Haneda Airport  
Estimated by the references [3], [4]

	ANA	JAL	Flight Time (Average)
Osaka (Itami)	67.3min	65.7min	65min (67min)
Osaka (Kobe)	71.7min	-	70min (72min)
Okayama	76min	75min	75min (76min)
Hiroshima	83.1min	80.6min	80min (82min)
Yamaguchi-Ube	100min	95min	100min (98min)
Kitakyusyu	100min	95min	100min (98min)
Fukuoka	107.2min	105min	105min (106min)

### 3. Results

Figure 1 shows travel time from Tokyo after the Linear Chuo Shinkansen opens to Nagoya. Use of the Linear Chuo Shinkansen is predicted to shorten the railroad time required to each destination by 20 to 25 minutes.

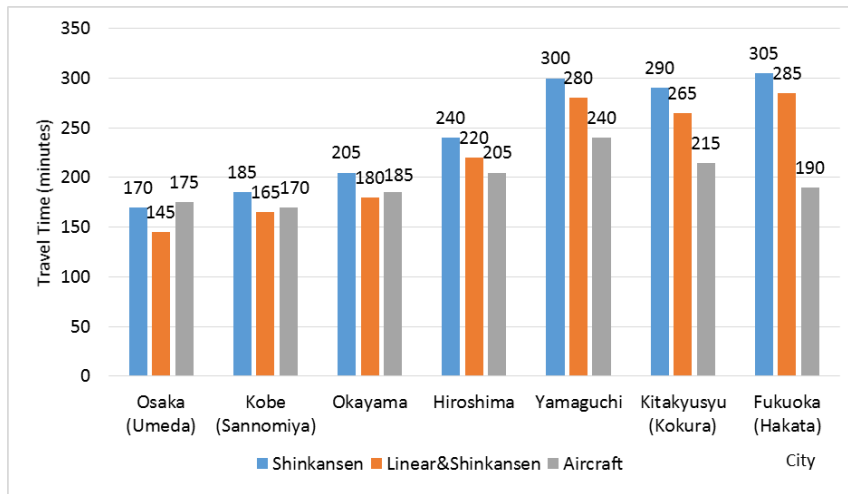


Figure 1. Comparison of the travel time after opened to Nagoya

Figure 2 shows the travel time from Tokyo to Osaka using the Linear Chuo Shinkansen. The Linear Chuo Shinkansen can shorten the travel time from that of the present Shinkansen by 35 to 50 minutes.

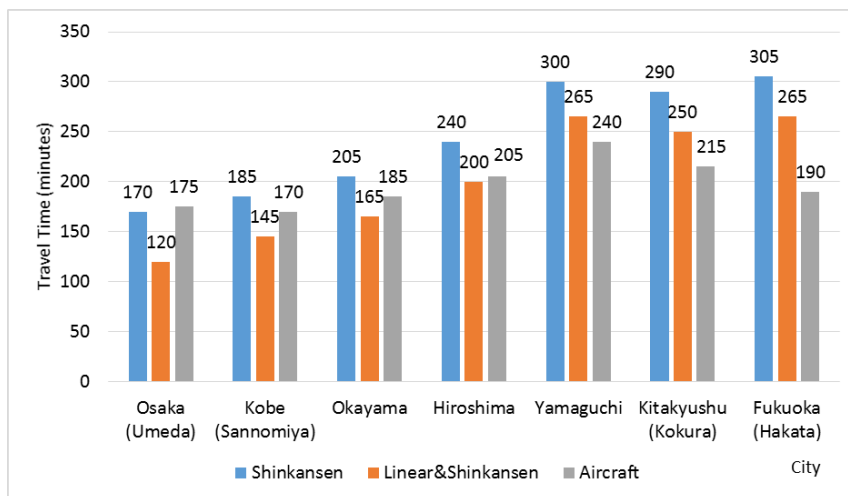


Figure 2. Comparison of the travel time after opened to Osaka

### 4. Conclusion

The results show that the travel time of the Linear Chuo Shinkansen will be shorter than that of aircraft between Tokyo and Okayama after the linear train opens to Nagoya. After is opens to Osaka, passengers between Tokyo and Hiroshima will be able to save time by using the railroad. The travel time of the Linear Chuo Shinkansen may attract passengers who currently use aircraft due to lower travel times which may benefit the railroads.

### 5. References

- [1] リニア中央新幹線建設促進期成同盟会 : <http://www.linear-chuo-shinkansen-cpf.gr.jp/jitugen.html>
- [2] JR 東海 : 東海道・山陽新幹線時刻表, <http://railway.jr-central.co.jp/jikoku/>
- [3] ANA : ANA GROUP FLIGHT SCHEDULE 2013 年 9 月 1 日~9 月 30 日.
- [4] JAL : JAL GROUP FLIGHT SCHEDULE 2013 年 9 月 1 日~10 月 26 日.