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# SpaceX's explosive start

On paper, Elon Musk's audacious start-up should never have succeeded. It very nearly didn't, as **Paul Marks** discovers in the story of SpaceX's early days



**Book**

**Liftoff: Elon Musk and the desperate early days that launched SpaceX**

Eric Berger

William Collins

IN THE autumn of 2008, a Falcon 1 rocket built by a maverick start-up called SpaceX lifted off from Kwajalein Atoll in the North Pacific Ocean and made it all the way to Earth orbit. After three earlier attempts had failed, it meant Elon Musk's 6-year-old firm suddenly moved from being a mere wannabe to a space-flight player to be reckoned with.

But it had been a close run thing. In *Lift Off*, Eric Berger's compelling history of SpaceX's early days, we discover what few knew at the time: if that fourth flight of the Falcon 1 had also failed, the company could easily have gone bust.

It was vital that the rocket reached orbit because it was powered by SpaceX's home-grown, ultra-efficient kerosene/oxygen Merlin rocket motor. Nine of these would be needed for the much larger rocket that cash-rich clients like NASA wanted to use to send cargo to the International Space Station (ISS) – and, later, crewed missions. If Falcon 1 hadn't shown that the motor could power a rocket to orbit, there might not have been a Falcon 9, the rocket that has become the backbone of SpaceX's business.

Berger chronicles the amazing human and technological struggles that led to the success of the launch. To be convincing, he needed unprecedented access to Musk and, perhaps more crucially, to the key propulsion, avionics, structural and launch engineers behind Falcon 1.



SPACEFLIGHT/SHUTTERSTOCK



DCPHOTO/ALAMY

**SpaceX's Starship rocket exploding (top) and Crew Dragon in space (bottom)**

After tracking them all down, Berger captured their entertaining warts-and-all stories of potentially avoidable foul-ups, the details of which make this book an essential, unofficial reference text for what to do (and not do) as space flight goes commercial.

What drives SpaceX, Berger writes, is Musk's relentless quest to get humans to Mars as soon as possible. That means two things: a laser-like focus on hiring the

smartest engineers, and adopting ultra-fast engineering techniques.

Musk comes across as a fiercely demanding boss, and the lengths he goes to hand-pick talent are revealing. On one occasion, he called Google co-founder Larry Page to ask if a senior Google staffer could work from a Los Angeles office instead of a Silicon Valley one so that the staffer's spouse could work for SpaceX. Page agreed. When an academic found that five of his 10 students had gone to work at SpaceX, Musk is said to have got in touch – not to explain, but to find out where the other five went.

Engineering rockets faster, however, means eschewing traditional aerospace processes in which design engineers can spend careers “creating stacks of paperwork without ever touching hardware”, says Berger. Musk's approach involves testing systems

**“At the time of writing, three prototypes of the firm's Starship Mars rocket have exploded spectacularly”**

early, designing out flaws so each version becomes more reliable.

It also means not being afraid to fail – and fail SpaceX has. From running out of liquid oxygen on the launchpad – which boiled off, as it took too long to fix software-related shutdown bugs on the launchpad – to fuel lines leaking due to salt corrosion in the tropical air of Kwajalein, the company has experienced a litany of errors.

But SpaceX has gone on to shake up the industry by cutting the cost of launching satellites threefold, developing a staggering ability to land rocket stages that its competitors still ditch, as well as flying astronauts to the ISS from US soil on its Crew Dragon for the first time since the space shuttle retired.

The firm's army of online fans seems to be getting used to its “go fast, break things and fix them” process. Attempts to land Falcon 9 rocket stages failed many times before success dawned. At the time of writing, three prototypes of the firm's Starship moon and Mars rocket have exploded spectacularly. All of which makes it a particularly good time to publish *Liftoff*, the fascinating backstory of why SpaceX does it this way. ■

Paul Marks is a London-based writer specialising in space and technology