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00:00:01,450 --> 00:00:04,000

Narrator: NASA's space shuttles are some of the most high-tech and

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00:00:04,000 --> 00:00:08,200

complex vehicles ever built, but they couldn't fly without the help

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00:00:08,200 --> 00:00:13,210

of a much older technology: the railroad.

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00:00:13,210 --> 00:00:19,000

This is no ordinary train -- it's the NASA Railroad at Kennedy Space Center in Florida.

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00:00:19,000 --> 00:00:23,340

It carries extremely dangerous freight... one of national importance.

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00:00:23,340 --> 00:00:24,850

Chris Bryant, URS Locomotive Engineer/Mechanic: "It's not something to just kind of

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00:00:24,850 --> 00:00:26,200

sneeze about, you know.

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00:00:26,200 --> 00:00:30,210

When we're hauling in, we're hauling four to five million pounds of explosives."

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00:00:30,210 --> 00:00:34,280

Narrator: One shuttle solid rocket booster contains four motor segments packed

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00:00:34,280 --> 00:00:37,710

with a hard, rubbery, volatile solid propellant.

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00:00:37,710 --> 00:00:42,100

Every space shuttle launches with two boosters, which give the vehicle the extra thrust it

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00:00:42,100 --> 00:00:45,380

needs during the first two minutes of the climb to orbit.

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00:00:45,380 --> 00:00:49,470

The large, heavy motor segments have to take a week-long, cross-country train ride

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00:00:49,470 --> 00:00:55,980

from the ATK manufacturing plant in Utah to NASA's Kennedy Space Center in Florida.

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00:00:55,980 --> 00:00:57,870

Dave Hoffman, Former NASA Railroad Manager: "And shuttle of course,

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00:00:57,870 --> 00:01:02,450

with the segments, it is absolutely essential, because you're looking at an average

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00:01:02,450 --> 00:01:06,700

of approximately 150 tons per segment, and, with eight of them for launch,

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00:01:06,700 --> 00:01:10,940

there really isn't any other, better way to get them here from Utah.

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00:01:10,940 --> 00:01:13,970

It's just an essential lifeline, is what it boils down to."

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00:01:13,970 --> 00:01:19,200

Narrator: Today this important, but hazardous, job is handled by URS Corporation

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00:01:19,200 --> 00:01:22,320

engineers and mechanics in the railroad shop.

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00:01:22,320 --> 00:01:27,220

The 11-member team takes care of all the rolling stock and the track system -- including

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00:01:27,220 --> 00:01:32,600

electrical work, mechanics, painting, welding and even fabrication.

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00:01:32,600 --> 00:01:37,210

That expertise is essential when it comes to handling the solid rocket booster segments,

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00:01:37,210 --> 00:01:42,220

which travel to Kennedy on cradles inside custom-built railcars.

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00:01:42,220 --> 00:01:45,380

During the trip to Florida, the segments are handed off

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00:01:45,380 --> 00:01:48,920

from rail company to rail company, with the final handoff at

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00:01:48,920 --> 00:01:53,910

NASA's Jay Jay Railroad Yard north of Titusville, Florida.

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00:01:53,910 --> 00:01:57,760

The Florida East Coast Railway, or FEC, delivers the segments to

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00:01:57,760 --> 00:02:02,120

Jay Jay, and that's when Kennedy's railroad team takes charge.

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00:02:02,120 --> 00:02:08,170

After a thorough inspection, empty "spacer" cars are added to prepare the train for the trip

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00:02:08,170 --> 00:02:10,540

across the Indian River to Kennedy.

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00:02:10,540 --> 00:02:12,640

Will Eriksen, URS Mechanic: "The main purpose for us is to distribute the weight

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00:02:12,640 --> 00:02:18,080

on our bridge coming across the Indian River. If you have all the heavy cars tied together,

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00:02:18,080 --> 00:02:23,560

that puts a strain on the bridge. So, try and separate the weight."

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00:02:23,560 --> 00:02:28,320

Narrator: The Kennedy rails can handle speeds of up to 60 miles an hour,

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00:02:28,320 --> 00:02:31,080

just like FEC's mainline track.

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00:02:31,080 --> 00:02:37,320

But because of the heavy and volatile cargo, the top speed here is only 25 miles an hour,

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00:02:37,320 --> 00:02:40,510
and the trains typically move slower than that.

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00:02:40,510 --> 00:02:49,680
All the work is done by a 1,500-horsepower locomotive known as the EMD SW-1500.

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00:02:49,680 --> 00:02:52,970
NASA has three of these workhorses.

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00:02:52,970 --> 00:02:58,330
They were built by General Motors between 1968 and 1970, and put to work

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00:02:58,330 --> 00:03:03,430
for the space agency when shuttle loads demanded a lot more horsepower.

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00:03:03,430 --> 00:03:08,060
Bryant: "They do have a lot of backbone. And again, when we bring in the segments

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00:03:08,060 --> 00:03:13,250
and the spacer cars, we've got probably close to four-and-a-half to five million pounds

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00:03:13,250 --> 00:03:19,050
that we pull with the one motor."

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00:03:19,050 --> 00:03:23,090
Narrator: Once the train arrives north of the space center, the spacer cars are removed

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00:03:23,090 --> 00:03:25,500
and taken back to the rail yard.

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00:03:25,500 --> 00:03:29,750
The booster cars are kept at Suspect Siding, an isolated staging area

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00:03:29,750 --> 00:03:34,760
near the shuttle runway, until they go to the Rotation, Processing and Surge Facility

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00:03:34,760 --> 00:03:38,070
to start final launch preparations.

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00:03:38,070 --> 00:03:42,600
When the boosters are recovered after launch, the same team loads up the spent segments

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00:03:42,600 --> 00:03:45,110
and sends them back to Utah.

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00:03:45,110 --> 00:03:49,960
Mike Stephens, URS Lead Mechanic: "We've got a great track record.

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00:03:49,960 --> 00:03:55,950
It's basically a pretty simple process. All the way from Utah, all the way to here,

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00:03:55,950 --> 00:04:01,130
to getting it on the launch pad. And the system has worked great."

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00:04:01,130 --> 00:04:06,180
Narrator: Kennedy's rail system was activated in 1963 to bring in construction materials

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00:04:06,180 --> 00:04:11,350
for the growing space center, as new facilities were built for the Apollo Program.

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00:04:11,350 --> 00:04:16,640
But throughout the years, the Florida climate took its toll -- and hauling shuttle segments

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00:04:16,640 --> 00:04:20,140
presented unique challenges of their own.

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00:04:20,140 --> 00:04:25,680
Hoffman: "Well, fast forward 20 years, and the Space Shuttle Program was starting.

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00:04:25,680 --> 00:04:32,730
We were looking at freight cars that were somewhat longer, and a lot heavier, and had a

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00:04:32,730 --> 00:04:34,830

higher center of gravity as well."

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00:04:34,830 --> 00:04:40,160

Narrator: FEC was paid to upgrade the aging system with heavier rail, welded joints

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00:04:40,160 --> 00:04:42,660

and concrete crossties.

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00:04:42,660 --> 00:04:46,830

Along with rolling stock standards, like hopper cars and gondola cars,

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00:04:46,830 --> 00:04:51,900

Kennedy also has some cars that were modified or even designed here.

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00:04:51,900 --> 00:04:56,090

In fact, Hoffman himself designed the "booster structures" car.

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00:04:56,090 --> 00:05:00,600

Hoffman: "These are custom-built cars. It's a concept I came up with to improve

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00:05:00,600 --> 00:05:06,410

on the delivery, or the movement, of the solid rocket booster aft skirts,

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00:05:06,410 --> 00:05:08,830

the forward skirts and the frustums."

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00:05:08,830 --> 00:05:11,700

Narrator: Many other commodities have traveled these rails,

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00:05:11,700 --> 00:05:16,290

such as nitrogen tetroxide rocket propellant... Air Force Titan rockets...

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00:05:16,290 --> 00:05:20,390

Navy Trident missiles... and the shuttle-derived booster segments

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00:05:20,390 --> 00:05:22,770

for the Ares I-X test flight.

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00:05:22,770 --> 00:05:26,760

Stephens: "It's not just moving segments. We've done so much more.

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00:05:26,760 --> 00:05:32,550

We've rebuilt the Air Force locomotives. We've built rail cars. We've done painting.

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00:05:32,550 --> 00:05:35,490

I mean, this locomotive here, you can see how much better it looks

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00:05:35,490 --> 00:05:40,220

than the other two and everything. So we're a pretty diverse group and we stay busy."

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00:05:40,220 --> 00:05:45,920

Narrator: The result is a vital and successful rail line that has stood the test of time.

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00:05:45,920 --> 00:05:52,870

In May 2010, the last load of shuttle solid rocket booster segments came to Kennedy.

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00:05:52,870 --> 00:05:57,770

Bryant: "For the most part, it's kind of like any other railroad, so to speak.

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00:05:57,770 --> 00:06:03,850

We don't run the speeds. But the things that we do and have to do when we're loading and

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00:06:03,850 --> 00:06:09,790

unloading demands your attention, demands respect."

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00:06:09,790 --> 00:06:13,460

Narrator: The NASA Railroad at Kennedy Space Center has played a quiet but critical