

Innovation Allowing More Paving Time....and less of everything else



Canadian Airfield Pavement Technical Group (CAPTG) Workshop

Presented by

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President

Guntert & Zimmerman

Highway & Airport
Paving Equipment

Concrete Batching
& Mixing Plants

Canal Construction
Equipment

Trenching
Equipment

Introduction

How to be Successful at Concrete Paving Today You Must...

- Get it Smooth the First Time
- Get in, Get Out and Stay Out!
- Eliminate the Constraints in the Paving Operation that Get in the Way of Paving!
- Select the Right Equipment that Helps Eliminate Constraints



Introduction

On a typical cut up concrete paving project, there can **more** time spent on...

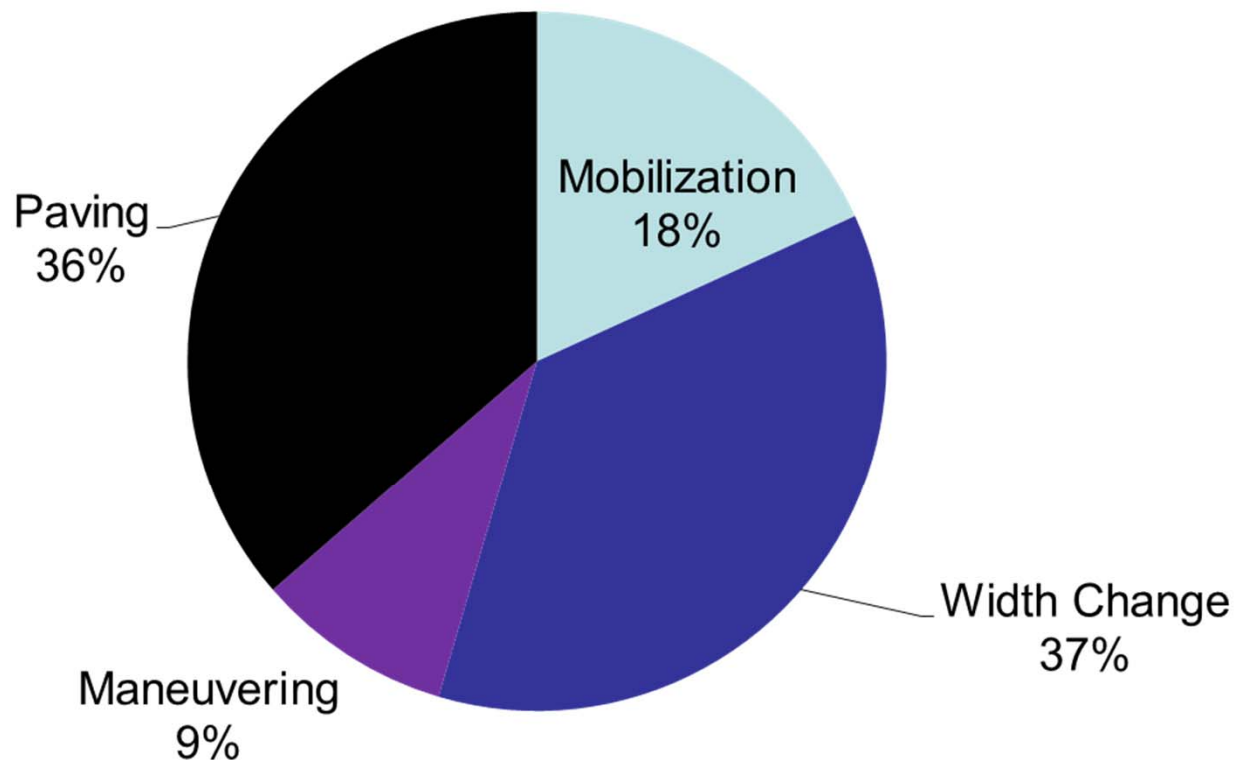
- **Width Change**
- **Maneuvering** - walking around the site and
- **Mobilization** - loading preparation, loading and unloading, transport **than actual paving!**

Recent innovations have focused on dramatically reducing the time required for activities other than paving!

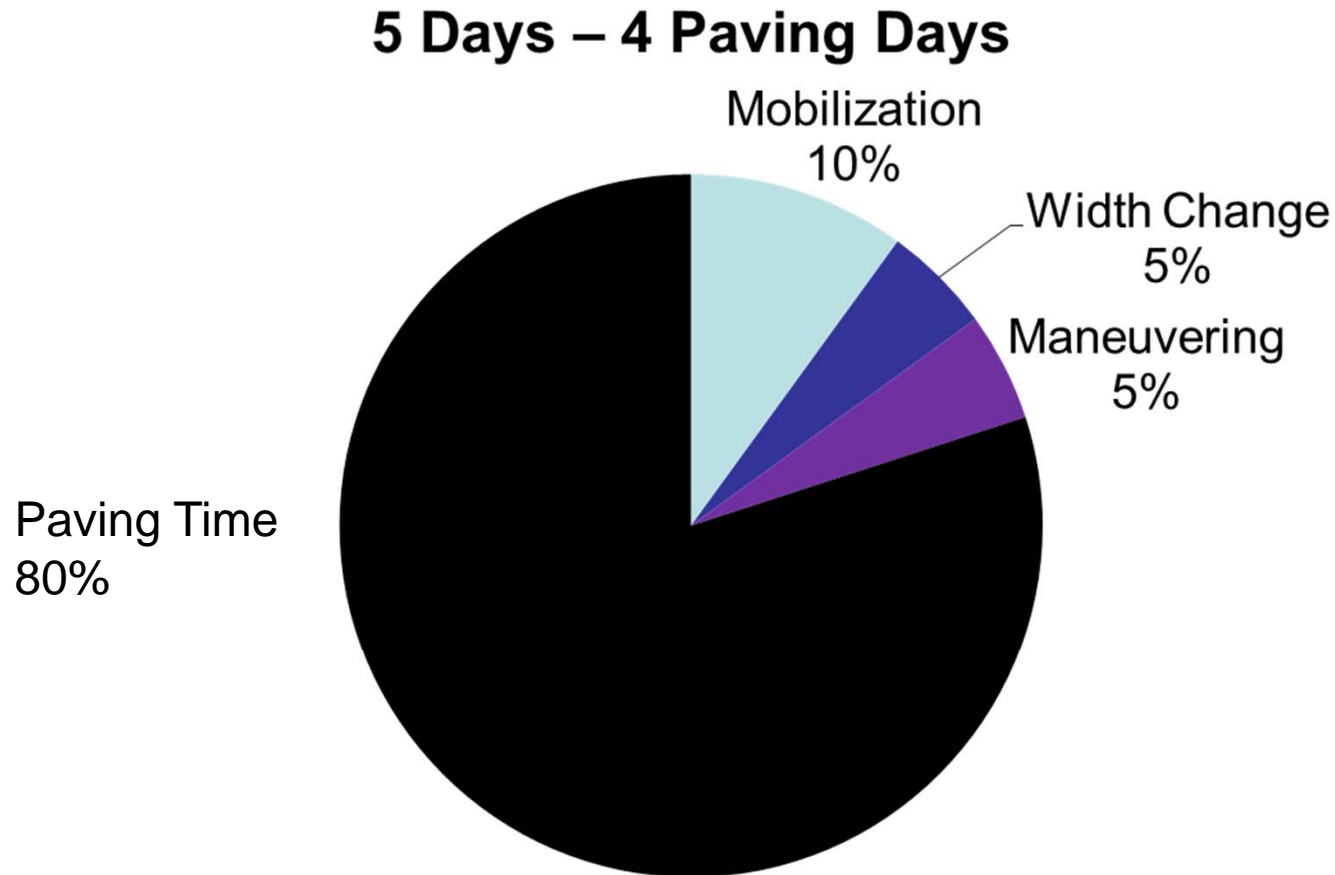


Days Consumed in a Small Project with Two Width Changes

11 Days – 4 Paving Days



By Eliminating or Reducing Constraints We Get to the Finish Line Faster!



What Are The Major Constraints in Concrete Paving

Machine Constraints

- Dual Stringline
- Machine Profile
- Machine Width Change
- Machine Maneuvering
- Machine Mobilization
- Machine Availability

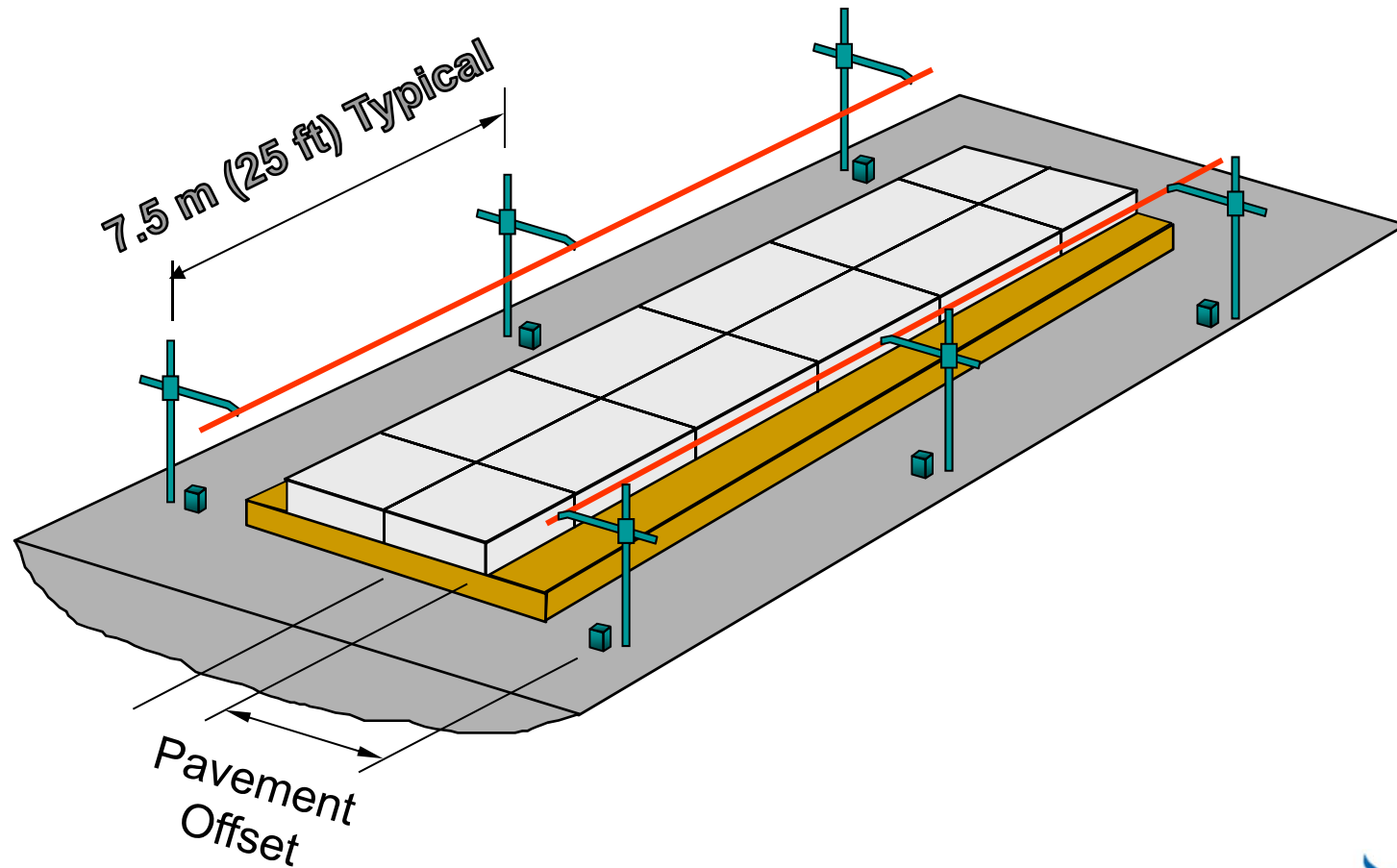
Other Paving Constraints

- Concrete Mix Design, Uniformity & Strength Gain
- Concrete Surface and Edge Finishing
- Concrete Plant Output & Delivery / Access
- Sawing & Sealing Operation
- Corrective Action



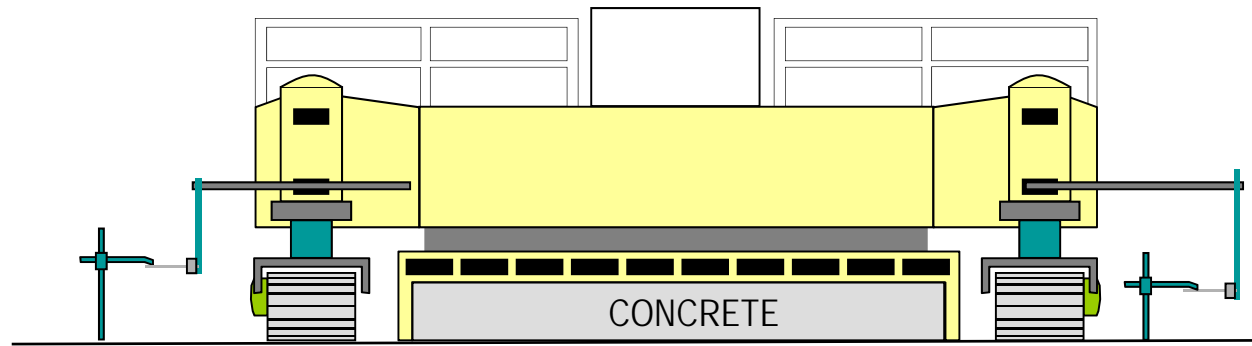
Dual Stringline Constraints

Pavement Offset of between 1.2 to 1.5m Required on Each Side



Stringline Constraints

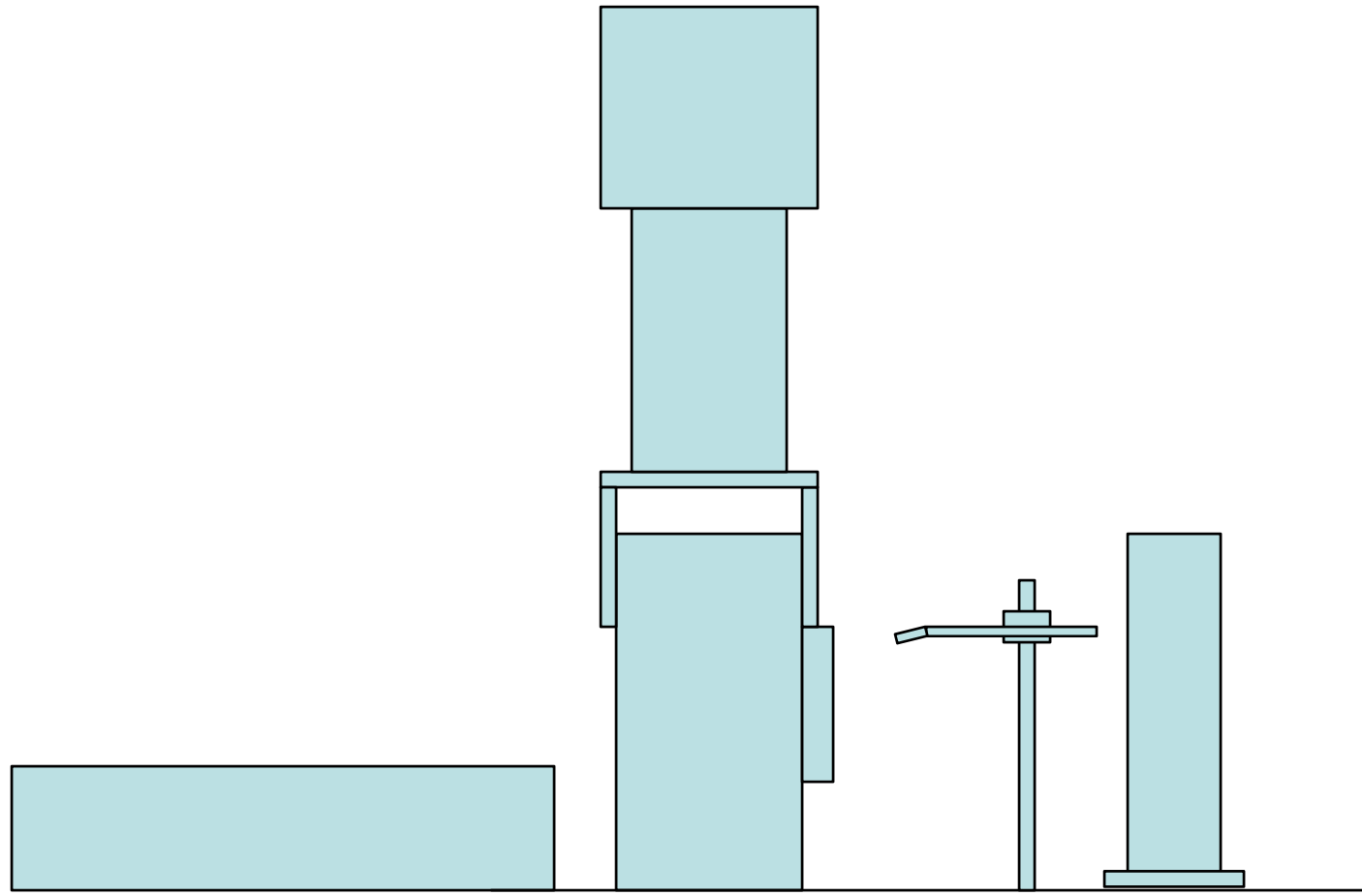
Physical Constraints to Paving



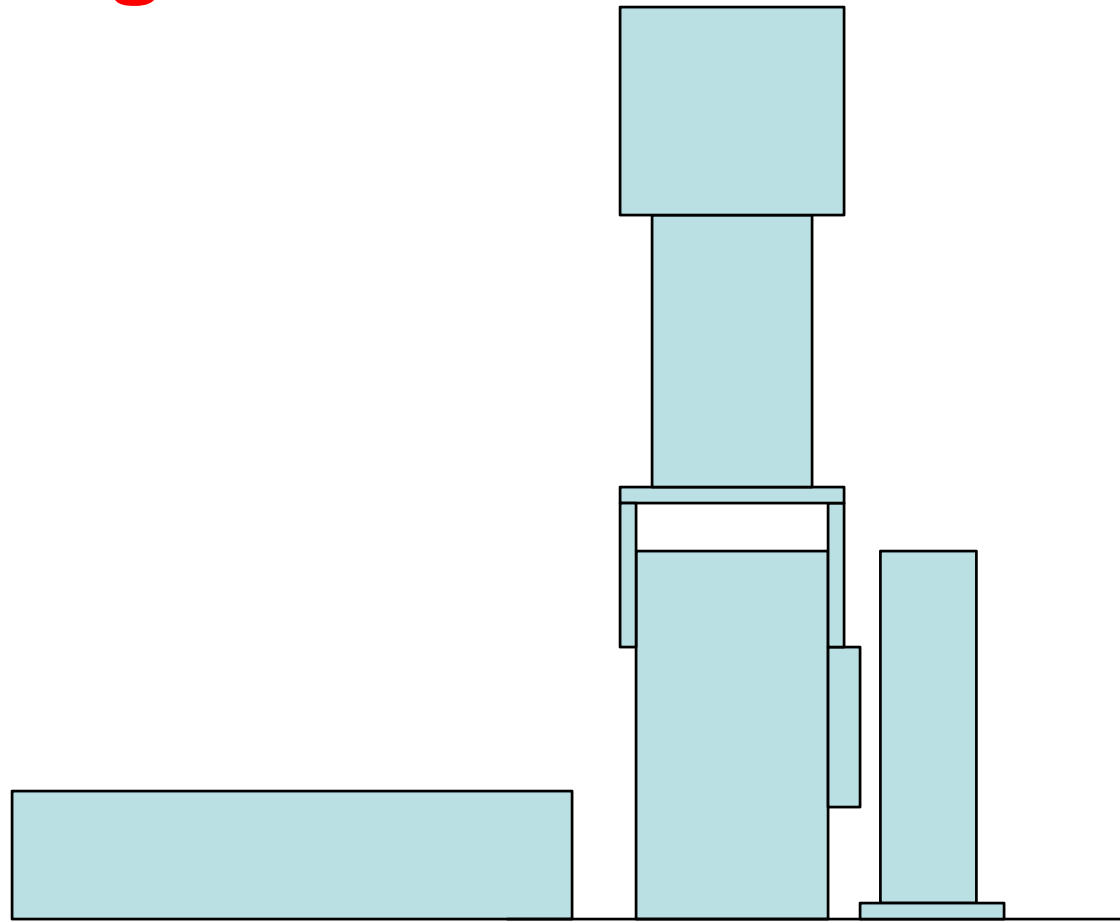
Machine Profile

- Room for Stringline / Sensor Support Arms
- Distance from Edge of Pavement to Inner Most Point of Crawler Track
- Distance from Outer Most Point of Crawler Track / Machine

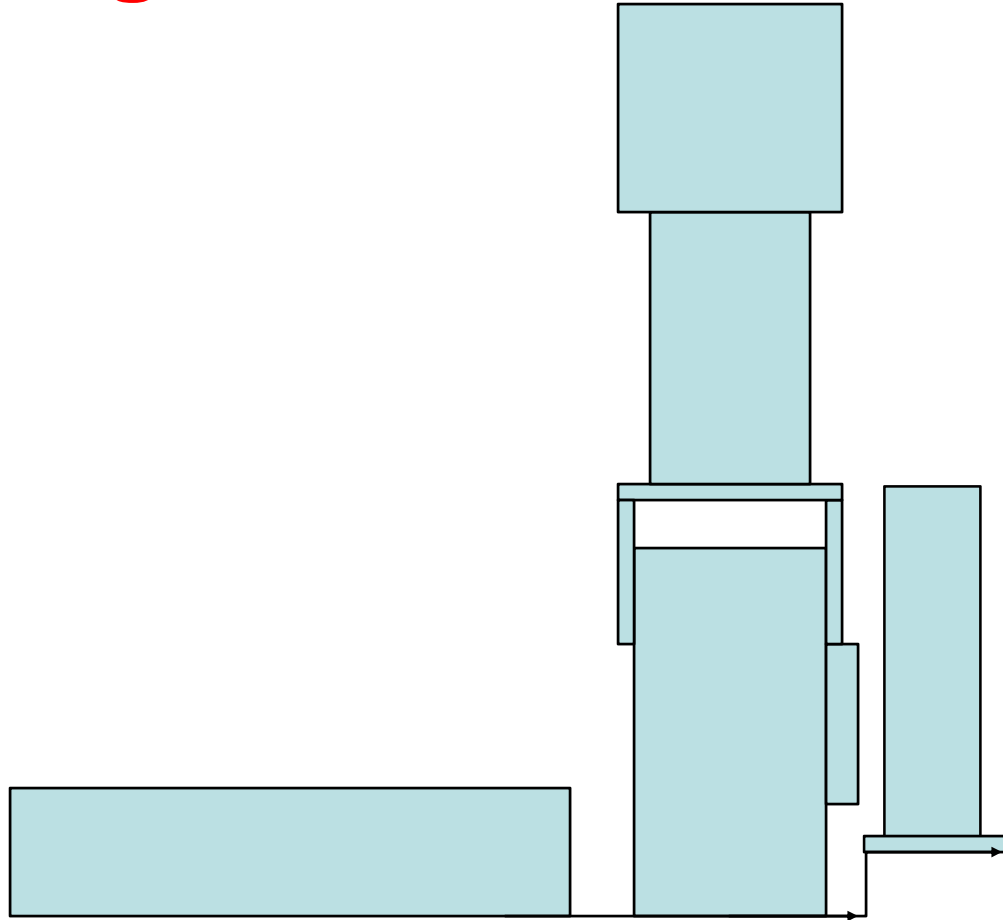
Machine Profile – Stringline on **One or Both Sides**



Machine Profile – “Stringless” or Single Stringline



Machine Profile – “Stringless” or Single Stringline – Milled Surface



Machine Profile – Need for a Narrow Profile Machine

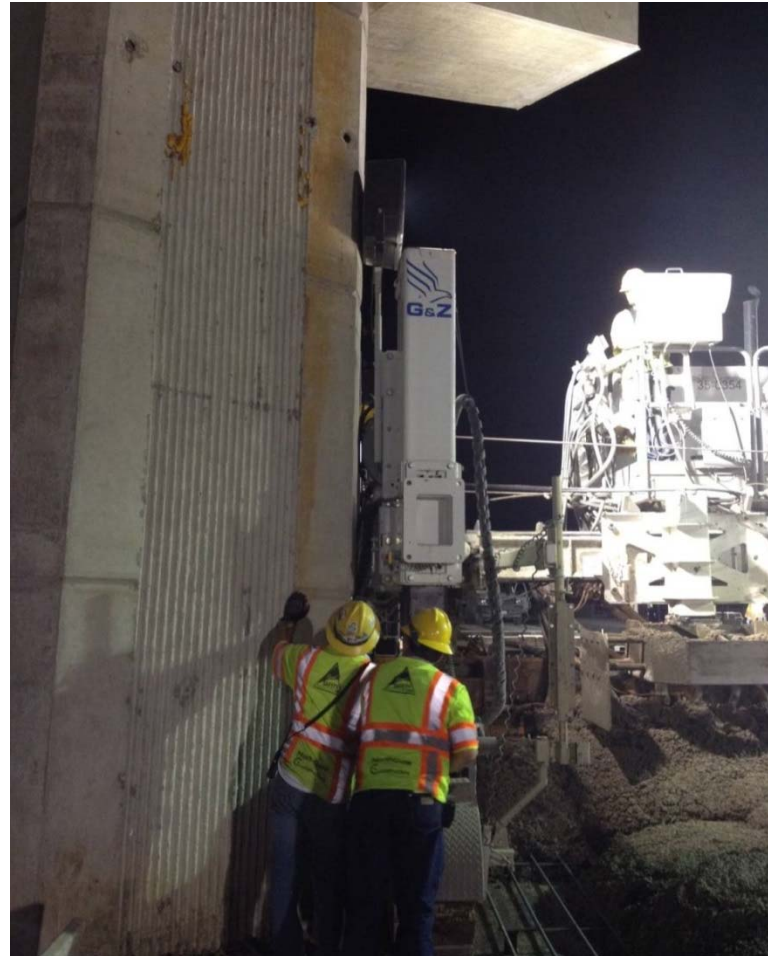
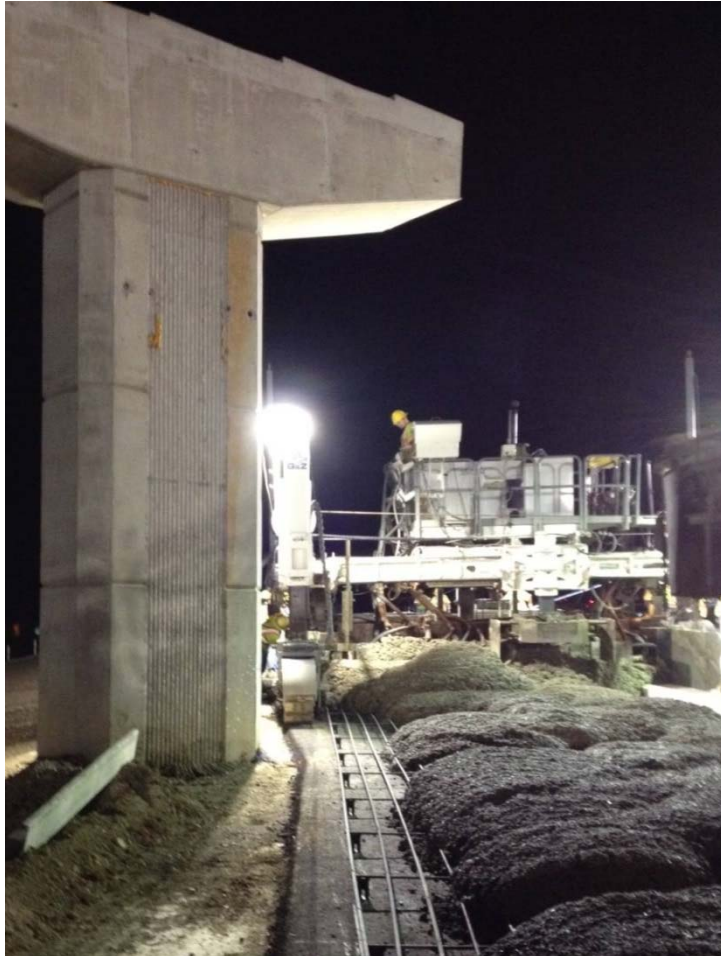


Machine Profile – Narrow Profile Machine with Single Stringline using X-Slope Control

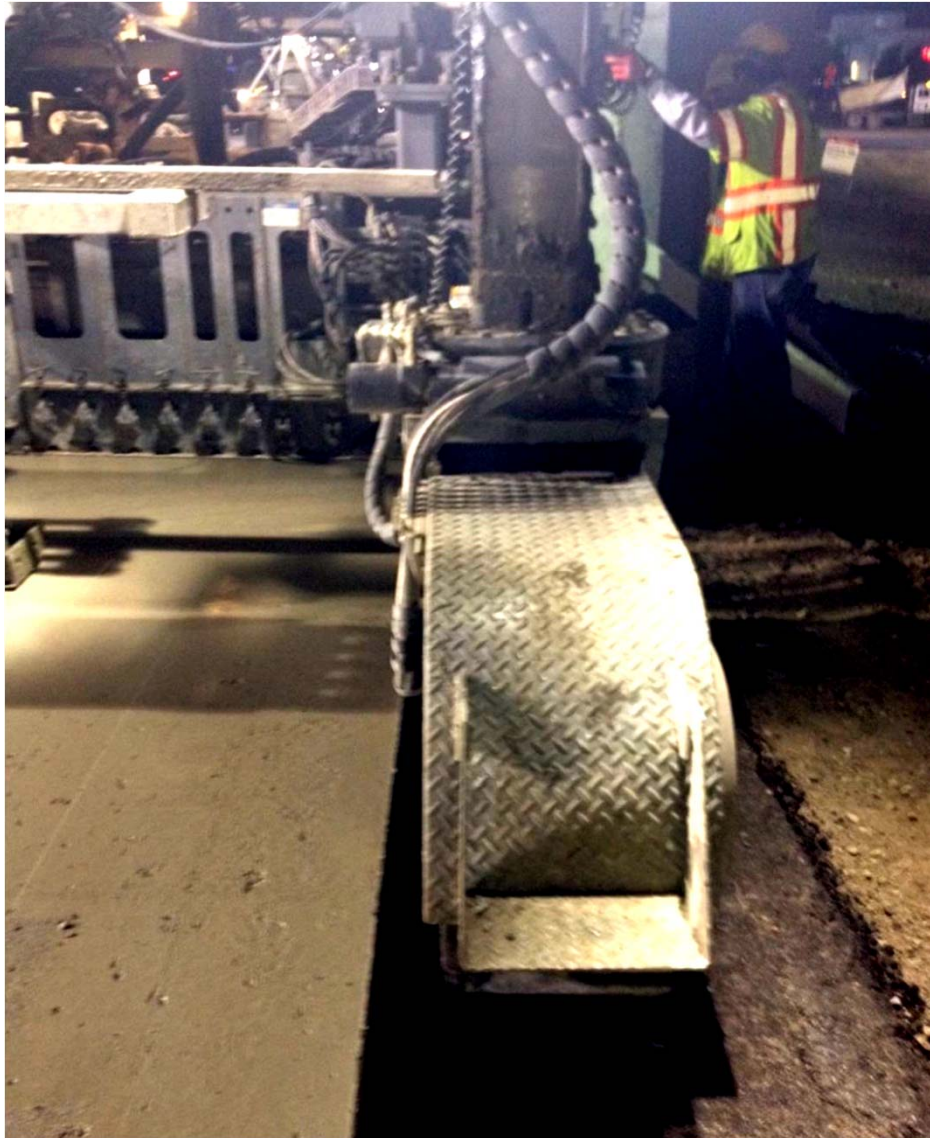


Machine Profile

“SmartLeg” Feature & Stringless Controls Allows Paving in “Tight Spots”



Machine Profile

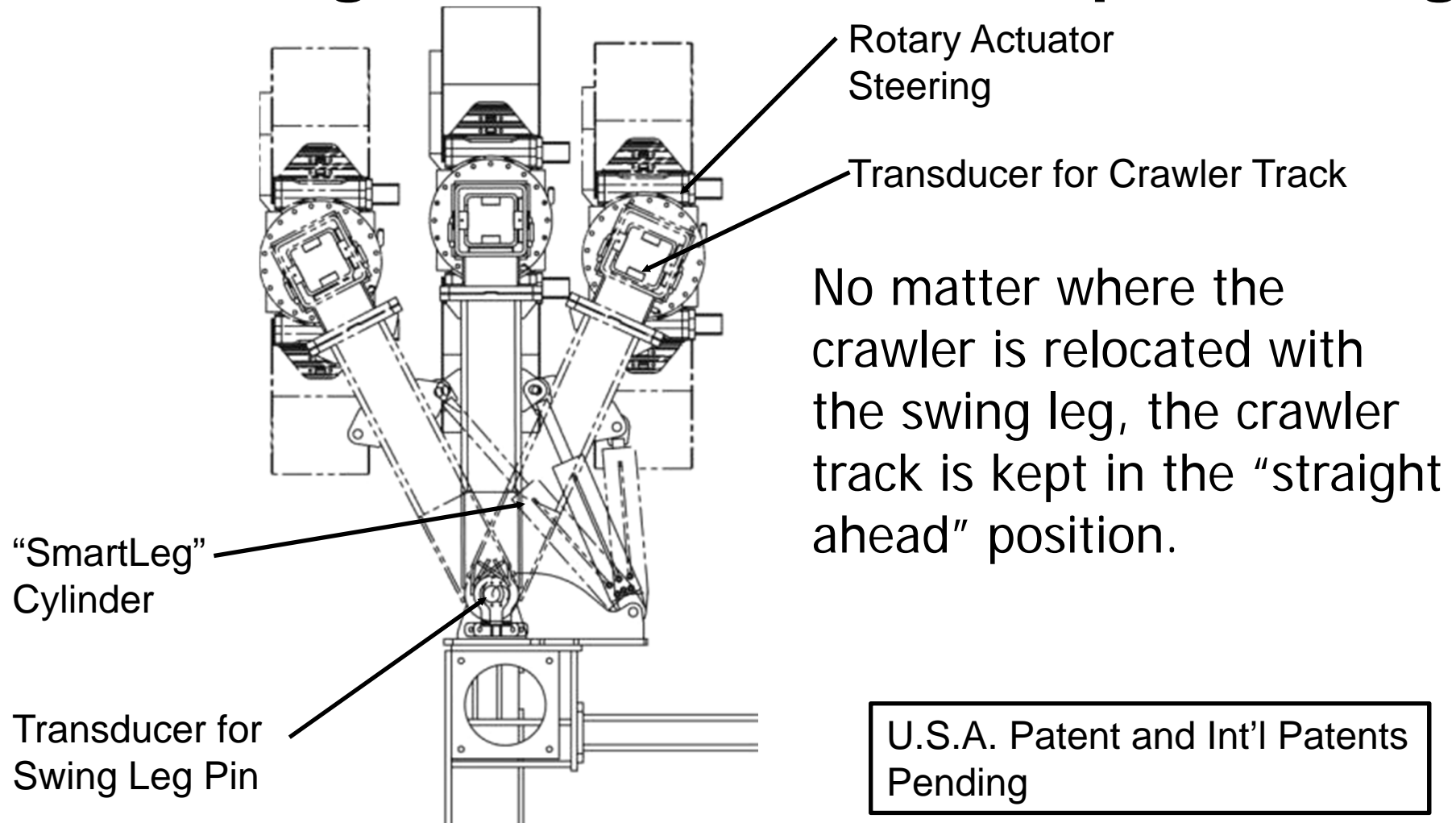


**Rear Crawler Track
Moved within Inches of
the New Slab On the Fly
Using “Smart Leg”
Technology!**



Machine Profile

“Smart Leg” Feature for Track Repositioning



Machine Profile

Optional “SmartLeg” Swing Leg Cylinder(s) Shown



Stringless Control



“Stringless” Defined

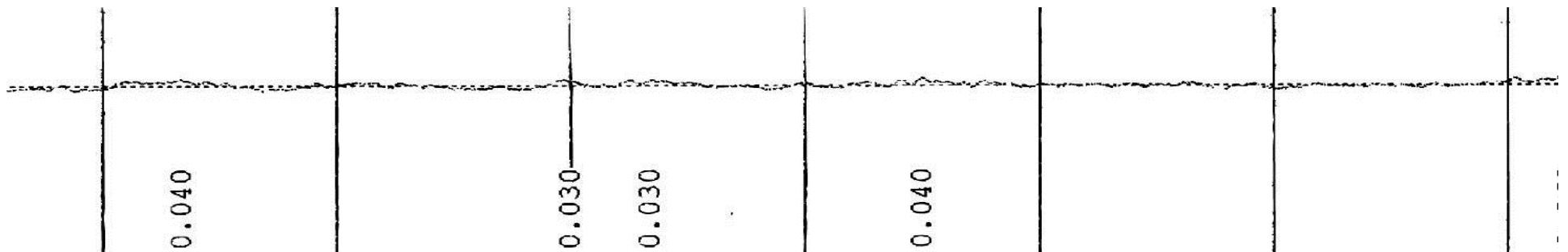
As the name implies:

“Stringless” technology replaces traditional stringline reference for the slipform with an electronic tracking process that controls the horizontal and vertical position of the concrete paver conforming pan



“Stringless” - Advantages

- Eliminate Space Required for Stringline Offset
- Better Access for Concrete Delivery
- More Room for Maneuvering at Bridge Approaches
- Eliminate the Costs Associated with Setting Stringline
- Eliminates Stringline “Eyeballing”
- No Bumping or Tripping over the Wire
- Eliminate Adverse Cordial Effects of Stringline
- Reduces Yield Loss and Concrete Thickness Std. Dev.



“Stringless” Major Players

- There are several major players in stringless technology - Leica, Trimble and Topcon.
- The worldwide leader in **concrete paving** applications has been Leica.

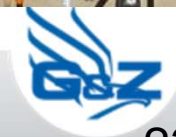
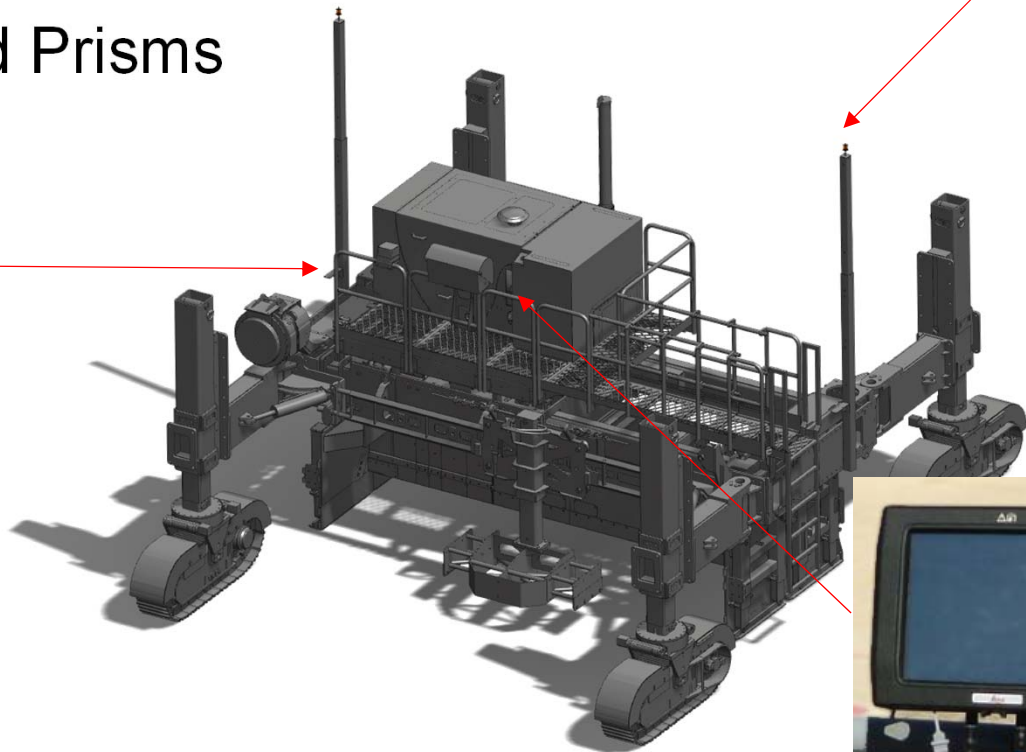


Machine Profile – Stringless Control



Machine Profile – Stringless Control

- System components
 - Computer including Paving Software
 - Slope Sensors
 - Total Stations and Prisms

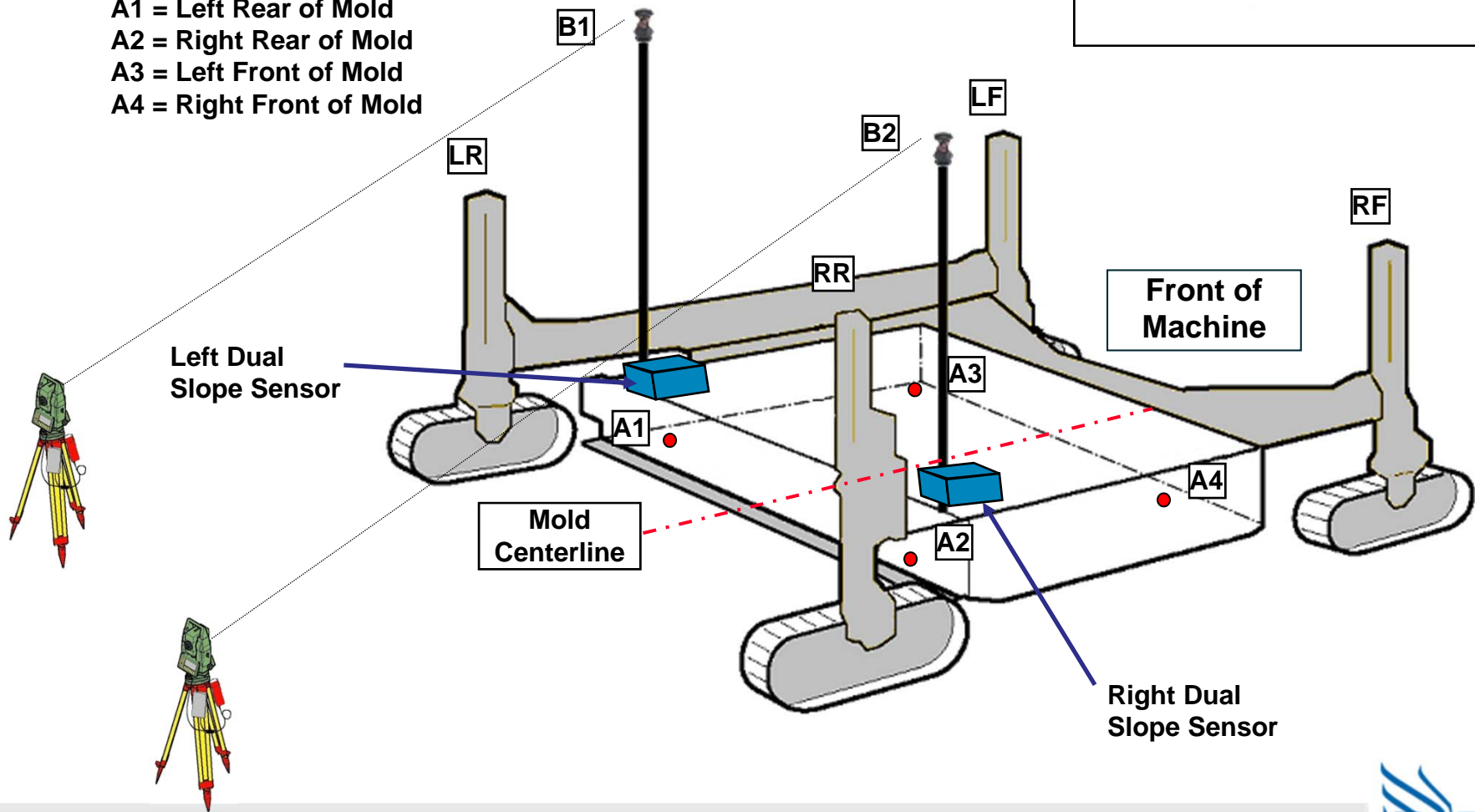


Stringless Principles

A1 = Left Rear of Mold
A2 = Right Rear of Mold
A3 = Left Front of Mold
A4 = Right Front of Mold

B1 = Left Mast Prism
B2 = Right Mast Prism

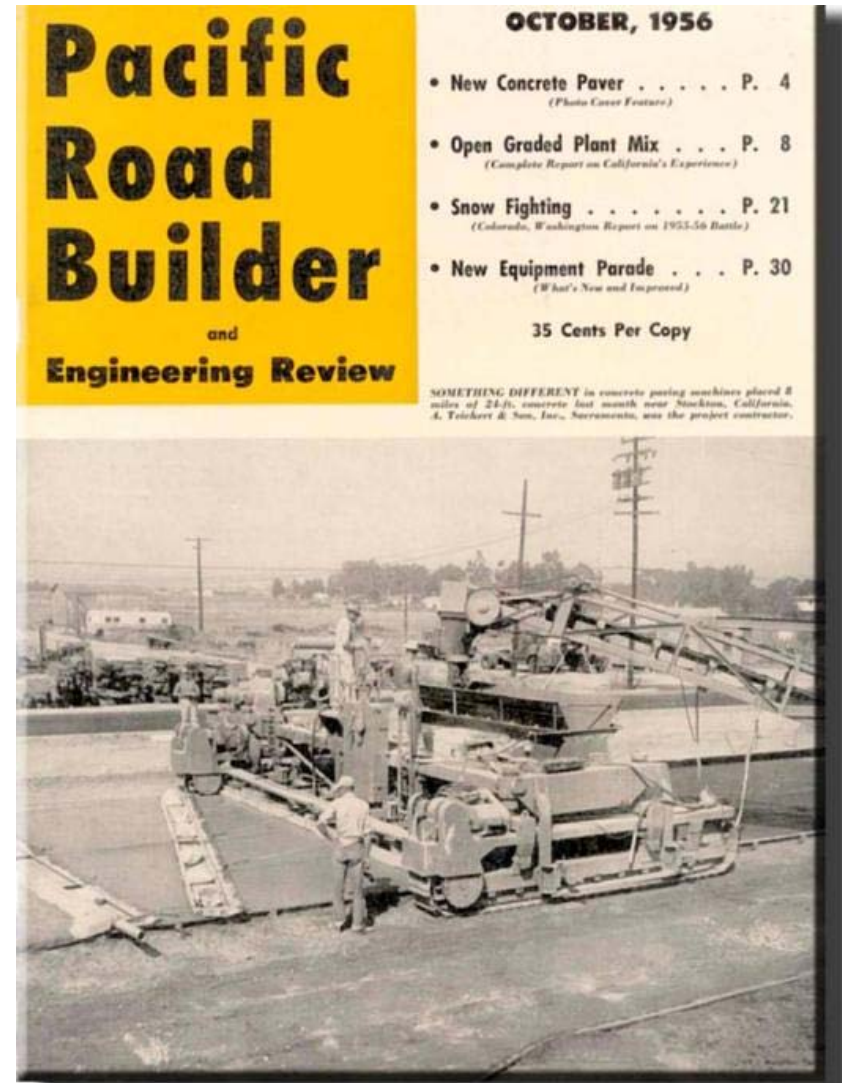
"B1 & Left Slopes" → A1 & A3
"B2 & Right Slopes" → A2 & A4



Obstacles To Going Stringless

Number 1 Reason....

Dual stringline reference has been the accepted method of elevation and steering control in concrete paving since 1956.



Obstacles To Going Stringless

- Prior to 2009, ability to meet smoothness spec
- In the past, string line was more reliable and required less expertise.
- Need for a topo map
- Initial equipment investment is relatively high.
- Must have clear line of site between robots and paver



“Iowa Struts it Stuff” – Worth County, Highway 65 Stringless Demo - 2009



Hwy 65 Overlay Project – Worth County

By using “**Stringless**” technology

- Iowa DOT estimates that on the average concrete overlay job, US\$340,000 can be saved by eliminating the string lines on both sides of the concrete paver.
- The elimination of stringline will also increase the available room on either side of the paver by approx. 4 ft. (1.2m) which can be used for traffic to pass the paving machine safely.



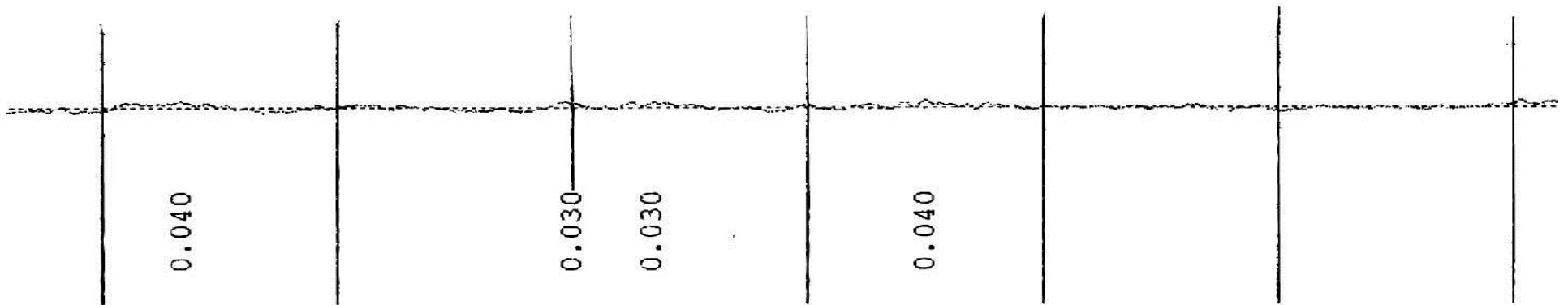
Hwy 65 Overlay Project – Worth County

- Advantages in overlay application
 - With GPS survey of the existing asphalt pavement, information can be used to guide the asphalt cold milling machine.
 - Optimize concrete thickness thus reducing concrete losses



Hwy 65 Smoothness

- The stringless smoothness results achieved on the Worth County job were the smoothest ever achieved with a stringless system anywhere in the world!
- The Stringless System smoothness was equal to any of the best stringline job results in Iowa even with Iowa's tight zero blanking band specification and tight filter!



Concrete vs. Asphalt Overlay

- Savings in materials and labor
- Long life expectancy and lower maintenance cost
- Proven technology since 2009



Machine Profile – Stringless Control



Machine Width Change - Tractor

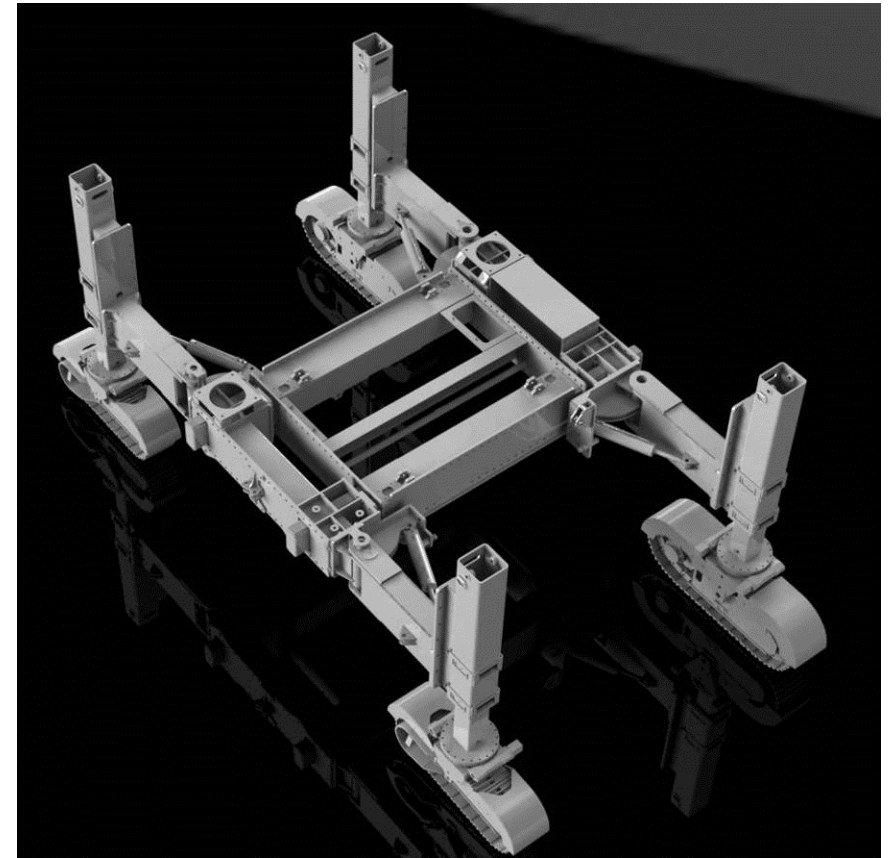
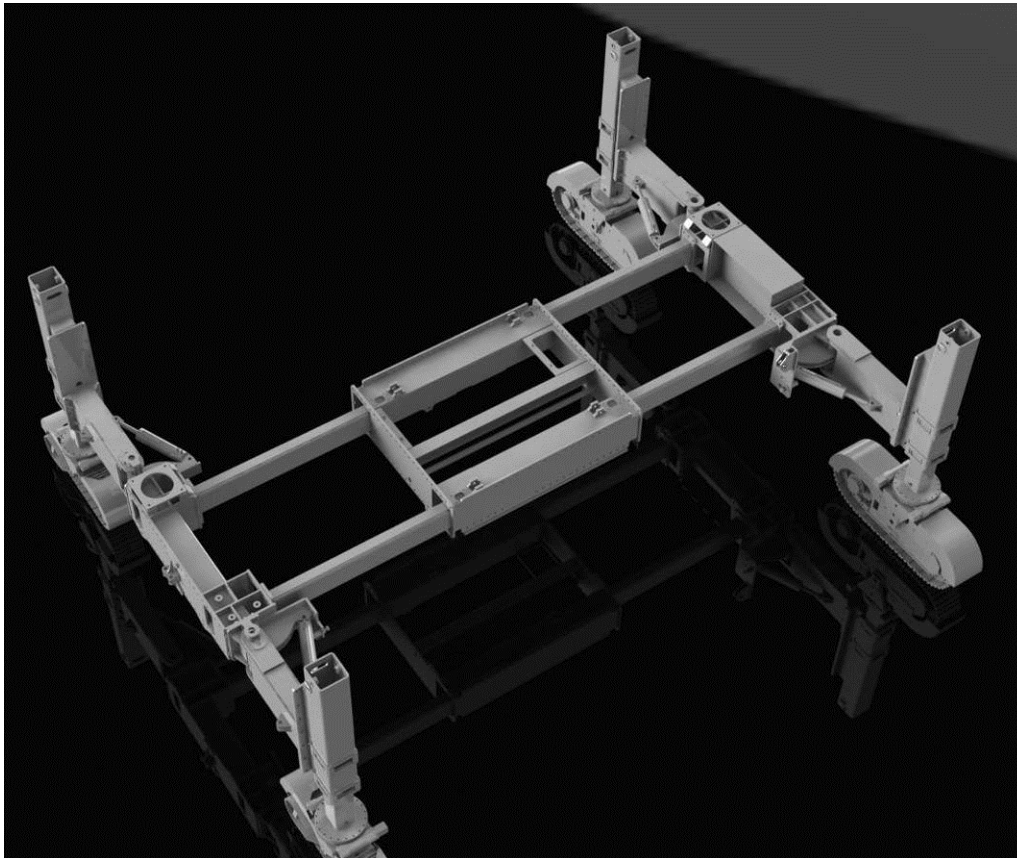
NEW Tractor Frame Width Change System with Rollers & Hydraulic Clamping Pucks:

- Eliminates the need to support the tractor frame center module when telescoping tractor frame
- Eliminates loosening / tightening conventional clamping puck **bolts** during tractor width change



Machine Width Change – Tractor

Widest Telescopic Range in the Industry Speeds Width Change

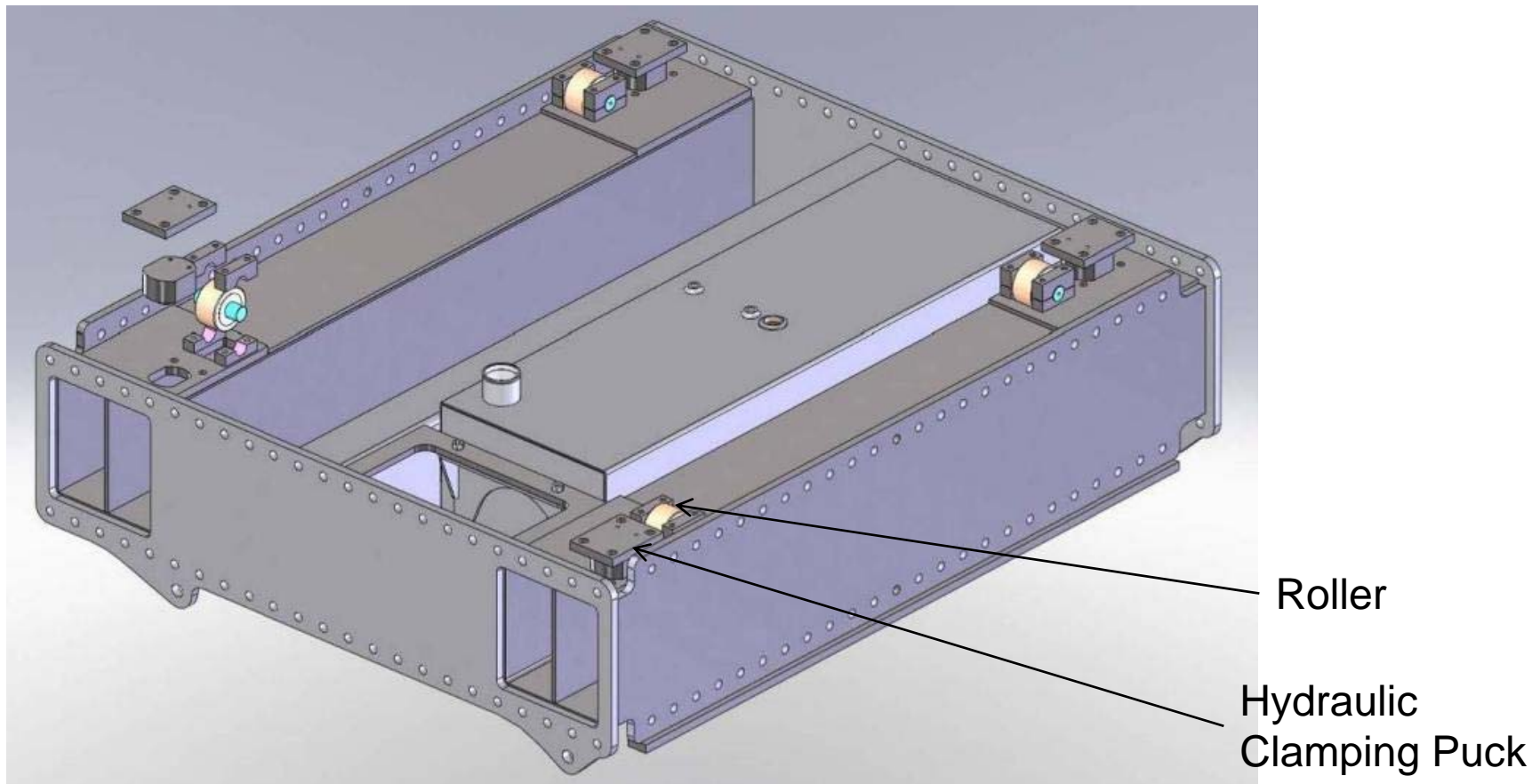


U.S. Patent & Int'l Patents Pending



Machine Width Change – Tractor

Hydraulic Clamping Pucks with Rollers and Camber Adjustment Speeds Width Change



Machine Width Change - Tractor

Rollers and hydraulic clamping pucks (bottom) shown



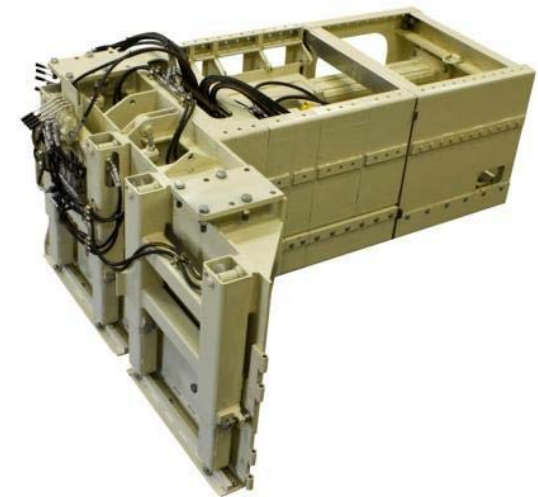
Machine Width Change – Tractor

Telescopic Access Walkway Speeds Width Changed



Machine Width Change – Paving Kit “TeleEnd” Telescopic End Sections

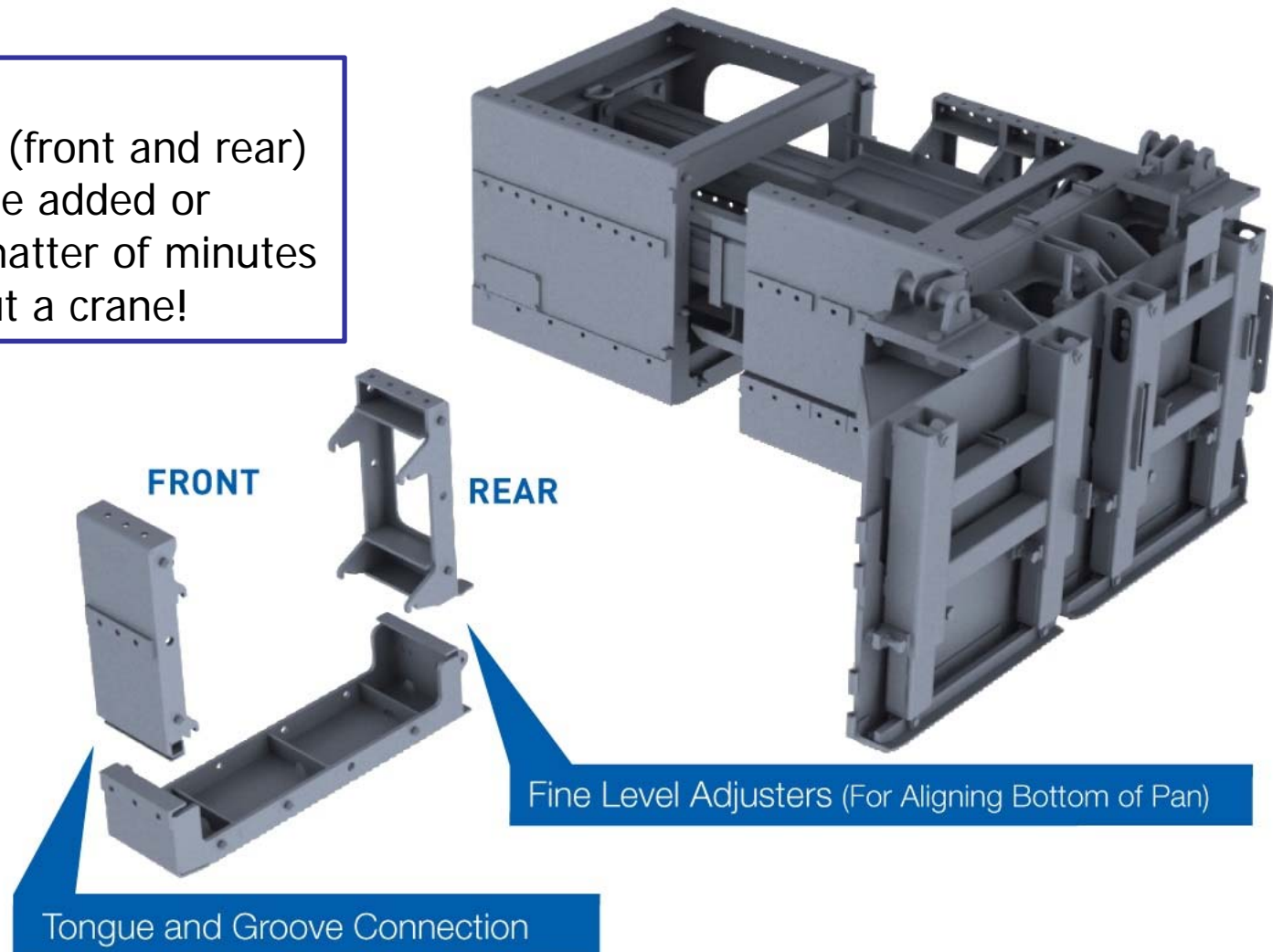
- What used to take days now only takes hours!
- 36” (915mm) of telescopic capability on both sides



TeleEnd: Telescopic End Sections

No Bolts!

Spacers panels (front and rear) and pans can be added or removed in a matter of minutes by hand without a crane!



TeleEndXLs – 1.25M telescopic ability per side



G&Z S600 Paver

DFW Connector Project, Texas USA



DFW Connector Project USA

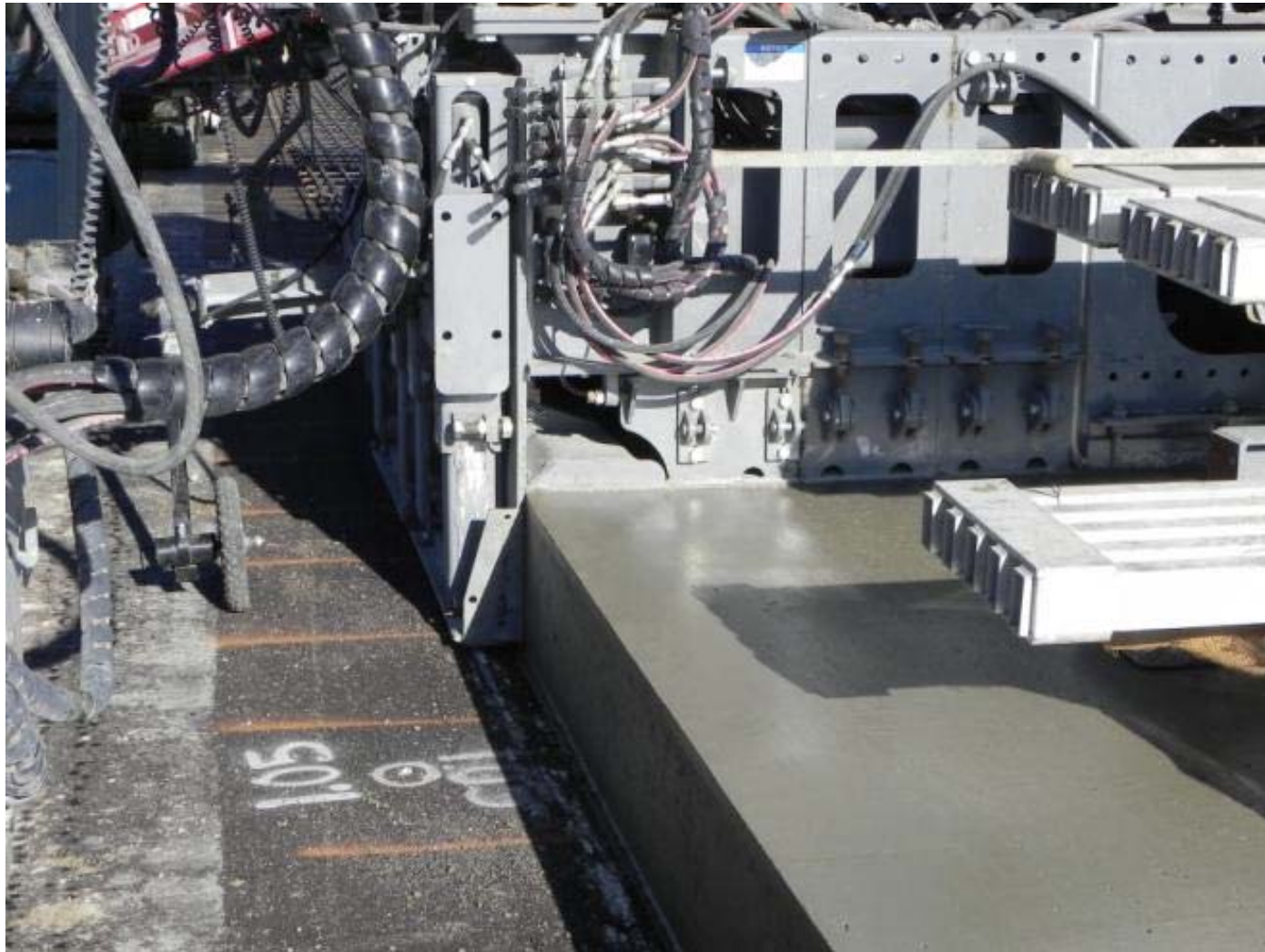
- A US\$ 1.1 Billion Project in Dallas - Ft. Worth area.
- Over 700,000m³ of CRCP concrete paving.
- Two paving spreads with stringless and TeleEnds.
- Over 150 width changes.
- Two years ahead of schedule.



G&Z S600 Paver with Leica 3D Control and TeleEnds



S600 Paver with 3D Control and TeleEnds



S600 Paver with 3D Control and TeleEnds

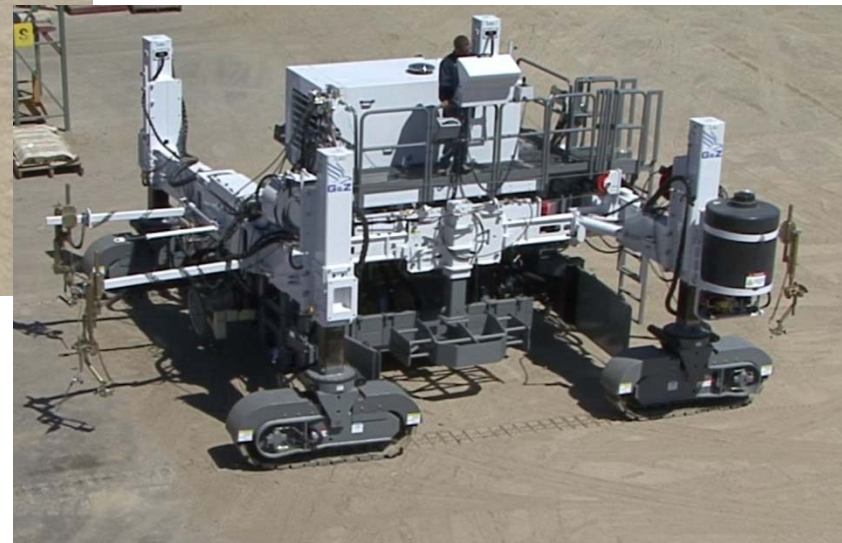


G&Z S600 Paver with Leica 3D Control and TeleEnds



Machine Maneuverability

Counter-Rotation or 90 degree Steering
Possible with a Flip of the Switch Speeds
Jobsite Manuevering



Machine Maneuverability



Machine Mobilization



Machine Mobilization

“SmartLeg” Used for Transport

- “SmartLeg” feature using the crawler track propulsion system allows the swing legs to quickly and **semi-automatically** go into the outboard / transport position.
- Going from the working mode to transport mode can be done in less than one hour!



Machine Mobilization

“SmartLeg” Used for Transport



Designed to Rapidly
and Semi-automatically
Walk into the Transport
Position



Machine Mobilization “SmartLeg” Used for Transport



Machine Mobilization “SmartLeg” Used for Transport



RM1

Machine Mobilization “SmartLeg” Used for Transport



Slide 54

RM1

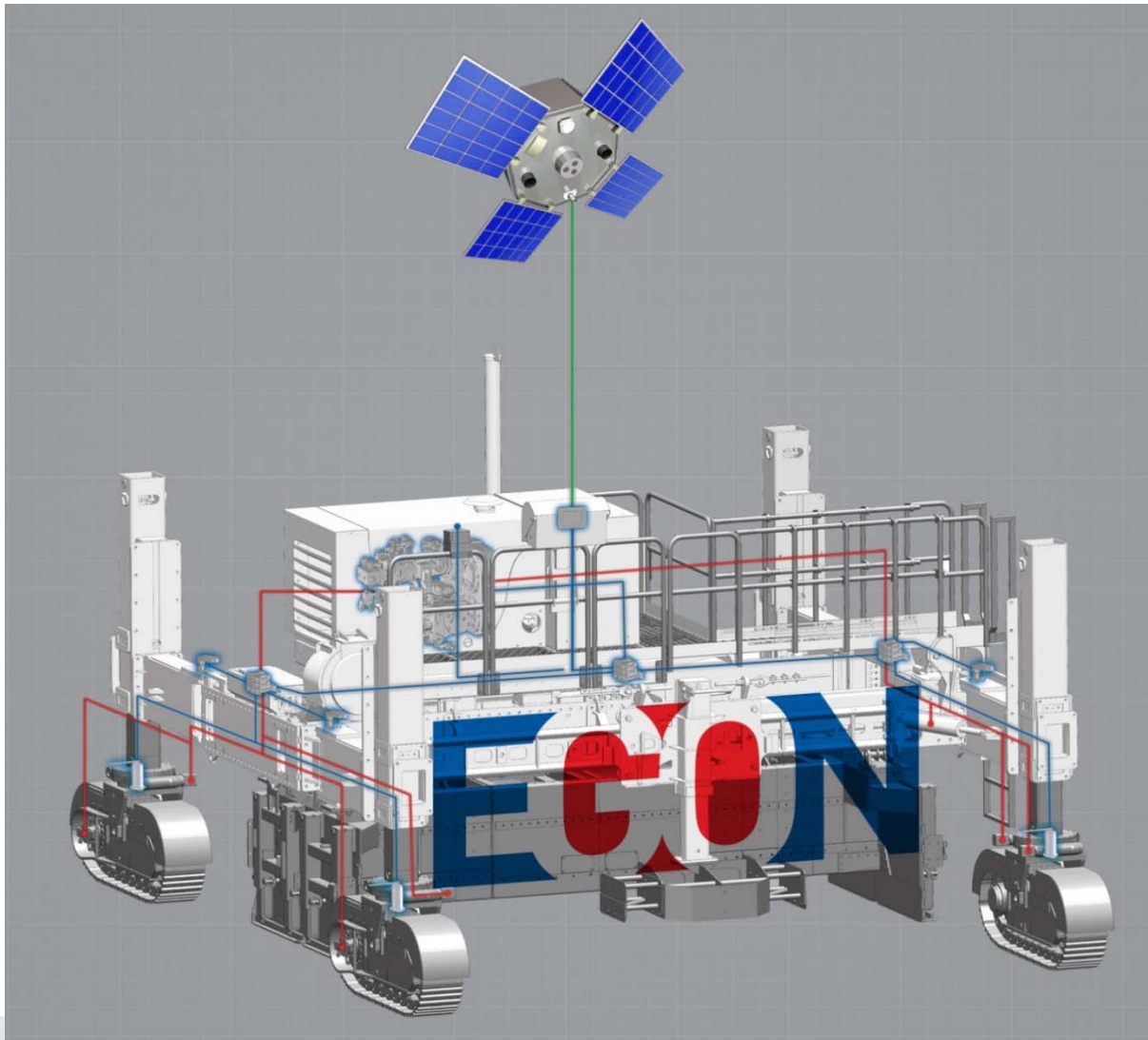
make sure to double click the picture to see the S400 transport video

Ron Meskis, 11/09/2015


Machine Mobilization Loaded on Transport Trailer



Machine Availability - EGON: Equipment Guidance & Operation Network




Machine Availability - EGON: Equipment Guidance & Operation Network



EGON
EQUIPMENT GUIDANCE AND OPERATION NETWORK

S600
Machine Serial No. 0

Master Control Status OFF



CONNECTED TO DEVICE WITH DATA

Power
Alarms
Start
Steer
Propel
Elevation
Hyd
Engine
GPS

Steering System Outputs & Sensors

Left Front Track

Act mA	0	Left Front Steer Left Output	Left Front Steer Right Output	0
Des mA	0			2473.9
			Left Front Steering Sensor	0

Left Rear Track

Act mA	0	Left Rear Steer Left Output	Left Rear Steer Right Output	0
Des mA	0			0
			Left Rear Steering Sensor	0

Right Front Track

Act mA	0	Right Front Steer Left Output	Right Front Steer Right Output	0
Des mA	0			0
		Right Front Steering Sensor		0

Right Rear Track

Act mA	0	Right Rear Steer Left Output	Right Rear Steer Right Output	0
Des mA	0			0
		Right Rear Steering Sensor		0

Steering System Inputs & Switches

Left Front Track


Auto

Jog Left | Jog Right

Man

Steering Potentiometer Input Raw Values

0	Machine Steer Left Input	Machine Steer Right Input	652
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Right Front Track

Auto

Jog Left | Jog Right

Man

Coordinated Steering Selected	Auto Steer Mode ON	Front Steering Selected
Crab Steering Selected	Steering Select Switch	Rear Steering Selected

Left Rear Track

Auto

Jog Left | Jog Right

Man

Right Rear Track

Auto

Jog Left | Jog Right

Man



Closing Comments: How to Achieve Smooth, Durable and Quiet Pavements



How to Achieve Smooth, Durable and Quiet Pavements

- Set aside attractive and meaningful incentives to build it right in each contract! Suggest 1.5 to 2% of the contract value for maximum incentive. Make at least 75 to 80% of the incentive related to concrete quality, uniformity and smoothness.
- The contractor who doesn't seek quality and maximizing their incentive will need to change / improve quality or ultimately they won't be able to compete.



How to Achieve Smooth, Durable and Quiet Pavements

- By offering meaningful incentives, good quality contractors will buy new technology, better materials and innovate to maximize their incentive dollars.
- Seeking maximum incentive dollars will drive quality but eventually when the contractor gains confidence, competition will force a portion of the incentive “on the table” to insure they secure the work.



How to Achieve Smooth, Durable and Quiet Pavements

- Borrow from the Iowa USA specification using the incentive based Coarseness Factor Chart (“Shilstone Mix”) and holding each sieve size within a narrow band to insure dense, well graded concrete.



How to Achieve Smooth, Durable and Quiet Pavements

- The owner and industry need to work together to eliminate specified designs that detract from durable, smooth and low noise pavements. Do this at the design stage.
- Allow innovative new technology that meets your end result specification.



Thanks!



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