APRIL 2020

Manufacturing in a Crisis - Keep Communicating

WHITE PAPER COMMISSIONED BY ESCHBACH DURING THE COVID-19 CRISIS

AB Risk Limited

www.abrisk.co.uk

AB Risk Limited I Andy Brazier
T: +44 (0)1492 879813
M: +44 (0)7984 284642
E: andy@abrisk.co.uk

Andy Brazier is a risk consultant specialising in human factors and process safety. He has a chemical engineering degree, PhD and vast consultancy experience. He has worked as a consultant since 1996 and founded AB Risk Limited in 2008.

CONTENTS

1 Executive Summary

Communication is critical to manufacturing. But it is not always easy, even in normal times, and it becomes far more difficult in a crisis. Face-to-face communication is always best and we rely on informal, chance encounters more than we may realise.

A crisis can result in higher workload, reduced staffing, people carrying out unusual tasks and working in different locations. Opportunities for face-to-face communication may be reduced and people under pressure communicate less well. In a major crisis these effects can apply to all stages of the supply chain and a normally robust process can quickly fall apart.

> “Companies need to be prepared for crises that can happen at any time.“

Companies should always be prepared but crises are unpredictable. You need to react and adapt and changes need to be managed properly to ensure they do not create unacceptable risks. This has to be done quickly and decisively. Technology can help overcome changes that affect communication, but only if managed properly to support business processes. Introducing technology in a crisis without proper control can be catastrophic.

This Whitepaper has been commissioned by Eshbach in response to the COVID-19 pandemic. Their Shiftconnector® product provides a very powerful technology solution to supporting communications that are critical to manufacturing including shift handover and communication between frontline personnel and management, engineers and technical support.

The current global crisis has required companies to adopt social distancing, which has inevitably resulted in significantly reduced face-to-face interactions. In these circumstances communication can degrade with catastrophic consequences if not managed effectively.

Guidance on identifying and managing changes taking place as a result of social distance is given and a method is given for monitoring risk on a daily basis.

Although written in response to the current crisis the information in this Whitepaper should be considered good practice at all times. Companies need to be prepared for crises that can happen at any time. Most will be smaller and more localised but can still have a significant impact on a business. Being able to survive this current crisis will make companies much stronger for the future.

2 Communication is Critical to Manufacturing

One of the reasons that humans can achieve so much is our ability to share ideas, information and instructions. We use multiple methods of communication to allow us to do so much more than we can do on our own.

Every manufacturing company relies on its employees communicating with each other. It is essential for coordinating activities at all stages in the process. Also, it is essential for keeping people engaged and motivated.

Having the ability to communicate does not mean it is always easy. Communication errors are very common. One of the fundamental reasons for this is that language is not precise and leaves lots of opportunity for misunderstanding. Combined with limitations in the human ability to receive, store and process information; it means we have to work hard to make sure important messages are given and received correctly.

Communication is not defined by the information that is sent out. It is the way messages are understood and acted on that matter. This is more difficult than it sounds.

2.1 Face-to-face is best

Being in the same room as someone you are communicating with is always the best option. This is not because we use different words. It is because it gives us the opportunity to use lots of different mechanisms to make sure the correct messages are getting through.

One of the most valuable aspects of face-to-face communication is discussion. It allows the people involved to respond dynamically to what is being said; varying the message until the proper meaning has been understood. Someone receiving a message has the chance to ask questions and the person giving the message can vary what they say until they are satisfied that they have been understood correctly.

Of course communication via telephone and two-way radio (walkie-talkie) also allow discussion to take place in a way that other methods such as sending an email or written report do not. However, face-to-face gives us a number of other mechanisms that further enhance communications.

When communicating with someone who is physically with us we use multiple resources that are readily to hand. We may point to a paragraph in a report, a number on a computer screen, a light on an alarm panel or an image on a CCTV monitor. We may show a physical item such as a damaged piece of equipment or a chemical sample; presenting either the actual item, a photo or model. In fact, being able to see multiple sources of information at the same time can be valuable in its own right as it demonstrates the scale or complexity of an issue being discussed. As the phase goes, you only understand something if you can "see it with your own eyes".

> "It is the way that messages are understood and acted on that matter."

The other big advantage of being in the same room is non-verbal communication. This is beneficial, even without any formalised skill in understanding it. If you are with someone you will immediately know whether

they are alert, interested, confused, worried or stressed. These factors all make a big difference to the way someone understands what they are being told and allows you to tailor your message to suit them.

2.2 How do we cope?

Communication errors have been implicated in many accidents over the years. This reinforces the messages above that it is a complex and error prone activity. But we actually cope most of the time. This is because there are usually lots of opportunities to notice our errors and correct them. Also, protection is often in place that means even if an error is not discovered it does not result in an accident.

For example, if I set off to do a task based on some information received from a colleague I will usually do my own checks when I arrive at the work-site. Seeing that things are not how I expected them to be may prompt me to think about what I was told, often saying to myself "now I understand what they meant." Alternatively, I can return to the colleague and ask them to repeat the message, which I have a much greater chance of understanding this time around.

In other circumstances I may perform the task the incorrectly due to my misunderstanding. This may trigger a safety system that means an accident is avoided. It may interrupt production, but at least no one is hurt.

The multiple opportunities to recover errors like this are sometimes known as 'layers of protection.' Each layer reduces the likelihood that the error will result in an accident. However, none of these layers are perfect and so every now and then, no matter how many there are, an accident will occur. This explains why accidents do occur only infrequently, even though communication errors are happening all of the time.

2.3 Formal and informal

A lot of communication takes place formally in business. We attend pre-planned meetings and presentations; and we write and receive reports. Organisational charts define who we should be communicating with and procedures tell us when and how we should communicate.

However, a lot of communication takes place informally. If we want a quick response to a question or instruction we will pick up the phone, send an email, use a direct messaging service or simply get off our chair and go and see the person. And there are many chance encounters where we pass someone in the corridor, happen to go to the coffee machine at the same time or even bump into them outside of work; and we use this opportunity to ask a quick question or pass on a piece of information. In fact, seeing someone by chance often prompts us to communicate something that we may have forgotten about or considered not important enough to make a special effort. It is easy to underestimate these as being trivial (and lots of them are) but this is not always the case. Also, these chance encounters allow our communication styles to evolve to suit the individual. We get to know each other better and this helps us communicate with each better.

3 Things Change in a Crisis

A crisis can have a big impact on the way business is done and this can affect communication. Increased workload caused by greater demands or reduced staffing (or both) means that people have less time to communicate. People carrying out unusual tasks or covering roles they are not familiar with means that the requirements for communication are not understood. People working in different locations reduce the opportunities to meet face-to-face and those chance encounters that are so beneficial for informal communication to take place.

Behaviourally, people do not communicate so well in a crisis. They tend to become more focussed on what they need to do and so think less about what they need to tell others. They feel under pressure to resolve problems themselves and so less likely to ask questions. When we are stressed we tend to be more abrupt in what we say and invite far less discussion.

All systems have a degree of resilience that mean they are able to withstand isolated problems including individual communication errors. Each stage of the delivery chain has its own set of formal and informal checks and balances. These capture errors when they are small and stop them progressing to cause a major problem.

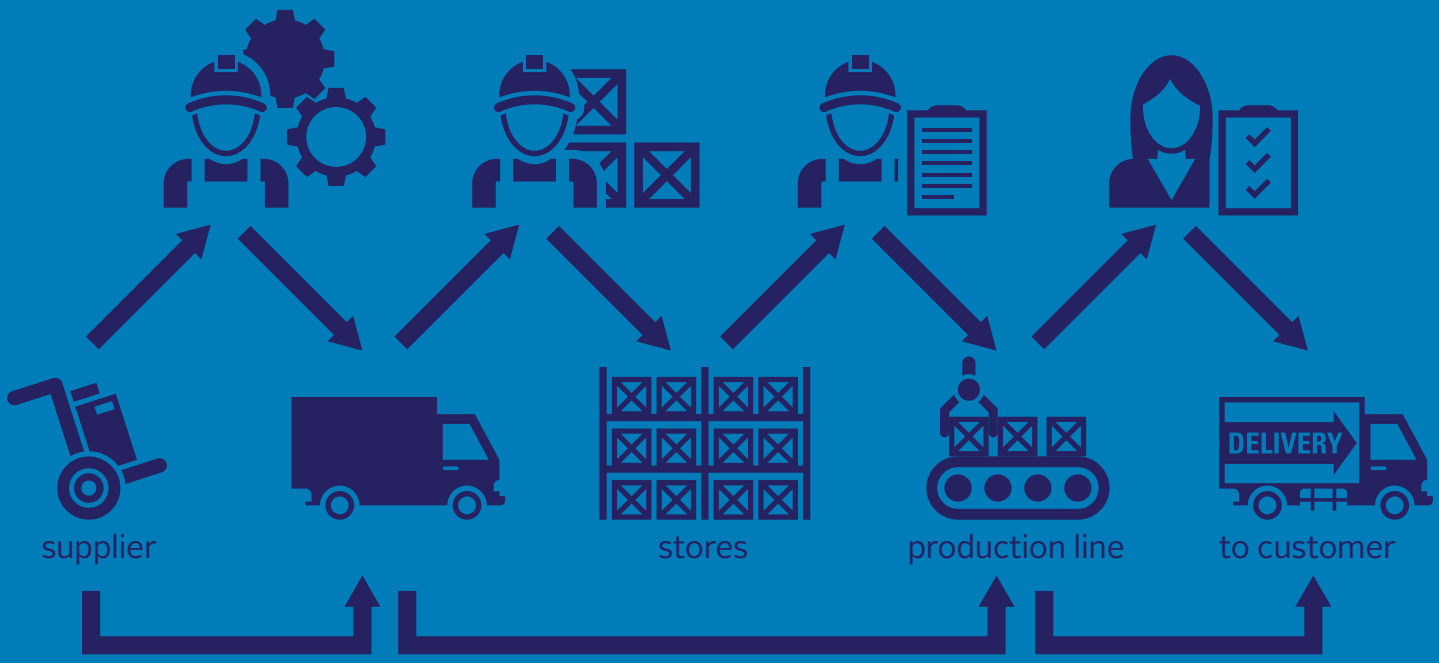
A major crisis can affect every part of the delivery chain. Not only does this mean errors occur more frequently, the check and balances that normally provide protection become less effective.

3.1 The whole supply chain is affected

As an example, if you are a manufacturing company you will require supplies to be delivered to a certain specification. These can be raw materials, equipment components, packaging or labelling. Errors can happen in making these and if they are not detected they can, in some circumstances, mean your product does not work as intended and it may actually be unsafe. In normal times you would expect your suppliers to conduct their own quality assurance before they ship the supplies to your site. You would carry out your own checks when they arrive at site and again before they are used. Your customers will do the same when they receive you product and before they use it.

If a major crisis creates a high demand for your product your customer may phone you to ask you to deliver sooner than planned or in greater quantities. Immediately you feel the pressure and are quickly on the phone to your supplier to tell them they need to work faster. They agree to do this but need to take a few short cuts, which may means some of their normal checks don't get done. When supplies arrive at your site they may get sent straight to the production line. This is a good way of optimising production but may mean one or more normal steps in the process are missed, reducing the opportunities to pick up mistakes made by your supplier. Finally your customer may let their guard down as well. If you already have a good relationship they will know that your products are usually very good

People involved in normal times



so feel that there is no need to check what you send them. But of course things are no longer normal and your past performance should not really be taken as a guarantee of what you are producing in the crisis.

3.2 Managing a crisis

Companies should always aim to be resilient but crises are unpredictable. It is important to react to what is happening but it is also important to manage the situation effectively. You need to balance the immediate problem, which is handling the crisis, with the wider business requirements including health and safety, product quality, traceability and long term impacts to business continuity and profitability. There may be pressure to keep operations going but you need to keep in mind that this cannot be at any costs and so shutting down has to remain one of your options.

One way of managing a crisis is to focus on the things that have or will change in the way you conduct your business. This is done by defining your normal arrangements and then identifying the differences and determining whether the changes could pose a risk to your business. If the changes have already happened (i.e. a rapidly developing crisis) you should use the process to identify what you need to do manage the risks that you are already facing. If you have more time you can determine how the changes can be implemented in a way to minimising the risks.

3.3 Technology can help

Advances in hardware, software and networks have provided us with a range of solutions that can, if used wisely, fill some of the gaps created when things change in a crisis. The speed of the internet and availability of huge amounts of data storage at modest cost have provided us with new ways of communicating that can be very effective at over-coming some of the barriers that can be encountered when people are required to work in different ways.

Introducing technology requires careful management. First you have to select the correct tool for the job. Secondly, you have to integrate it into your business processes. Finally, you have to equip people with the skills they need to use it. Technology should support

your business processes, not define it. Although, introducing technology should also be an opportunity to evaluate your current practices in order to see if there are opportunities to improve.

Poorly managed introduction of technology can have a detrimental effect. This can be catastrophic in a crisis when everyone and everything is already stretched close to breaking point.

3.4 Shift handover

Operating a continuous process requires people to work shifts. Continuity is the key to ensuring safety and efficiency; and relies on good communication between shift teams. The way they handover between shifts is one of the most critical activities undertaken at most manufacturing and process sites.

One of the most important pieces of advice is that shift handovers should always be conducted face-to-face between individuals working in the same role. This gives the person about to start their shift the best opportunity to understand what is happening and hence what they need to do to keep the system running safely and efficiently. But this can be disrupted in a crisis. There may be less opportunity to meet face-to-face or it may stop altogether. Staffing shortages may mean that some roles may not be filled on every shift so it may not be possible to handover to a particular individual. There is likely to be more to report adding to the quantity and complexity of the information that has to be communicated. And shift workers are likely to be fatigued and stressed.

Good handovers do not just happen in the 10 or 20 minutes that the shift workers spend together. They are created throughout every shift by the information that is collected and recorded, by the preparation done immediately before the handover and in the way that the new shift deals with the information they have received. Good practice requires that a good quality chronological log is kept continually up to date, time is allocated at the end of each shift to prepare a handover report and time is allocated at the start of each shift for a team meeting and systems review to validate the information received.

Technology can be a great help in supporting good shift handover.

The chronological log is a good place to start. It is important because it is a record of what happens and when. Without a good log people are likely to forget to communicate important information at handover or create confusion if they get the details wrong (e.g. time, duration, order of events). A technology solution like Shiftconnector® makes it easy for people to keep their chronological log but it has additional advantages. The first is that is allows protocols to be established that encourage better quality information to be recorded. Instead of just recording what happened the protocol will prompt for additional details (e.g. who, what, why?). Another advantage is that it uses decentralised data acquisition methods that mean everyone can keep their own log and remains accountable for the information that is recorded, but the records can be seen by anyone who has the appropriate credentials.

> “Define your normal arrangements and then identify the differences and determine whether the changes could pose a risk to your business.“

Preparing for a shift handover allows communication to be focussed on the most important information. An end of shift report is an excellent way of doing this. Again, a technology solution like Shiftconnector® can help by making it easy to write this report. Records from the chronological log can be selected and additional commentary can be added to explain why it is important at the time of handover. Templates can be set up that ensure information is presented in an appropriate order with status of critical systems being the highest priority and information about ongoing activities and priorities

for the following hours being of particular importance to the shift that is starting work. Again, the use of decentralised data acquisition means that information from any log or report can be included in the handover report.

The reality is that shift handover is a critical but complex activity at any time. A technology solution like Shiftconnector® can quickly pay for itself by improving communication and avoiding problems with continuity between shifts. However, in times of crisis these benefits are amplified. The fact that information is available to whoever needs it is particularly important because in a crisis you cannot be sure who will be working when or where. This includes scenarios where job roles cannot be filled due to staffing shortages that in other circumstances could result in important information being lost or overlooked.

Conducting good shift handovers when face-to-face contact is not possible poses some very difficult challenges. Electronic chronological logs and handover reports can assist greatly because people can talk through the information on the phone; and being able to see each other using webcams goes some way to overcoming the fact that people are not in the same room. The ability to share computer screen displays, particularly from control systems, and using photos and other images are other useful ways of allowing interaction and prompting discussion.

You should not expect people to be naturally good at shift handover. They need to be skilled at communication and share common goals. This applies at all times, but particularly during a crisis. Good procedures emphasising how to communicate effectively backed-up with appropriate training, possibly via a webinar if people cannot attend in person, are essential.

3.5 Management and technical support

Front-line workers (whether they work shifts or not) have a clear role in keeping the process going but they cannot do this effectively over the longer time without support from managers, engineers and other technical staff. This requires good two-way communication. Managers and technical staff need to know what is happening on the process so that they can make the right decisions. They may be able to determine some of this from process data but to really understand what it means they need to know what people are doing and observing. Also, front-line workers need to understand the instructions and advice they are given so that they can act accordingly. Information that is communicated needs to be accurate, but also consistent to ensure everyone is working towards a common goal.

> “A technology solution like Shiftconnector® can quickly pay for itself by improving communication and avoiding problems with continuity between shifts.“

During normal times managers and technical staff can meet up with front-line workers and each other whenever they like. Some of this will be via formal meetings but a lot of it will be informally. Popping into the control room or process areas is a useful way of them not only talking to front-line workers; but it also allows them to see for themselves what is really happening. Also, they can access the data and other information they need easily; and if they cannot find what they want they can go and look for it.

Managers, engineers and other support personnel will inevitably be affected in a crisis. The novelty of the

situation will mean the decisions they need to make will be more complex and urgent. There may be fewer people available due absence or re-deployment (i.e. providing cover for front-line personnel); and people may need to work from different locations (e.g. from home). These will all affect the way they can communicate with colleagues and access the information they need.

Most modern control systems provide the facility to access data remotely. There are clear security implications and a reliance on network capability meaning that these functions are not always enabled or significant restrictions are put in place.

Information recorded by front-line personnel is another way that support personnel know what is happening. The chronological logs and handover reports supported by technology solutions like Shiftconnector® can be particularly valuable; and security and bandwidth issues are generally much easier to manage because they are independent of critical systems.

Obviously support personnel can phone front line workers if they need information and use video to enhance those conversations. But care is required that these inquiries do not cause nuisance and distraction. Also, it is important that the responsibility for actions and decisions being made at the front line does not become confused. Support personnel should schedule when they are going to call-in and to make sure arrangements are in place to maximise the effectiveness and minimise the time taken. Being able to share screens and taking effective notes with clear actions and responsibilities will help greatly.

Although the introduction of computers several decades ago allowed us to move away from relying on paper we still tend to record a lot of data and information in stand-alone reports. Some may be circulated by email and hard copies may be available in defined locations. This tends to work during normal times because the person who generated the report knows where it is and if someone else needs it they know who to ask. In a crisis these arrangements can quickly fail. If someone is absent their colleagues may not know where to look for the report or may not be able to access it. If you are working from home it is no good knowing that there is a hard copy on your desk at work. Putting everything on a network drive can overcome this to a certain extent but to be effective it has to be very well administered. One of the main concerns is making sure you have the most up to date version of a report, which is not always clear.

Technology solutions like Shiftconnector® allow you to switch from recording everything in pages of documents to a record based approach. This means each piece of information has its own identify and value. Reports can be compiled that use the appropriate records; but each record can be used by anyone that has appropriate access. This means that an important piece of information can be accessed from a single source rather than being duplicated, which introduces the risk of error and makes it difficult to trace its origin. Records are far easier to search and sort than information that may be stored in documents; and it is far easier to link them with other business systems (e.g. asset or maintenance management, resource planning etc.).

3.6 Keep maintaining

All systems need to be maintained. Some of this planned and some is in response to breakdown. Communication is critical in making sure maintenance is carried out effectively. Operations need to notify maintenance

teams about work that needs to be done, and better quality information allows maintenance to be properly planned and implemented. Also, maintenance personnel need to keep the operations teams informed about what they are doing on site, the impact it may have on operations, the status of equipment and when it is likely to be returned to service. A lot of this communication normally takes place face-to-face at the worksite.

Maintenance appears to be an activity that can be postponed or even cancelled in a crisis. If the process is still operating it can appear that maintenance is not required and should be avoided in case it causes any disruption. This may be true in the short term but is likely to be counterproductive if the crisis continues for an extended time.

There are two problems with omitted maintenance in a crisis. The first is that unavailability of equipment can make operations more complex. It may be possible to manage in normal situations, but when you are already under pressure this can lead to serious problems. The other is that processes are likely to be operated under more challenging conditions (e.g. higher throughput) and operations personnel are likely to be under more pressure. This can result in a greater reliance on safety and other back-up systems and if they are not being maintained they may fail at the time when they are really needed leading to much greater consequences.

Electronic maintenance management and permit to work systems are already used widely in industry and should be appropriate for use in a crisis. But they do not address the communications requirements that can be degraded in a crisis. A technology solution like Shiftconnector® can have a role by making sure activities on site are properly logged and equipment status information is kept up to date and visible. Also, allowing maintenance teams to access information in chronological logs and handover reports allows them to better understand the operational issues being experienced and to prioritise their workload.

4 Managing Change in a Crisis

The table below is intended to give you a simple method of assessing changes occurring in a crisis so that you can implement controls to management associated risks.

CHANGE	RISKS	MITIGATION
Reduced staffing levels	• Unable to handle normal workload • Unable to respond to unplanned events • Fatigue • Stress	• Prioritise routine tasks • Focus on one thing at a time (reduce multi-tasking) • Postpone or cancel unnecessary tasks • Shutdown unnecessary processes • Review emergency procedures to suit staffing • Monitor actual hours worked. • Consider non-work sources of stress
People in unfamiliar roles	• Unable to perform tasks to required standard • Support required from other team members (distraction)	• Assess team competence to ensure all requirements covered • Assign mentors • Improve operating procedures • Create accelerated learning plans for critical skills
Different work/ shift patterns	• Fatigue • Morale from external effects • Options to cover absence • Communication within and external to the team	• Design new pattern to minimise fatigue risk • Be aware of family arrangements (e.g. childcare) • Plan absence cover arrangements into the pattern (on-call rota) • Introduced additional planned communication events
Different shift handover	• Communication method • People involved • Scope/area of responsibility	• Electronic shift logging • Update handover procedures • Set-up work stations to optimise communication. • Improve communication skills • Increase duration of shift end planning, handover, shift start team meeting • Require all team members to perform handovers
Remote working	• Poorer communication • More frequent calls (distraction) • Confused responsibilities. • Information unavailable	• Set-up work stations to optimise communication • Schedule communication events • Plan communication to maximise benefits and minimise time taken • Reinforce roles and responsibilities • Record based information to replace page based reports

5 Assessing Risks Dynamically During a Crisis

The following table gives examples of criteria that can be monitored during a crisis to give an indication of daily risk.

CRITERIA	OPTIMUM DEFINED IN.	ACTUAL	ASSESSMENT
Staffing levels	Staffing assessment	Required staffing achieved?	Good/OK/unacceptable
Team competence	Competence matrix	Team has all required competencies?	Good/OK/unacceptable
System status	Critical systems register	All critical systems operational?	Good/OK/unacceptable
Operating conditions	Plant manual	Working within capacity with some margin?	Good/OK/unacceptable
On-site support	Departmental procedures	All support in place?	Good/OK/unacceptable
Remote support	Management procedures	All support in place?	Good/OK/unacceptable
Physical health of personnel	Fatigue risk assessment. Sickness policy.	Everyone rested and healthy?	Good/OK/unacceptable
Psychological health of personnel	Stress risk assessment.	Work and non-work stress minimise?	Good/OK/unacceptable

The assessment results based on the criteria above can be used as follows.

ASSESSMENT	OUTCOME	ACTION
>4 OKs or >1 unacceptable	Red	Stop operations and put into a safe hold position until conditions improve.
<4 OKs or 1 unacceptable	Amber	Reduce workload. Increase vigilance and be prepared to stop operations.
All good	Green	Operations can continue as planned

WHITEPAPER COMISSIONED BY ESCHBACH DURING THE COVID-19 CRISIS

Contact eschbach for more information on:

- Shift Handover and Collaboration Maturity Assessment
- Best Practice Workshop
- Free Digital Solutions Evaluation

www.shiftconnector.com
info@eschbach.com

Europe: +49 (0)7761 55959-0

USA & Canada: +1 (617) 618-5261

SHIFTCONNECTOR® *io*

eschbach

eschbach GmbH

Schaffhauser Str. 97
79713 Bad Saeckingen
Germany

eschbach North America

31 St. James Avenue
Boston, MA 02116
United State

About eschbach and Shiftconnector

We help production teams stay safe and work smarter through better information sharing and collaboration. Eschbach provides solutions for effective shift handovers, transparent team communication and increased asset performance.

For over 15 years, our award-winning Shiftconnector® solution has brought shift teams together to improve safety and performance. In that time we have continuously developed Shiftconnector® in close cooperation with leading organizations in the chemical industry. Companies like BASF, Bayer, Roche and DuPont engage their workforce with our easy to use, yet powerful solution.

Eschbach is a provider of manufacturing solutions and headquartered in southern Germany with offices in Boston, Mass.