PURPOSE AND METHODOLOGY

PURPOSE
To learn from those involved in the construction industry about state-of-the-art management tools introduced to the marketplace and used to streamline project management, help to compete for projects, and to stay within budget and improve margins.

METHODOLOGY
1. A core questionnaire was delivered digitally via the survey mechanism Question Pro in September 2016 with the survey sent four times to ensure a projectable response level. The survey was sent to those subscribers to Construction Equipment with fleet replacement values of $5 million or more along with contractors from the subscriber list of Roads & Bridges, building contractors from Building Design & Construction, and those involved in water infrastructure construction from the list of Water and Wastes Digest, Storm Water Solutions, and Water Quality Products.

2. A second, supplemental questionnaire was sent in early December 2016. The purpose of this questionnaire was to obtain additional information about data that responders firms collect about their fleets.

3. A “cover email” was sent over the signature of Rod Sutton, Editorial Director, Construction Equipment.

4. An incentive was provided. Respondents were offered the opportunity to enter a drawing for one of three Virtual Reality goggles. In addition, responders will receive the results of the study to learn what how their industry colleagues are utilizing today’s construction technology.

5. A total of 257 respondents opened the emails with 146 (56.8% of opens) answering all or parts of the survey and 101 completing the questionnaires in-full (69.1% of those starting the survey).

6. Appreciation and thanks to Case Construction Equipment for its partnership with Construction Equipment in presenting this analysis of technology in the construction industry.
SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Equipment users were asked about telematics capabilities with their fleets

- Sixty-one percent of respondents to the survey say their equipment fleets have telematics capabilities.
SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

*Users were asked if their equipment divisions/departments collect telematics data*

- About one-third of respondents say they collect telematics data.
- In a supplemental questionnaire, users indicated that an additional 32 percent have their dealers monitor data for them.
SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Those who use telematics data were asked how they use the data.

<table>
<thead>
<tr>
<th>Use</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling maintenance</td>
<td>77%</td>
</tr>
<tr>
<td>Tracking machine locations</td>
<td>77%</td>
</tr>
<tr>
<td>Monitoring hours/fuel</td>
<td>74%</td>
</tr>
<tr>
<td>Monitoring parameters (i.e. Idling)</td>
<td>58%</td>
</tr>
<tr>
<td>Repair/replacement decisions</td>
<td>55%</td>
</tr>
<tr>
<td>Predictive maintenance</td>
<td>52%</td>
</tr>
<tr>
<td>Geofence/theft protection</td>
<td>42%</td>
</tr>
<tr>
<td>Utilization</td>
<td>42%</td>
</tr>
<tr>
<td>Tracking production</td>
<td>29%</td>
</tr>
<tr>
<td>Life cycle</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

“We have our own preventive maintenance program from which we make equipment decisions.”
“Remote diagnostics.”
“Fuel.”
SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Are fleet data used elsewhere in the respondents’ organizations and how is it used

- More than one-third of respondents (34%) say they use data elsewhere in their companies.

- Over one-third (34%) say equipment cost data is incorporated into estimating and job costing with 25 percent indicating that equipment dealers monitor their machines and advise respondents’ companies.
SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Those surveyed were asked over what cellular bandwidth their is telematics transmitted.

- 54.5% of company’s telematics is transmitted over 4G cellular bandwidth.
- 33.3% of company’s telematics is transmitted over 3G cellular bandwidth.
- 12.1% of company’s telematics is transmitted over 2G cellular bandwidth.
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of Go Pro or comparable video recording devices and how they are used

- To aid in site preparation and mapping (46%) and to monitor job sites are applications in which Go Pro and similar devices are used most.
- Other applications include inspecting infrastructure (bridges, pipelines, underground) to determine conditions, indicated by 31% and to inspect job sites (27%).

- More than 15 percent of those surveyed indicated “other” applications, including:
  - “Record lecture, observe clinical skill exams.”
  - “Tech video.”
  - “Traffic trucks (for) setting and retrieving cones.”

Use Go Pro or similar recording devices

Use Go Pro or similar recording devices

Not using such devices

Use Go Pro or similar recording devices

Not using such devices

30%

70%
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of robotics

- 92% Do not use robotics
- 8% Use robotics

Bar chart showing:
- Other applications: 40%
- Material handling: 20%
- Lifting & hoisting: 20%
- Jobsite inspections: 20%
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of virtual reality

- 92% of responders said that they do not use virtual reality.
- 8% use virtual reality.

Use of augmented reality

- 100% of responders said that they do not use augmented reality.
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of mobile apps as a management tool

- Nearly 63 percent of respondents say they use mobile apps as a management tool.

- Monitoring weather: 46%
- Scheduling: 44%
- Fleet management: 36%
- Tracking expenses: 30%
- Managing project flow: 26%
- Analyzing daily production: 26%
- Data input for enterprise software: 24%
- Payroll: 20%
- Tracking labor costs: 18%
- Other applications: 8%
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

*Use of mobile apps for in-house or in-field equipment maintenance*

- Attaching photos to work orders: 67%
- Equipment inspections: 61%
- Planning and tracking work orders: 61%
- Tracking time to complete service jobs: 50%
- Communicating with service personnel: 50%
- Creating repair requests: 39%
- Parts inventory management: 28%
- Parts ordering: 28%
- Communicating with customers: 22%

Use mobile apps for in-house or in-field equipment maintenance: 76%

Do not use mobile apps for in-house or in-field equipment maintenance: 24%
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of cloud storage

- Over half of the responders (52%) said that they do use cloud storage.
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of UAVs

- Nearly 22 percent of responders say they use UAVs.
SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of safety tools

- A vast majority of responders, 85 percent, say they use safety tools
SUMMARY OF THE FINDINGS

SITE/PROJECT MANAGEMENT

On the topic of site connectivity, users were asked, “if their company has implemented technology to facilitate data communications in site/project management?”

• Just over 45 percent of the responders said that their company has implemented technology to facilitate data communications in site/project management.
SUMMARY OF THE FINDINGS

SITE/PROJECT MANAGEMENT

Those surveyed were asked, “How did you implement your site-management system?”

- Turnkey system from a vendor: 41%
- Worked in collaboration with multiple technology vendors: 36%
- Proprietary system developed in-house: 24%
- Other: 12%
- “None.”
- “Standard software & apps.”
- “Paper/pencil.”
- “Equipment dealer.”

*Construction Equipment* State-of-the-Art Technology in the Construction Industry Executive Study
SUMMARY OF THE FINDINGS

SITE/PROJECT MANAGEMENT

Users were asked, “What does your site-management system include?”

- Scheduling: 44%
- Machine monitoring: 41%
- Machine control: 39%
- Equipment inspections: 34%
- Mapping and file updates: 31%
- Real-time data transfer: 30%
- Production supervision: 28%
- Autonomous or remote-controlled machines: 11%
- Other: 8%

“None.”
“Communications.”
SUMMARY OF THE FINDINGS

ORGANIZATIONAL TECHNOLOGY OVERSIGHT

When it comes to corporate management, responders were asked, “Who is responsible for technology strategy and implementation?”

Company owner: 49%
Corporate-level technology manager, eg, CIO or CTO: 36%
Corporate-level technology committee: 19%
President or Chief Executive Officer: 16%
Chief Operating Officer: 12%
SUMMARY OF THE FINDINGS

ORGANIZATIONAL TECHNOLOGY OVERSIGHT

Who is involved?

Individual departments 73%
Individual projects 46%
Outsource to a third party 20%
Other 3%
SUMMARY OF THE FINDINGS

ORGANIZATIONAL TECHNOLOGY OVERSIGHT

*Users were asked how they integrate data technology into the organization*

- **Data flow into enterprise software and are accessible to decision makers**: 61%
- **Data exist within departments and are not yet integrated across the organization**: 38%
- **Data integration is outsourced to a third party**: 12%
- **Other**: 5%

“None.”
“Data integration is company wide.”
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Those surveyed were asked to best describe their title

- Fleet & Shop Superintendents, Engineers and other equipment staff: 8%
- Supervisory/operating staff: 20%
- Management: 71%
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Equipment users were asked, “Which of the following best describes your organization?”

- Highway and heavy construction: 23%
- General building contractors: 20%
- Government agencies: 12%
- Dealer/distribution/rental outlet: 9%
- Water & Wastewater systems/plants: 9%
- Highway/heavy & general building: 7%
- Residential building construction: 5%
- Other: 13%

Other examples of organizations include:
- “Geotechnical Engineering.”
- “Water treatment sales and service.”
- “Mining.”
- “Driveway and parking lot maintenance.”
- “Painting contractor.”
- “Environmental cleanup contractor.”
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Users were asked, “Construction Equipment & Trucks owned/leased company wide”

- Under $1 million: 37%
- $1 million to $5 million: 17%
- $10 million to $25 million: 17%
- More than $25 million: 15%
- $5 million to $10 million: 14%
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Your organization’s Annual Contract Volume (Non-government agencies)

- More than $25 million: 34%
- Under $1 million: 21%
- $1 million to $5 million: 21%
- $5 million to $10 million: 12%
- $10 million to $25 million: 11%
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Those surveyed were asked the number of people their organization employs

- Under 25 employees: 33%
- More than 500 employees: 27%
- 100-500 employees: 23%
- 25-100 employees: 17%