

# City Talk



The launch of Fujian, above, this month comes hot on the heels of Shandong, right, and Liaoning.



## CLOSING ON TAKE-OFF FOR NEWEST CARRIER

China's third aircraft carrier, Fujian, was launched from a Shanghai shipyard dock two weeks ago. This marks a major step forward for our mother country's naval fleet.

The carrier will still require at least a year of fitting out before it can be put into service. Some of its technical details are not likely to be disclosed, but from information in the media and websites we can expect it to carry a lot of state-of-the-art features.

At about 80,000 tonnes, Fujian will be the largest of a trio of aircraft carriers that is completed by Liaoning and Shandong.

The first carrier, Liaoning, was converted from a Russian/Ukrainian vessel, but the second, like this third one, is of indigenous Chinese design.

One of the most important features of a carrier is the ability to launch aircraft over a short distance. Land-based runways are at least 1,000 meters long to allow aircraft to run up to about 200 kilometers an hour to take off, but on a carrier, limited by its size, the runway can only be about 300 meters long.

A ski-slope-shaped runway is popular for carriers as it helps to launch the fighter planes. But fighter planes still need to accelerate at full force, supplemented by conventional mechanical catapults, to take off effectively.

Modern carriers use steam catapults for fast acceleration of fighter planes with larger carrying capacity to be used for powerful combat duties.

With nuclear-power vessels, steam for the propulsion system is bled to a receiver and stored. When in combat, this reservoir of steam charges up steam cylinders to power the pistons to catapult the airplane to accelerate to about 200 kmh in about two seconds to enable it to take off reliably with the short runway.

For carriers with conventional propulsion, steam in large quantities is not as readily available and hence it will limit take-off frequencies.

With advanced technology, an alter-



### Nuts and bolts

Edmund Leung

native electromagnetic catapult system can be used.

Apart from providing a much stronger catapult force than the steam system, the ability to repeat launching without needing time to recharge steam enables rapid consecutive take-offs.

They are also a lot simpler to build and to maintain, again enhancing reliability.

It is understood that Fujian will use this improved launching system.

Landing planes also require quick deceleration from flight.

They must allow a plane to touch down at high speed as, should the landing be aborted for all sorts of reasons, it must still possess enough momentum to take off again safely.

Arrestors are used for this purpose. Steel wires on the runway deck catch the tail hook on fighter planes and provide strong deceleration force with hydraulic dampers.

Another feature is the ability to store fixed-winged fighter planes in the hold to be lifted by elevators to the launch deck in quick succession. Again this will be much more powerful than using folded-wing fighter aircraft as this can significantly shorten launch time. Fujian is reportedly able to carry 60 fixed-wing fighter planes.

The size and shape of fighter planes for use in carriers are specially designed to withstand the high stress of the catapult force at take-off and arresting force at landing.

Engineers are capable of designing many different types of machines, for civil and military use. But the need for efficiency, safety and reliability remains vital for all purposes.

**Veteran engineer Edmund Leung Kwong-ho casts an expert eye over features of modern life**