China Aerospace

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EQUITY: TECHNOLOGY

Zhuque-3 completes China's 1st land recovery

Recovery is proven, reuse is not yet; scale benefit remains distant

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Two recovery routes; two supply chains; scale benefit remains distant

LandSpace (Unlisted) recovered the first stage of its Zhuque-3 reusable launch vehicle on 19 August 2026 (*China's first landing-leg recovery and its first land recovery of an orbital-class stage*). According to the company, Zhuque-3 is a new-generation reusable liquid oxygen/methane launch vehicle independently developed by LandSpace. Across overall vehicle design, the propulsion system, return control, stainless-steel airframe manufacturing and ground support, the program has established a technology framework purpose-built for reusable launch vehicles, according to management. **Our first read is that the two routes load different parts of the supply chain:** Sea-net recovery concentrates spend in marine assets: the recovery vessel, dynamic positioning and net gear (*Net catch: China's original route to rocket reuse* published on 10 July 2026). Landing legs keep it in the rocket, in landing mechanisms, buffering, terminal control and thermal protection. **Our second read is that first-stage recovery is the tractable half, and reuse economics are not.** Zhuque-3 flies 5-6tons against a 21.3tons nominal, a payload fraction below Falcon 9's above-4%. We estimate several years of payload-fraction gains and system iteration before economics close.

Comparison among Zhuque-3, Long March 10B, and SpaceX

Zhuque-3's route is the inexpensive one to replicate. It recovers on land, downrange, on legs, which keeps the recovery hardware, the inspection work and the refurbishment cost inside the vehicle; the ground-side requirement is a prepared landing area, not a capital asset. That scales with the number of pads rather than with a fleet, and we expect it to be the route other private operators follow. **Two costs come with Zhueque-3's route, beyond the dead weight of the legs themselves:** i) On ascent, an inland site must keep spent-stage drop zones clear of populated areas, which compresses the usable launch azimuths into a narrow window and pushes the vehicle off the energy-optimal trajectory; ii) On recovery, a ship repositions in real time, while a land pad cannot move and can only widen the cleared area to cover the same error. Zhuque-3 must, therefore, fly precisely to a fixed cleared coordinate rather than to the point that costs the least energy; this likely tightens usable trajectory design and lowers both mission range and payload, according to our industry survey.

Long March 10B takes the opposite trade. It replaces legs with hooks and catches the stage in a net on a purpose-built vessel, moving the burden onto CNY0.8-1.0bn of marine infrastructure plus roughly CNY5mn per mission of consumables. What that buys back is about 1ton of payload on a 500ton-class vehicle. Two consequences of this route: i) Offshore recovery adds 400-600km and one to two days of shipping before the stage reaches a workshop, which caps turnaround and therefore cadence; and ii) the error margin is asymmetric: a bad landing on a droneship is survivable, a bad landing into a CNY1bn net system is not.

Zhueque-3 already lands like Falcon 9; what it does not yet do is fly like Falcon 9. The gap is in the propulsion and the structure underneath it. Our industry survey shows that Chinese chamber pressures at around 10 MPa against 25 MPa for Merlin and above 30 MPa for Raptor, and SpaceX (SPCX US, Not rated) engine thrust-to-weight at about 240 against below 120 elsewhere. Higher chamber pressure and thrust-to-weight mean less engine mass and less structure carried for the same thrust, which is what lifts Falcon 9's payload fraction above 4% against 1.8-3% for the field. Our market survey indicates that this single ratio decides whether reuse is affordable. Recovery costs about 30% of the payload, which a 4% starting point can afford and a 2% starting point cannot.

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The same gap then shows up again in the cost per flight because the first stage is about 65% of what a rocket costs to build and that share falls only as the same booster flies again and again.

Fig. 1: Three architectures of rockets recovery

Variable	Zhuque-3 (LandSpace)	Long March 10B	Falcon 9 (SpaceX)
Where recovery cost sits	In the vehicle	In marine infrastructure	In the vehicle + droneship fleet
Ground/marine capex per site	Prepared landing area	CNY0.8-1.0bn (c.50% hull, c.50% net gear)	Droneship, cost not disclosed
Per-mission recovery cost	Not disclosed	c.CNY5mn consumables and replacement	Not disclosed
Payload effect of the mechanism	Legs are dead weight	c.1ton regained on a 500ton-class vehicle	Legs are dead weight
Turnaround constraint	Road move from an inland pad	400-600km, 1-2 days of shipping	Port return; high cadence achieved
Error tolerance	Vehicle-side failure damages the vehicle	Vehicle-side failure can destroy the platform	Deck explosions historically survivable
Replicable by private operators	Yes	No (on capex grounds)	Yes
Status at Aug 2026	Stage recovered 19 Aug 2026	Stage recovered 10 Jul 2026	97-98% recovery rate; max 33 reuses

Source: Company data, Nomura research

Fig. 2: Technology parameter comparison

Parameter	SpaceX	China / rest of world
Chamber pressure - Merlin	25 MPa	c.10 MPa for Chinese engines
Chamber pressure - Raptor	Above 30 MPa	n.a.
Engine thrust-to-weight	c.240	Below 120
Payload fraction (payload / liftoff mass)	4.2%	1.8-3%
Max reuses of a single booster	33	Zhuque-3: recovered once, not yet reflown
First-stage recovery success rate	97-98% (two notes differ)	n.a.
Cumulative recoveries	More than 500	2 (Long March-10B, Zhuque-3)
First / second stage cost split	65% / 35% (Falcon 9); 55% / 45% (Starship)	n.a.

Source: Company data, Nomura research

Three sources of the gap: pricing, technology, and order density

The economics gap has three sources: the price the US military is willing to pay, technology, scale (e.g. order density). The first source is the least replicable. Our industry survey indicates that SpaceX's launch-business' high margin is likely to attribute to the spread between an internal cost below USD40mn and external pricing of USD100-200mn on military and commercial contracts. Reliability verification and certification add cost on those missions, and at SpaceX's flight rate that increment cost is small.

The technology gap that bears on cost is not the same one that bears on payload. SpaceX does not pursue extreme reliability at the component level; **SpaceX engineers fault tolerance into the system, which lets industrial-grade parts and cheaper materials displace aerospace-grade equivalents across the supply chain.** It also standardises structure (e.g. a vehicle carries close to 20 sections with an interface frame at each end, so unifying the specification turns dozens of parts per rocket into a single batch-produced item). In addition, **SpaceX flew more than 160 missions in 2025 against 10-20 a decade earlier, moving from small-batch build to industrial production**, and vertical integration only amortises above roughly 100 flights a year. Chinese single-model cadence is 10-15 launches per year, and our industry survey shows that the threshold for scale effects is above 30. The binding difference is demand: Starlink and Starshield give SpaceX their own order book, while every Chinese flight has to be won in a tender and flown on the customer's schedule.

On the numbers, an expendable Falcon costs about USD67mn, while a mission flown on a booster with 30-plus flights comes in at USD34-37mn, roughly 40% of expendable, because the first stage is about 65% of vehicle cost and amortises to single-digit percentages. Zhuque-3 currently flies 5-6ton against a 21.3ton nominal, implying CNY28,000-30,000/kg, which sits above overseas expendable pricing. The timing gap is wider than the technology gap alone would suggest. SpaceX first recovered a stage in 2015 and did not reach reliable high-frequency reuse until after 2020; LandSpace recovered its first stage in 2026, and assuming the same five-year path would reach that point around 2031. Our industry survey is slightly more optimistic — one to two years to build reuse release criteria, three to four to close unit economics, batch reuse and CNY8,000-10,000/kg in 2029-31E — based on that a follower need not re-explore the route.

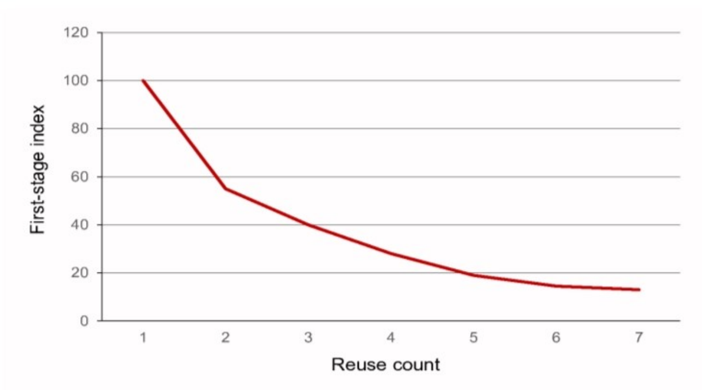
Fig. 3: First-stage amortisation curve

Expendable vehicle cost (USDmn)	67.0	a	
First stage share of vehicle cost	65.0%	b	
Refurbishment per flight, % of first-stage cost	10.0%	c	
First-stage cost (USDmn)	43.6	d	d = a x b
Second stage and other (USDmn)	23.5	e	e = a - d

Reuse count	First-stage cost per mission (USDmn)	Total cost per mission (USDmn)	% of expendable	First-stage index (expendable=100)
f	g = (d + (f - 1) x d x c) / f	k = e + g	h = k / a	i = g / d x 100
1	43.6	67.0	100.0%	100.0
2	24.0	47.4	70.8%	55.0
3	17.4	40.9	61.0%	40.0
5	12.2	35.6	53.2%	28.0
10	8.3	31.7	47.4%	19.0
20	6.3	29.8	44.4%	14.5
30	5.7	29.1	43.5%	13.0

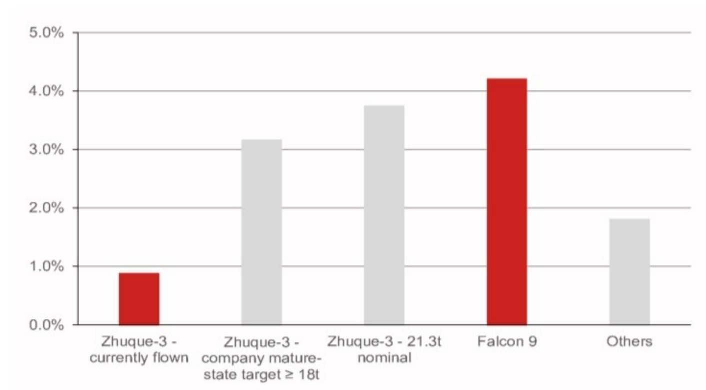
Source: Company data, Nomura research

Fig. 4: First-stage amortisation curve



Source: Company data, Nomura research

Fig. 5: Payload fraction comparison



Source: Company data, Nomura research

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