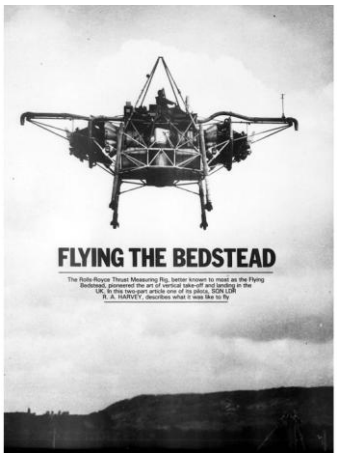
Comparative Evidence for XJ314 and Roadster Rocket

The early XJ314, the Tesla demonstrations and the local DEV25 series have different evidence. The XJ314 record supports the historical context, the reconstructed geometry and the reproducibility of its reference calculations. Tesla footage establishes visible events and frame-based bounds. DEV25 describes the behaviour of its own digital model.



Early Hucknall rig. Photograph 6-1 [S01].



R11 on first open. Native CAD view [S04, S16].

What the Evidence Supports

Object	Evidence supported	Boundary
XJ314	Early rig history, R10 and the R11 baseline. CAD reopened and subsystem calculations reproduced.	Synchronous telemetry of the early rig and final R11 acceptance remain open.
Tesla Rocket	Ramp support phase and visible airborne phases in Ramp, Kickflip and Encore.	Clip timestamps, obscured events and an unknown physical time scale.
Roadster DEV25	Coupled B2 results and isolated mechanical trials.	Main 5 m series at 0/4. A continuous accepted B2 stop remains open.

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Vehicle Profiles and Technologies

Photograph 6-1 establishes the outline of the early Hucknall rig. ARC R&M 3336 dates its first gantry flight to 19 August 1953 and its first free flight to 3 August 1954. The date of photograph 6-1 remains open. After transfer and modification, the RAE test programme began in March 1955. It examined stability and the effect of artificial stabilisation in hover and low-speed flight. [S01–S03, S22]

Feature	Early XJ314 and R11 CAD	Tesla Rocket and Roadster model
Purpose	Research rig for direct vertical jet lift.	Rocket is a demonstration car. DEV25 belongs to the local R5/C6I project.
Lift and control	Two Rolls-Royce Nene engines produce lift by exhausting downward. Bleed air feeds control jets. The rig carried a pilot and was used to study stabilisation.	Ramp uses external support. Tesla describes fan downforce, vessels and nozzles. The moments and exact configuration of each run remain open.
End support	The rig had landing gear. Photograph 6-1 covers an airborne instant.	The clips show ground roll. DEV25 models contact, wheel reactions and suspension.
CAD scope	R10/R11 reconstructs the early layout. The modern calculated valves and Nene colours belong to the digital edition.	Tesla footage and local R5/C6I components have separate provenance and conditions.

How the Method Transfers

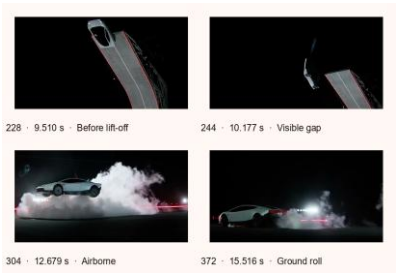
Record each vehicle’s coordinate system, initial support, sources of forces and moments, mass state, first contact and completion criteria. Link the frame, source, revision and operating condition, then reproduce the calculation with the same setup. [S03, S06, S12, S21]

LLTV R4D.1 gives a worked example of a simulated trace with lift-off, translation, contact and settling. Its modelled interval from lift-off to contact is 31.741 s over a 43 s simulation, under the LLTV configuration. [S15]

Frames from the Tesla Demonstrations

The four markers in each clip are the last selected pre-release frame, the first visible gap, the last confidently airborne frame and the first selected ground-roll frame. The lower bound is $t_2 - t_1$ and the upper bound is $t_3 - t_0$. Presentation timestamps (PTS) use ticks of 1/24,000 s at 24,000/1001 frames/s. [S07]

Clip	Frame numbers and PTS in seconds	PTS bounds, s
Ramp	228 / 244 / 304 / 372 9.510 / 10.177 / 12.679 / 15.516	2.503–6.006
Kickflip	769 / 771 / 840 / 901 32.074 / 32.157 / 35.035 / 37.579	2.878–5.506
Encore	12 / 17 / 78 / 150 0.501 / 0.709 / 3.253 / 6.256	2.544–5.756



Ramp [S18]



Kickflip [S19]



Encore [S20]

Frame panels show the marked events. The table and machine-readable ledger retain the exact markers. [S07, S18–S20]

Visible Phases and Timing Limits

Ramp includes an inverted phase supported by the ramp, followed by separation. The Kickflip side view shows inversion in flight above a row of cars. Encore shows brief lift-off from the pad and rotation. First contact is obscured in all three clips. Ground roll supplies the upper marker. Editing and playback rate limit conversion from PTS to physical time. [S07, S08]

Official clips Ramp · Kickflip · Encore

Reproducing the CAD and Calculations

XJ314 R10 and the R11 Baseline

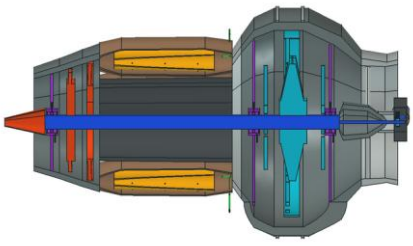
The R11 baseline FCStd matches the sealed R10 SHA-256. A fresh R3/R3A/R9 build reproduced 542 tree objects, 490 physical objects and 683 solids. All 491 BRep entries matched. The AP214 STEP reimport confirmed parts and colours. The audit of 119,805 pairs recorded zero overlaps above 0.05 mm³. Final R11 requires its own receipt and a coloured AP242 export. [S03, S04, S06, S23, S24]

R10 check in P1	Reproduced result
Sensitivity grids	864 cases across two grids and 81 clearance combinations. All 147,518 values matched. 144 fields differ only in numeric text format.
0.1 g/s leak reference	128/432 original and 114/432 alternative cases exceed the reference. Nominal leakage is 0.00074293 g/s.
F/R failure, 250 ms, 32 cells	First seat contact 24.084629 ms, reverse mass 5.136507 g and minimum manifold pressure 331.693855 kPa absolute.

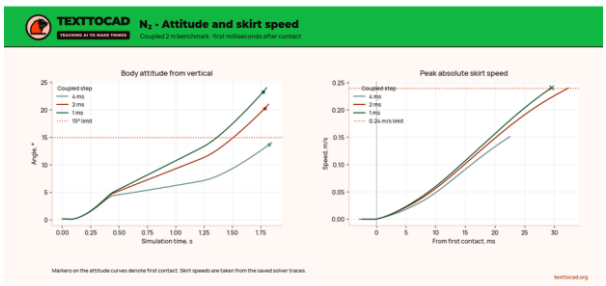
These figures describe the reference R10 gas-flow model. A changed R11, transient heating, additional scenarios and measurements require separate acceptance. [S05, S06, S25, S28]

Local Roadster DEV25

The coupled B2 rerun reached a centre-of-mass rise of 2.26808 m. First contact occurred at 1.770 s with a tilt of 23.26°. The trace extends 29.5 ms after contact, when the skirt-rate limit stopped the run. Four of five separately prescribed mechanical states passed a simulated 0.5 s dwell. The 5 m series remains at 0/4, and B2 stop acceptance is open. [S10–S13, S26]



R10 forward engine section [S17].



Pre-contact tilt in local DEV25 [S30].

The 250 ms window belongs to the XJ314 subsystem failure model. PTS belongs to the Tesla clips. The B2 times belong to the DEV25 integrator.

Mass Fuel and Energy

Configuration	Source evidence	Open boundaries
Early XJ314	Two Nene engines and fuel tanks in the TMR architecture. Photograph 6-1 fixes the appearance.	Weight sheet, fill state, fuel mass and use for the 6-1 event. Cycle time and ground servicing energy.
Public Tesla Rocket	Tesla reported about 600 L in two vessels and about 250 kg of gas. The event used the word air, and the interview used nitrogen.	Gas composition and mass discharged per clip. Initial and final p/T, compressor work, battery energy, losses and metered refill.
Local R5/C6I	3,311.928 kg before gas, 3,547.198 kg at the start of the AIR calculation. Replenishment to the initial vessel state requires 100.690 kg.	Full contact, dwell and replenishment cycle. Station performance and metered electricity.
LLTV R4D.1	Virtual mission from 1,768.071 to 1,657.880 kg. Uses 9.384 kg of JP and 100.807 kg of H_2O_2.	Fuel use for a particular historical flight requires its own primary record.

Energy Accounting Boundary

The local nominal AIR model gives 13.386 kWh of reversible work to replenish the vessels and 100.594 kg discharged across the model boundary. The difference from the 100.690 kg vessel replenishment includes redistribution in the lines. A full-cycle comparison needs a common boundary for metered electricity, gas and battery states before and after, compression, cooling and between-run preparation. Liquid-fuel energy and reversible gas work each retain their own units and conditions. [S02, S08, S09, S14, S15]

Evidence Still Needed

The early XJ314 needs a dated weight sheet, a tank inventory and installation records for the F/R Nene engines. A continuous 6-DOF reconstruction needs synchronised position, attitude, forces, commands, vehicle states and contact events. For Tesla, link the footage to the original clock and manoeuvre telemetry. DEV25 needs support maps and a continuous trace through the accepted stop. [S03, S06–S12, S22]

Sources and Verification

The ledger records each claim, status, scope, locator, exact path and SHA-256. The available Ramp MP4 was checked by hash. For Kickflip and Encore, the ledger retains the video identifier, the hash recorded in the marker file and local frame panels. [S07, S18–S20, S27]

Source IDs	Documents and locators
S01–S03, S22	Photograph 6-1, ARC R&M 3336 §§1–4 and figs. 1–4, XJ314 R11 baseline and evidence registry.
S04, S16–S17, S23–S24	FreeCAD run 20261121_p0_02, first-open image, overlap audit and sealed R10 manifest.
S05, S25, S28	Run 20261121_r10_replay_01, comparison.json, inputs.json and the R10 replay report.
S07–S08, S18–S20, S27	tesla_frame_marks.json, primary-source card, local frame panels and original Ramp clip.
S09–S15, S26, S30	R5/C6I matrix, DEV25 run, stop receipt and manifest, mass interface, 5 m acceptance and LLTV R4D.1.
S06, S21	Final R11 criteria and the LLTV/Roadster comparison methodology.

Four Steps for Rechecking

1. Check the SHA-256 of the source, CAD, scripts and inputs. Record the variant, units and operating condition.

2. Use a single shot, verify the frame indices and PTS of the four markers and calculate the segment bounds. Keep any obscured event as an interval.

3. Open the final FCStd in a fresh process and capture the initial view before changing the camera. Check the BRep and export. For calculations, compare matching inputs and outputs after refinement.

4. Test contact, reactions, attitude, speeds and uninterrupted dwell against the criteria for that series. Record open fields and why they matter.

The acceptance matrix tracks the final R11 release. Each numerical result here retains its source and scope.