



Maximizing the Growing Value of Business Video

Prepared by Managing Automation Research Services

A Report Prepared by





New forms of video communications can transform manufacturing companies into faster-moving, more agile, and more competitive businesses.

Executive Summary



Bob Dean,
North American
Executive Director
for the Manufacturing
Industry Vertical, Cisco
Systems



Across the spectrum of manufacturing, from aircraft making to consumer product goods, to medical device manufacturing and beyond, business video is transforming the way companies work, how products are made, and how customers are engaged and satisfied.

This game-changing technology takes many forms—telepresence, desktop videoconferencing, one-way live streaming, archived video, video annotated with data and video surveillance with analytics, often delivered over wireless handheld video devices. But the effect is the same: Business video is changing the way manufacturers see the world.

Manufacturers have recognized that video is much more than a mere cost-reduction tool that reduces travel to partner and customer sites. Thanks to new technology capabilities, video is now changing the way manufacturers do business, as they embed it into key processes across the entire manufacturing ecosystem, from operations and supply chain, to R&D, engineering, sales, and service delivery. As a result, demand for video in manufacturing is in the double digits. Market research firm IDC, for example, forecasts that over the next 18 to 24 months, video will be more integrated with established applications and processes, translating into a 20%-30% growth rate in manufacturing.

Of course, manufacturers face challenges when they embark on a transformation based on integrated video applications, including bandwidth, storage, and security considerations; cultural resistance; and the required financial investment. However, global competition, the demand for greater business speed and efficiency, and rising customer expectations are compelling manufacturers to deal with these issues proactively.

This report provides insights on how the growing adoption of video technologies is driving the creation of new competitive advantages for many manufacturing companies. It explores the following areas:



Bryce Barnes,
Chief Architect,
Manufacturing Industry
Vertical, Cisco Systems

- Why the competitive dynamics in today's manufacturing market are inspiring video adoption, and where business video is being applied in the manufacturing enterprise.
- How access to rich, immersive communications, enabled by recent developments in video technology, can lead to fruitful collaboration and stronger business relationships.
- How manufacturers are building the business case for video and measuring benefits and results.
- How four key areas of the manufacturing value chain—supply networks, operations, product innovation, and customer intimacy—are being transformed.

The Competitive Context



Increasing globalization, the economic downturn, margin pressures, diminished access to capital, and other factors are forcing manufacturers to seek new and more creative ways to innovate, build products faster, achieve breakthrough gains in productivity, and delight customers. Manufacturers are continuously expected to do more with less—less capital, fewer workers—and in shorter time frames. The pressure is on to bring products to market more quickly and at lower costs.

To meet these challenges, manufacturers are increasingly turning to the game-changing tool of video to drive greater business value.

"Video is helping manufacturers create new ways to collaborate in a rich manner at a higher frequency," says Bryce Barnes, Chief Architect, Manufacturing Industry Vertical, at Cisco Systems. "The original applications of video were essentially about cost reduction via travel. Now, it's being applied to the need for deeper partner relationships. You can enhance the value chain with these technologies, in addition to lowering operational expenses."

Here are just a few of the applications for which manufacturers are currently using video technologies:

- High-definition videoconferencing and telepresence systems are driving faster decisions and more valuable collaboration, as manufacturers and suppliers discuss critical issues in a setting that enables frequent meetings with natural interaction.
- Cameras on the plant floor are vastly shortening troubleshooting and maintenance processes, as engineers remotely diagnose machine malfunctions.
- Plants are sharing lessons by using video to capture solutions in real-time production scenarios.
- Live video streaming is providing service technicians with just-in-time training to shorten break/fix cycles.

- Automation and quality control managers are using video to better monitor and manage these processes.
- Product designers are working directly with parts suppliers, using data-annotated video to shorten development lifecycles and speed time-to-market.

"Throughout history, the most common mode of knowledge transfer has been the written page, but now, the preferred knowledge transfer mechanism is moving toward video," says John Paul Williams, Business Development Manager for Manufacturing and Energy at Cisco Systems. Even 18 months ago, he says, manufacturers that were leaders in the use of videoconferencing used it for weekly sales meetings. Today, however, "the general understanding of its capability has reached a point where people get it very quickly and move to deploy video into more transformative kinds of applications."

Indeed, business videoconferencing is forecast to grow tenfold by 2014, with traffic increasing almost three times as fast as overall business IP traffic, according to the Cisco Visual Networking Index.¹ Forrester Research Inc., a research and analyst firm, predicts that video will become the new business norm for communication and collaboration over the next five to 10 years, replacing voice and text in both personal and business life.²

As video becomes more integrated in the next couple of years into manufacturing applications, there will be double-digit growth, says Robert Parker, Group Vice President for IDC Manufacturing Insights. These applications are likely to include quality, maintenance, and training, he says. Right now, usage is commonly more ad hoc. A supervisor might use a portable camera to record how two parts aren't fitting together in an assembly and attach that to an e-mail, Parker says. But soon, video will become integral to filling out the documentation of that type of quality discrepancy report, taking the place of text.

Bob Dean, North American Executive Director for the Manufacturing Industry Vertical at Cisco, anticipates an uptick in adoption of video technologies, as manufacturers seek creative approaches to boost productivity, collaboration, and innovation. "While there's been significant growth in emerging markets, they're playing catch-up with the basics, while the more advanced economies like

¹The Cisco Visual Networking Index is an ongoing initiative to track and forecast the impact of visual networking applications. For more information, see "Cisco VNI: Forecast and Methodology, 2009-2014," http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html

²Henry Dewing, "How Tech Strategists Can Ride the Coming Tidal Wave of Business Video," Forrester Research, Inc., April 1, 2010, http://www.forrester.com/rb/Research/how_tech_strategists_can_ride_coming_tidal_wave/id/47574/t/2?src=RSS_2&cm_mmc=Forrester_-RSS_-Document_-17

the U.S. and Canada are really rocking and rolling with the newer approaches,” he says.

The U.S. consumer is also helping to accelerate adoption. With ever-growing expectations for immediate gratification, consumers exert tremendous pressure on manufacturers to respond to fast-changing requirements or run the risk of becoming less relevant, according to Dean. This drives the premium for speed-to-market and innovation among manufacturers’ ecosystems of suppliers.

Employees are influencing adoption of video technologies as well. Younger people entering the workforce expect immediate and effective forms of communication and collaboration, thanks to smartphones, the Internet, and social media. If the employer doesn’t supply these, the employees will find a way, using easily obtained consumer-based video technologies such as Skype, YouTube, and Apple iChat.

How Video Technology Has Advanced



Clearly, this isn’t your father’s videoconferencing technology. In the same time frame that video has become pervasive in consumer and social networking situations, video technology for business has also moved away from its unreliable, cumbersome, and proprietary roots. Videoconferencing and telepresence systems today are characterized by high-definition displays and other technological advancements that enable natural interactions. Meanwhile, dependable and pervasive IP-based networks, intuitive user interfaces, integration with familiar applications, and a wide variety of devices to capture and view video remove barriers to adoption and successful usage. Starting a telepresence meeting today is as easy as pushing a button—a far cry from the older systems that were hard to use and not integrated with other collaboration tools.

“Thanks to increasingly mature technology, video has become more reliable, effective, and easy to use, for users and IT managers alike,” says Forrester analyst Henry Dewing.³

Video systems today come standard with IP communication capabilities and 128-bit encryption, which has opened up the usage cases, Williams says. “In the early

³ Henry Dewing, “How Tech Strategists Can Ride the Coming Tidal Wave of Business Video,” Forrester Research, Inc. April 1, 2010, http://www.forrester.com/rb/Research/how_tech_strategists_can_ride_coming_tidal/q/id/47574/t/2?src=RSS_2&cm_mmc=Forrester_-RSS_-Document_-17

⁴ “Applications of Tandberg Videoconferencing in the Manufacturing and Energy Industries,” speech by John Paul Williams, Video Conferencing Reviews, March 10, 2010, <http://videoconferencingreviews.wordpress.com/2010/03/10/applications-of-tandberg-video-conferencing-in-the-manufacturing-and-energy-industries/>

days, when it was ISDN and the public-switched phone network, making a videoconference call was agony,” he says. “But it’s gotten to the point where it’s the same process as making a call with your mobile phone. It wasn’t until it got to that level where you could overcome the reluctance of using it directly on the factory floor.”

There is a range of form factors for video on the plant floor. Some manufacturers use portable units that they roll directly into a work cell to collaborate with suppliers, engineers, service technicians, product designers, and even customers, who can immediately assess what’s going on. Others, such as high-speed packaging plants, use 802.11 wireless units with seven- to eight-inch screens. Video capabilities are also being embedded directly into complex equipment that requires on-demand training, through archived video or even live interaction with a highly trained support representative. Many automation and control systems use video input for process and quality control, monitoring fast-moving machines or checking products for defects. If the controller can use the video, so can any engineer or support person.

Meanwhile, in conference rooms, telepresence systems are enabling rich, immersive communications for collaborative meetings, and desktop videoconferencing is pulling in remote workers. At some firms, engineers and designers come into work and immediately turn on their PCs to collaborate with other parts of the value chain.

The ROI of the New Video



Many companies first waded into video transformation by implementing a telepresence system and then providing desktop videoconferencing to the executive staff or finance groups. Once the infrastructure is laid, it becomes easy to extend the video network to the manufacturing floor or for collaboration across the value chain. These newer applications often enable ROI much more quickly than travel cost reductions.

Although it’s less often the case, some manufacturers such as Eaton Corp. and Procter & Gamble start with the supply chain, Williams says. These companies planned to implement telepresence for management meetings, but when business process owners saw its capabilities, they recognized its potential for communicating with new plants in distant locations where the skill base was still being developed. Video, they realized, could be used for plant inspections, training, and equipment upgrades.

“These were very large, process-oriented plants with a lot of mechanisms that would need maintenance and training,” Williams says. “It didn’t take long for them to

see the business value.”

For these new applications, ROI comes in the form of greater efficiencies and higher revenues that result from faster production cycles, speed-to-market, faster decision-making, better customer engagement, and closer collaboration in the value chain. An example is in product design. In some cases, time-to-market pressures cause manufacturers to release products with sub-optimal design. But by getting the right people together more frequently, using the more effective mode of video communication, more ideas can be generated and better decisions can be made faster. “You can make breakthrough discoveries because you’re accessing the right information, with the right people, at the right time,” Williams says.

Dean calls this kind of collaboration “the immersive value chain.” “There’s a higher level of communication, collaboration, and understanding between people in the immersive value chain, from the supplier’s suppliers to the customer’s customers,” he says. “Business video is playing a role in that, not just from a collaborative aspect, but when you participate in a business video style of communication, the personal aspect really comes through with much more impact than an e-mail or PowerPoint.”

Four Quadrants of the Manufacturing Value Chain

Video can transform the entire manufacturing ecosystem. This can be seen by breaking it into quadrants: supply chain, operations, innovation, and customer intimacy (see table on page 7).

Supply Chain



Today’s supply chain mandate is to build closer and thus higher-value relationships with suppliers, turning the supply chain into a value chain. Today’s telepresence and videoconferencing systems help build these trusted relationships by enabling more frequent interactions in an immersive and rich communication setting. People can make eye contact, read the nuances of each other’s facial expressions, and interpret non-verbal cues. Before long, manufacturers and suppliers find themselves able to discuss highly sensitive topics and make consequential decisions more often than in the past, when they were limited to infrequent face-to-face meetings.

Through these interactions, the vendor-supplier model is transformed, as the supplier’s value is elevated, Barnes says. “Your suppliers can play a different role, helping you innovate in the market rather than being just low-cost suppliers,” he says.

An example is Boeing, where Williams says aircraft suppliers are in 13 different countries, with final product assembly in Seattle. At any one time, Boeing has suppliers in at least four countries on video, participating in the build process, he says. “You can’t be a key supplier to Boeing without being on that video network,” he points out. “They want to resolve problems instantly when they come up, and they want the supplier to already have a context for where the problem has developed and the issues that it’s creating.”⁴

Another example is an industrial lighting manufacturer that reduced time-to-market by enabling desktop videoconferencing between its design team and suppliers. Designers now share CAD drawings with parts suppliers on the same screen as the video feed, and collaborate on optimal part placement to minimize the impact on machine and supplier facilities. “They literally look at the drawings together, exchange ideas, and mark them up,” Williams says. “If they agree to move something three centimeters to the left, for instance, that could save three days in tooling costs and avoid delays that would otherwise show up once you got to the prototyping stage, which could be months down the line.” The result: Time-to-market is reduced by 25% by carving 50 days off the development cycle. “They connected their supply chain in a more intimate fashion,” Williams says. “Supply chains are now becoming knowledge chains.”

Operational/Plant Floor



As in the supply chain quadrant, video transformation in the operations area can enable more frequent, rich interactions and encourage collaboration and trusted relationships, but this time, it’s inside the enterprise. This is particularly relevant for manufacturers, whose operations tend to be largely isolated from the rest of the company. Examples of video usage in operational areas include:

Troubleshooting: Some manufacturers are applying video to equipment malfunctions or production failures that require troubleshooting. They are using high-definition mobile video cameras to point at the problem and stream the video wirelessly to a Web-based collaborative application that shares the live video with engineering staff. This is accompanied by live audio and even annotation and control capabilities from the camera itself. “This unites video and Web collaboration to address production failures in real-time,” Barnes says. From the camera, plant workers can take a frame, drill down into a particu-

⁵ “Applications of Tandberg Videoconferencing in the Manufacturing and Energy Industries,” speech by John Paul Williams.

lar action, and circle where the problem is.

An example of where this is occurring today is Lexmark, whose new manufacturing lines in China are connected by video to engineers in the U.S. The company can now fix production line problems in an hour that used to take close to two weeks to resolve, according to Williams. Because of the time zone differences, on-call engineers can have the video streamed to a PC at home.⁵

The same concept can be applied to maintenance/service on equipment at customer premises. If capital equipment goes down, video can be used to get it up and running much more quickly, enabling manufacturers to meet their service-level agreements. This area offers extremely high payback—ROI can be achieved in 4.5 months, especially for complex capital equipment, Williams says. Some manufacturers are also reducing the number of parts they replace by first verifying issues via video.

Manufacturers of complex automation machinery are embedding video in the equipment, combined with telemetry capabilities, for operators to use when problems occur. Operators can place a video call to trained technicians and use a mobile camera to show them where a problem is occurring. SLAs are measured in minutes, not by how long it takes to get the truck to the location.

Quality control: Specialty cameras combined with analytics are being used in high-speed bottling and robotics production lines to ensure quality levels are met. If captured images deviate from the norm, engineers are alerted.

Product design: In some cases, manufacturers are linking remote design teams to manufacturing facilities to perform quality audits and design for serviceability reviews.

Training: Manufacturers are also using video to train operators when they run into an unfamiliar function. When training can be delivered at the exact moment it's needed, retention is eight times higher than offline training, Williams says.

A German car manufacturer, for example, is building videoconferencing rooms in its dealerships to train technicians on servicing its automobiles rather than having technicians travel to a training center. It is also using video for ad hoc training sessions when its cars experience a high frequency of particular problems; for example, with water pumps. Furthermore, when techs run into a problem in a repair bay, they can make a video call to a centralized training facility, which can also review data streamed from the dealership's engine analysis system. For complex repairs, this reduced problem resolution times by 270%.

Innovation



In the third quadrant, video is being used to spur innovation in R&D, product lifecycle management, and basic research, and in gathering requirements from customers.

Brainstorming new ideas is difficult in a typical voice call, Dean says, as people lack the visual cues to interpret each other's disposition. With long development cycles, video becomes the element that allows teams of engineers to convey information more quickly, thus shortening product development cycles.

"There's an emotional component to decision-making that is absent when you don't have video, and that's a real factor in product lifecycles," Barnes adds. "It sounds counter-intuitive because it's engineering, but the ability to trust is built into decision-making length, and trust is visual." This is particularly true for intense development cycles or those involving global teams, which can last for years, he says.

Baxter Healthcare is using telepresence to link developers and project managers in Austria and California.⁶ In working sessions, these teams are troubleshooting defects, perfecting designs, and making key design decisions. The teams say they can understand problems much more quickly and can talk through them to find creative solutions. During one session, engineers and quality control staff worked together on a problem with a product component. Being able to share a life-size image of the component with the whole team on the call introduced a new dimension to the meeting. The team quickly gained understanding of the issues and rapidly resolved the problem.

Customer Intimacy



Manufacturers are using video to build more engaged, trusting relationships with customers. As with suppliers, telepresence systems tend to increase customer face-time, which allows for deeper relationships.

For instance, manufacturers of high-end products are applying video to customer acceptance reviews, enabling customers to inspect products in fine detail to verify that

⁶ "Global Healthcare Company Improves Communications for Dispersed Employees," Cisco Systems Inc. case study, 2008, http://www.cisco.com/web/strategy/docs/healthcare/baxter_cStudy.pdf

⁷ Derek Kreindler, "Saab to Let Customers Watch Their Cars Get Built by Webcam," AutoGuide.com, Oct. 18, 2010, <http://www.autoguide.com/auto-news/2010/10/saab-to-let-customers-watch-their-cars-get-built-via-webcam.html>

⁸ Steve Diehlman, "BMW Allows Customers to Watch Assembly of 2011 X3 Online," Automobile, Jan. 20, 2011, <http://www.autoguide.com/auto-news/2010/10/saab-to-let-customers-watch-their-cars-get-built-via-webcam.html>

MANUFACTURING QUADRANTS FOR VIDEO TRANSFORMATION

MANUFACTURING AREA	PROCESS TRANSFORMATION	ROI/BENEFITS
OPERATIONAL EXCELLENCE/PLANT	<ul style="list-style-type: none"> • Troubleshooting plant floor issues. • Break/fix complex capital equipment by specialty engineers. • Quality control and quality audits. • Design for serviceability reviews. • On-error/real-time training. • Detection of safety violations. 	<ul style="list-style-type: none"> • Lower production downtime. • Ability to meet or exceed service-level agreements. • Lower service costs. • Increased customer satisfaction. • Higher employee productivity. • Higher rate of compliance.
SUPPLY CHAIN	<ul style="list-style-type: none"> • Frequent meetings with extended value chain in a rich, immersive environment. • Real-time supplier visibility into plant floor operations issues. • Collaborative prototyping between product designers and suppliers. 	<ul style="list-style-type: none"> • Value chain optimization and transformed manufacturer-supplier model, where suppliers play a role in process/product innovation. • Shorten problem resolution time frames. • Speed product development.
INNOVATION	<ul style="list-style-type: none"> • Engagement of partners, suppliers, customers, and business in idea generation and execution. • Collaboration with experts inside and outside the company. 	<ul style="list-style-type: none"> • Shorten product development lifecycles. • Speed decision-making process. • Easier access to expertise.
CUSTOMER INTIMACY	<ul style="list-style-type: none"> • Final customer acceptance testing on high-value products such as custom aircraft, complex machinery. • Frequent, immersive meetings with customers, and ability to discuss even sensitive topics remotely and on short notice. • Assistance in retail settings with high-ticket, custom products and services, such as kitchen remodeling. 	<ul style="list-style-type: none"> • Shorter customer acceptance cycle. • Competitive advantage by providing customer with personalized experience. • Faster decision cycles and opportunity for innovation, due to higher levels of engagement, trust, visual cues, and “face time.”

all final calibrations were performed correctly. Some systems allow the customer to control the video remotely. One custom aircraft manufacturer enables customers to take detailed tours not only of the final product but also during the build, to avoid rework at the end.

Used in this way, video can shorten customer acceptance cycles, move products out the door more quickly,

and lower their exposure to risk. Customers can scale their engineering teams more effectively, as these highly trained workers can conduct inspections from a centralized place.

Manufacturers are also able to reach out to customers they would ordinarily have no contact with—for example, by placing video in retail settings. In one case, a manufacturer is placing video booths in stores

to answer questions on a product that requires a lot of design decisions, providing more expertise than can be found in the store. Once an account is established, the customer can continue to work with the designer from home. “They’re moving the purchasing environment from the store to the home, and video is what’s enabling that,” Dean says.

In other cases, automobile manufacturers are inviting customers to watch via video key moments in the assembly of their cars. ^{7 8}

Top Action Items



As with any transformational effort, there is a fair amount of preparation that needs to be done to prepare the way for video adoption. Here are a few of the most important action items:

- **Establish the business case .** Clearly define the business outcomes expected with business video. Companies are realizing benefits beyond reduced travel costs. The true value of business video is found once you move beyond the executive suite and integrate it into business processes, accelerating time to market and fostering innovation.
- **Understand interoperability challenges.** Manufacturers should ensure the solution they choose can co-exist and integrate with their existing systems and platforms, in order to make a comprehensive collaboration business case work.
- **Ensure you have appropriate levels of bandwidth.** This is a particular concern for companies with regional offices that might use cable, DSL broadband, and other low-bandwidth technologies. This issue is driving innovation such as new compression algorithms, caching and multicasting. “In the next 18 months, we’ll see a lot of technology in bandwidth management that will open new capabilities,” Williams says.
- **Check storage capacity requirements.** As increasing numbers of employees create multi-megabyte video files, companies can quickly run into storage issues. Some of this can be resolved through implementation. For instance, live streaming video is less storage-intensive than archived video files. Some cameras

are easing the storage issue by offering built-in live streaming. In other cases, there are applications for handheld cameras that enable a user to stream a series of snapshots while talking with a live expert, rather than having to use a video stream.

- **Consider security requirements.** Security can be of particular concern when intellectual property is of high value, IDC’s Parker says. “Will you see a lot of cameras going through the door at Lockheed Martin? No,” he says. “In certain segments within manufacturing, it will be hard to get video in unless you think about encryption, IP protection, and digital rights management.”
- **Work on culture change.** Video transformation will also pose challenges for companies low on the maturity curve in terms of having a culture of innovation, in their business processes, or in their technology infrastructure. Manufacturers need to adopt a top-down, strategic perspective on how they plan to implement video throughout the enterprise, as it will greatly impact business processes and cause big changes for how they conduct business. A good approach, Dean says, is to start in one small area, learn about it, and grow the implementation from there. “It does need vision, direction, and forethought in terms of what may happen,” he adds.

Call to Action



In today’s challenging global economy, manufacturers cannot afford to play a game of inches when it comes to increasing productivity and driving innovation. Video in all its forms can speed processes by an order of magnitude and transform manufacturers’ relationships with customers and suppliers, building more relevant business models for the future.

As Forrester says, “Serious companies are investing serious time and money to improve clarity and speed of communications and collaboration at their companies.” It’s time for manufacturers to move forward with implementing complete, secure solutions that capture, store, archive, retrieve, and transmit video content.

The future of communications is video, and manufacturers that understand and embrace its promise will reap its rewards.



For more information:

Cisco Website: www.cisco.com/go/manufacturing

MA Innovation Channel:

www.managingautomation.com/innovation

Contact: Dan Kern,

Cisco_Systems_dakern@cisco.com