

# Aviation Study 2015

## Managing the Global Value Chain



A study by Staufen AG and the  
German Aerospace Industries Association (BDLI)

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## EDITORIAL

As hardly any other industry, the German aerospace industry stands for innovation and quality. The 300 - 500 German companies in this industry - depending on how they are counted - have for decades provided their customers with state-of-the-art technology „Made in Germany“, whether as large system manufacturers or small suppliers. Correspondingly, growth in this industry has been rapid over the last four decades. The number of employees could be doubled, turnover almost quintupled.

So everything is sunshine and roses for these companies and their more than 105,000 employees in Germany? Not at all. The boom in the business above the clouds will continue - an end is not in sight for a long time to come. But the headwind is getting stronger. Small and Medium Enterprise companies in particular are at risk of encountering turbulences if they do not put their procedures and processes under very close scrutiny. Because pressure from the airlines on aircraft manufacturers and further down the supply chain to the smallest supplier has increased massively and will increase even further. This forces companies to take action.

The industry is about to face massive changes that hardly any company can escape from. Germany as an industrial location is also affected by this. With the growth of the Asian aerospace markets, the development and production facilities in this industry will move to the Far East over the coming years. For that reason, companies see it as their most important task now to build up a presence on the most important key markets in Asia. For that reason, one in five managers in the aerospace industry predicts a reduction in development and production sites in Germany.

It is imperative to accept the challenges arising from this trend. This also includes making development and production as fit for the future as possible through the implementation of Lean most effective and efficient processes and structures. This is the only way to ensure that we continue as one of the globally most important locations for the aerospace industry in the future.



**Dr. Jens Zimmermann**  
Executive Board Member,  
Staufen AG



**Harald Knoke**  
Senior Manager,  
Staufen AG

## ABOUT THIS STUDY

Together with the German Aerospace Industries Association (BDLI), the Staufen AG consultancy conducted a survey about „Managing global value creation chains in the aerospace industry“. One aim of this survey was to identify the challenges that the German aerospace industry has to face. The other is to assess possible solutions in order to master these challenges successfully.

### The participating companies

Altogether, 103 managers from all sectors of the German aerospace industry took part in this survey: aircraft manufacturers (OEM = original equipment manufacturer), module and parts suppliers (Tier 1, Tier 2) and companies from the service sector (MRO = maintenance, repair, overhaul). All of them expressed their views on the status quo and their expectations for the years ahead.



## BACKGROUND:

### Aerospace industry is changing

For decades, there has been an unwritten rule in the aircraft industry of a division according to size: regional aircraft for “less than 100 Passengers” and larger commercial aircraft for “more than 100 Passengers”. Within each market segment, competition between the few suppliers was fierce, but the segments hardly overlapped. In the regional aircraft market, a handful of manufacturers competed with each other, for larger aeroplanes, the competition was mainly between Airbus and Boeing.

This situation has now changed. Manufacturers of regional aircraft now break into the phalanx of Boeing and Airbus. They focus ever more on developing aircraft for more than 100 passengers. At the same time, new manufacturers appear in the aerospace sky. These include for example the Commercial Aircraft Corporation of China (Comac), the Japanese Mitsubishi Aircraft Corporation and also Suchoi from Russia. None of the three has as yet conquered a significant share of the market, but they all need to be taken seriously as future competitors.

For example, China’s state-owned Comac is right in the middle of developing its medium-range C919 plane, with its maiden flight planned for 2015. The aircraft with space for up to 170 passengers could go into series production in 2016 and would compete with the Airbus A320 and Boeing 737 from 2017. It is not only supposed to be cheaper, but also able to keep up technologically with its Western competitors.

While the Far Eastern competition launches new aircraft models, a look at the traditional manufacturers presents a different picture: after the market launches of the Boeing 787 Dreamliner (2011) and Airbus 350 (2015), no new models are expected from either manufacturer. Instead, over the coming years they will develop new variants based on existing models. The focus will be on models with greater passenger capacity, lower consumption costs and greater ranges. This reduces the costs associated with a completely new development.

On the whole, the aerospace industry worldwide is about to face major changes. Economic dynamics and the impending changes in this growth industry also force suppliers continuously to adapt their processes and production methods. This applies in particular to German suppliers who are mainly from the SME sector.

This study shows where the industry itself sees the greatest challenges at the moment and how they are going to be faced. For the aerospace industry, it is particularly important to find answers to the following questions: How can the industry react to the enormous price pressure and to specifications and modifications introduced into the production process at a comparative late stage? Where will production and development be located in the future? And: What measures need to be taken to ensure that production in Germany remains competitive? The focus in the survey is on civilian aviation.

## Three major spheres of activity

### CHALLENGES ARISE FOR THE AVIATION INDUSTRY IN THESE THREE AREAS IN PARTICULAR:

#### Finance and business acquisition

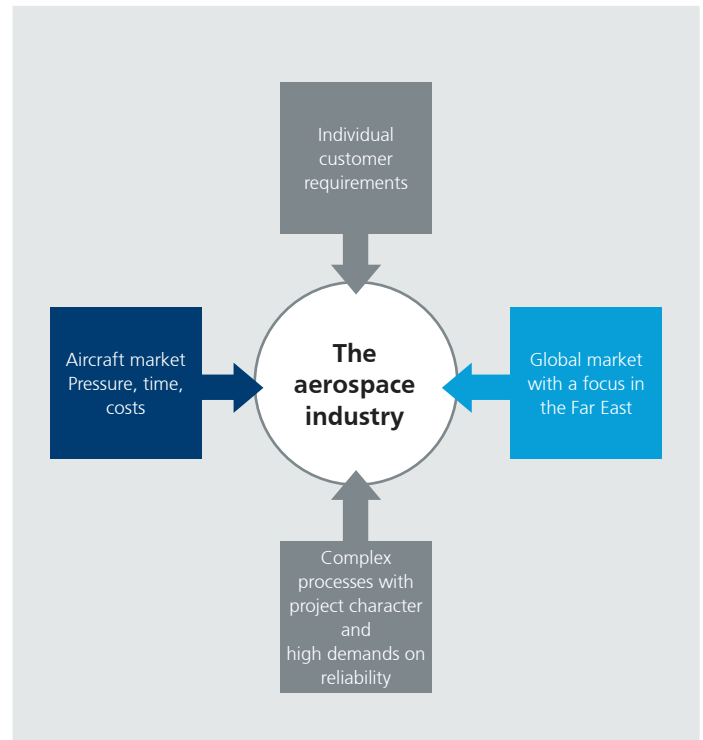
Over recent years, competition between airlines has become noticeably more fierce. Established European and US airlines have come under pressure from two sides: on the one hand from budget airlines operating newer planes with lower operating costs, and on the other from Arabian or Asian airlines offering premium services. This pressure has been passed on to aircraft manufacturers and their entire supply chain, because more economical and cost-effective products have to be brought to market as quickly as possible.

#### Operational business

The great complexity in aircraft manufacturing goes hand in hand with an absolute focus on safety and reliability. Characteristic features of projects include individual customer requirements as well as a number of innovation requirements such as lower fuel consumption and change request that are put forward only late into the production process. Also, compared to other industries, only a comparatively small number of units are being produced. This applies equally to all companies within the value creation chain.

#### Macro-economics

By its very nature, the aerospace industry has a global focus. However, not all parts of the supply industry have yet followed the great migration trend of recent years towards the Far East.

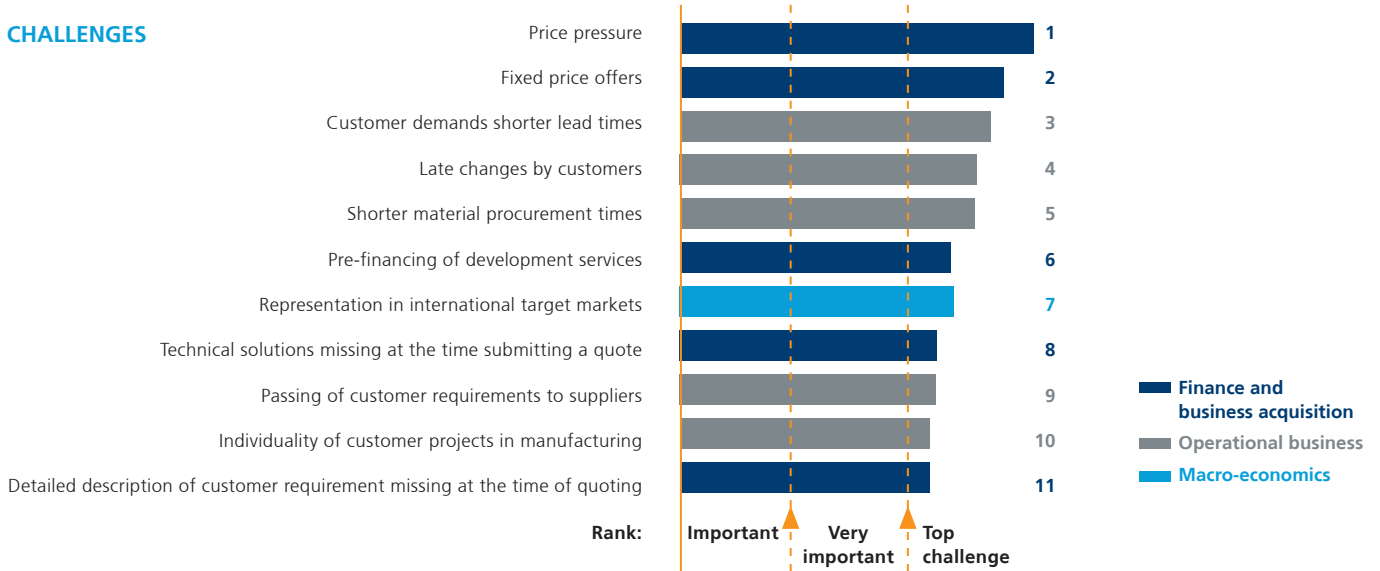


„The aerospace market is currently undergoing a period of restructuring and consolidation in practically all branches. In addition, there will be new OEM in the markets in Asia, Russia as well as North and South America for commercial aircrafts. A successful company in this environment needs to have a distinct look at the overall market changes and the strategic and tactical options. This is the reason why Broetje Automation is located with its subsidiaries within each significant region. Completed by a high implementation speed within the local value stream, the company can count itself among the top league of its market segment.“

Bernd Schröder, CEO, Broetje Automation GmbH

# Central results: Price pressure as the greatest challenge

## TOP CHALLENGES



The most important challenges for companies at present arise from high price pressure (Rank 1) and the trend towards fixed-price quotes (Rank 2). Of the eleven most important problems listed here, there are three more that belong to the area of financing and business acquisition, currently the greatest concern within the industry: pre-financing (Rank 6), missing technical solutions at the time of quoting (Rank 8) and lack of detailed information about customer requests at the time of quoting (Rank 11).

However, the operational business also presents companies with great challenges, as shown by the topics listed on ranks three to five. These are lead time reductions by customers (Rank 3), late change requests by customers (Rank 4) and short material procurement times (Rank 5). By contrast, only one of the eleven greatest challenges of the aerospace industry falls into the macroeconomic sector, namely representation in international target markets (Rank 7).

## VERY IMPORTANT CHALLENGES



Participants in the survey identified eleven additional challenges rated as „very important“. These are dominated by the operational business and macroeconomic topics.

The following also became obvious: if process complexity and international competition increase further, these aspects would quickly rise to the top category of greatest challenges.

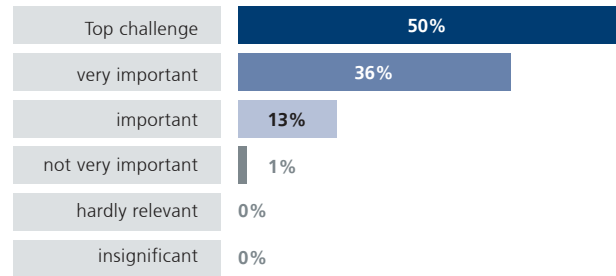
# Sphere of activity: Finance and business acquisition

## TIER 1 SUPPLIERS IN A PRICE SQUEEZE

One in two of those questioned sees the increasing price pressure as the greatest challenge for his/her own company and the German aerospace industry as a whole. A further 49 percent still rate price pressure as „very important“ or „important“, respectively. The pressure on prices is by far the greatest challenge that German aerospace companies have to deal with now and in the years ahead.

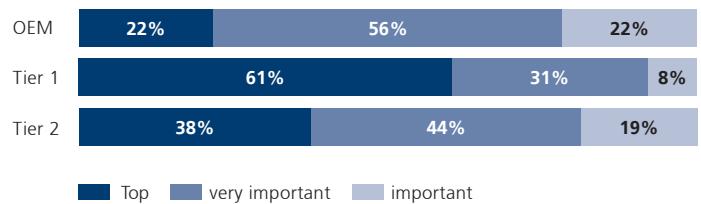
An interesting picture emerges if this is broken down according to different positions within the value creation chain: only one in five interviewees from an aircraft manufacturer named price pressure as the greatest challenge, but more than 60 percent of Tier 1 suppliers. It seems that Tier 1 suppliers do not pass the price pressure on to subsequent companies in the supply chain, because only just over a third of Tier 2 suppliers lists this aspect as a „top challenge“.

### Price pressure – Overall assessment



**CHALLENGE:** “Price pressure from customers is on the increase.”

### Price pressure – Distribution pattern



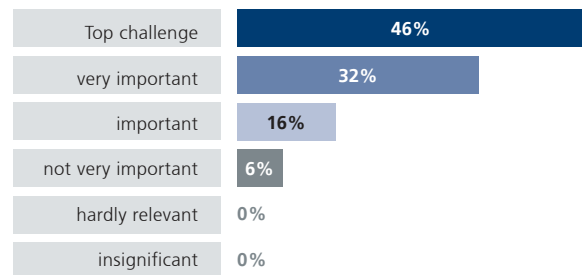
(Totals of not exactly 100% are the result of rounding inaccuracies)

## SMALL SUPPLIERS LITTLE AFFECTED BY LATE CONFIGURATION CHANGES

The challenge posed by fixed price quotes is ranked as the second most important challenge in the overall ranking (p. 7). Here, too, the same phenomenon is apparent: risks are mainly borne by Tier 1 manufacturers, because suppliers further down the chain do not assess this problem nearly as critically as their customers.

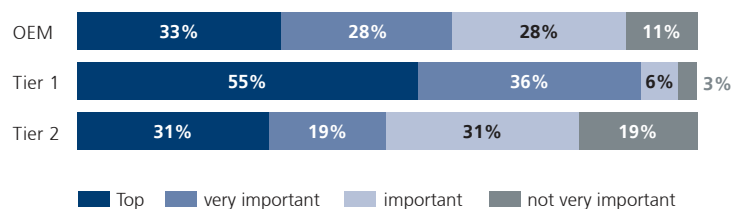
The reason: Tier 2 suppliers often supply individual parts that are less dependent on late configuration changes by the airlines - change often only affects the quantity supplied. Tier 1 suppliers are system suppliers. They develop and produce complete systems in multiple variants so that they are prepared for the airlines’ selection and configuration options.

### Fixed price quotes – Overall assessment



**CHALLENGE:** “Customers try to minimise their own risk by more frequently demanding fixed price quotes from their suppliers.”

### Fixed price quotes – Distribution pattern



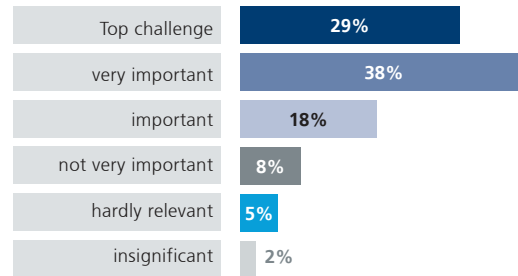


## SHIFTING DEVELOPMENT COSTS TO SUPPLIERS

As mentioned earlier, aircraft manufacturers increasingly shift the responsibility for complete modules and systems to the suppliers. For Tier 1 suppliers, this means that they have to pre-finance the development costs for these complete systems. As the study shows, this drives many of them to the limits of their financial capability

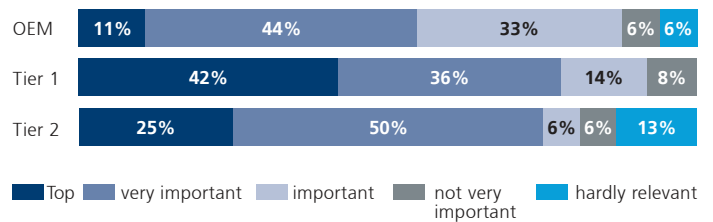
85 percent of those questioned thus consider pre-financing an important problem, three in ten companies even see this as one of the top challenges. In the overall ranking, pre-financing is on Rank 6 (p. 7).

### Pre-financing – Overall assessment



**CHALLENGE:** “Customers demand ever more frequently that suppliers pre-finance development costs.”

### Pre-financing – Distribution pattern



## Sphere of activity: Operational business

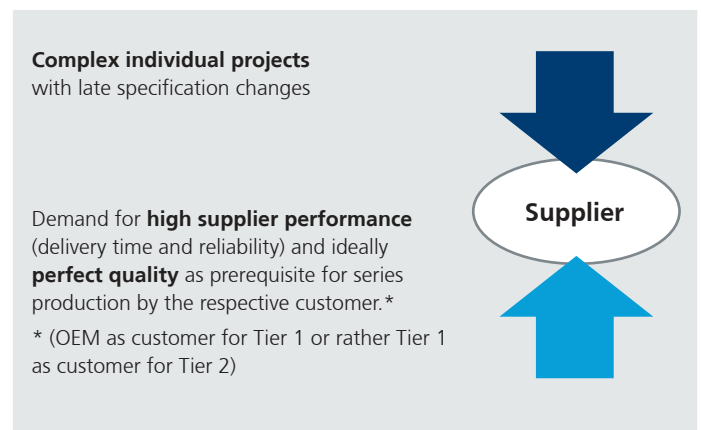
### OPPOSING CHALLENGES

Aerospace industry suppliers find themselves in a quandary; they have to set up their operational processes in such a way as to meet totally opposing requirements. On the one hand, there are complex individual projects with changes and specifications introduced to the production process at a very late stage. Many suppliers meet this with individual piece production. On the other hand, growth in the industry and price pressure require new solutions with more efficient processes and series production.

The larger aircraft manufacturers as well as some Tier 1 suppliers have switched their manufacturing processes to taktet line production. Reliable adherence to delivery dates, a zero-error strategy and absolute quality requirements are essential for long-term survival in the market.

„Aerospace projects are by their very nature extremely complex, not just because of the technologies involved, but especially because of the cooperation of different agents in the product development and the production process. At the same time, these projects are characterised by the airlines’ very individual requests as well as frequent and at times very late changes to configuration and details. As systems suppliers, this does not only present us with problems in the production process, but our development and approval sections also have to be able to react quickly to such changes. Outstanding project management with an efficient use of processes and their continuous improvement is one of the outstanding key factors in order to meet the high quality demands of the aircraft manufacturers in terms of technology and also in terms of processes.“

Rainer von Borstel, President of Corporate Division Board Diehl Aerosystems, Diehl Aerosystems



The aerospace industry is seeking hard for solutions in order to deal with increasing production figures, reduce lead times and still to remain flexible in order to accommodate individual customer requirements arising late in the production process. Participants in the survey attach great importance to the „Operational business“ aspect. As the most important challenges were seen the customer demand for reduced lead times (Rank 3 in the overall ranking, p. 7) as well as reduced material procurement times (Rank 5). However, these requirements are difficult to reconcile with the other top challenges: late change requests by customers (Rank 4), the individuality of customer projects (Rank 10) and the complexity of processes (Rank 12).

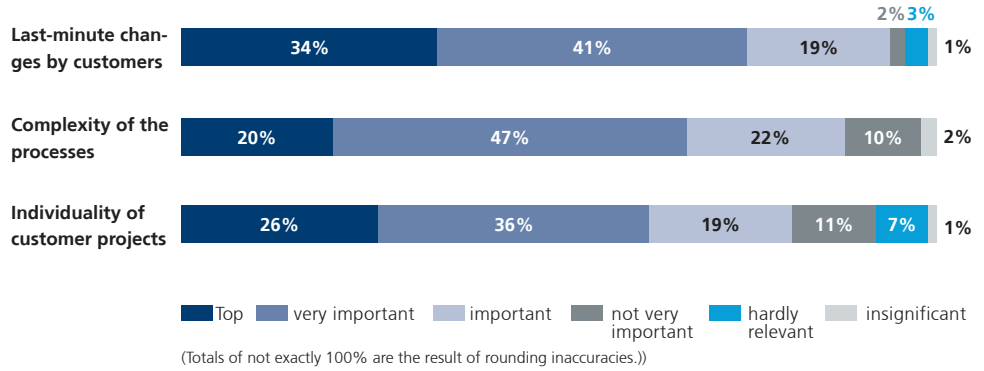
## SYSTEM SUPPLIERS SUFFER FROM LATE CHANGE REQUESTS

The study results confirm some of the special features of the aerospace industry that no company in this sector can escape from:

- > Processes are becoming ever more comprehensive and complex
- > Projects are becoming ever more individual; more often than ever, they resemble unique one-of-a-kind projects
- > Individual design changes happen at a very late stage in the production process and require adequate adjustments by the companies in the supply chain

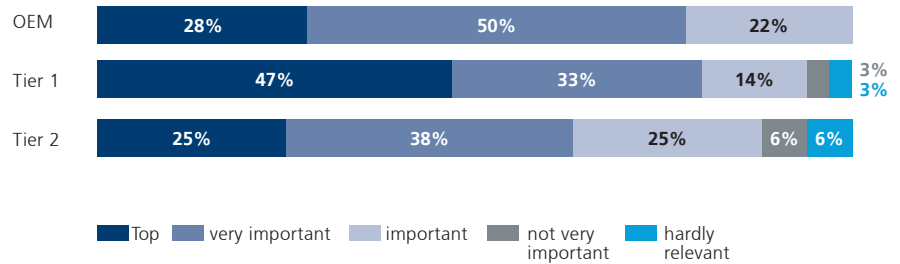
The aerospace supply industry is thus increasingly faced with ever more complex individual projects that require higher management input and control.

### Challenges in operational business

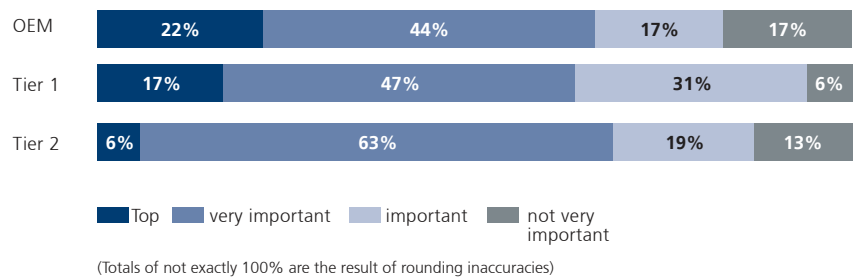


Between 62 and 75 percent of those questioned consider the individual character of each order as very important or even as a top challenge. It is not surprising in this context that Tier 1 suppliers attach significantly greater importance to the two challenges of „Late changes to customer requirements“ and „Individuality of customer projects in the production process“ than the aircraft manufacturers. Because Tier 1 suppliers increasingly appear as system suppliers, any change request has a direct impact on the production process and causes disturbances and changes to their value creation chain. These change requests also have an impact on production of the aircraft manufacturer, but on a much smaller scale. Process complexity is the much greater challenge for them than for suppliers.

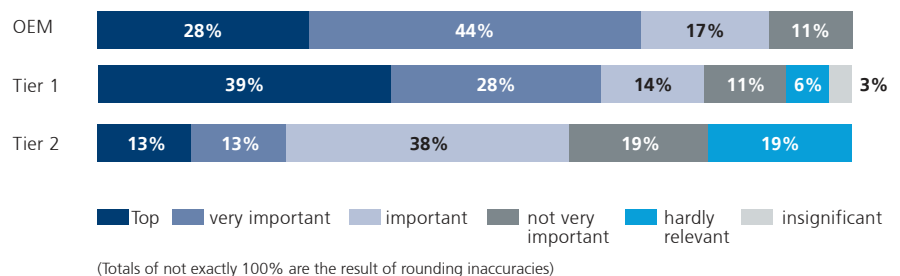
### CHALLENGE: Late changes by customers



### CHALLENGE: Complex processes



### CHALLENGE: Individual customer projects



„We work closely with over 100 airlines and both large aircraft manufacturers. Our customers’ requests are ever more individual and varied. There are planes where we fit up to 50 different versions of a seat type for the respective lay-out.

And many change requests are made ever later, some even in the middle of the development and production process. This results in an enormous complexity for us and requires highly flexible and highly efficient processes.

This is the only way that we can guarantee one hundred percent adherence to schedules as well as an extremely high quality standard. On the way to this, we have undergone complete global restructuring 8 years ago: the complex processes associated with the development of new products are handled in Germany, all subsequent activities take place in our international site in the US, in Eastern Europe and Asia, regionally close to our customers. As part of this restructuring, we have already made many processes more efficient and leaner. However, we need to be far more consistent in aligning everything to the value stream and in optimising our processes“

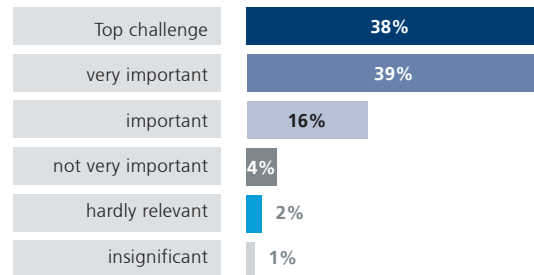
Dr Mark Hiller, Chief Operations Officer,  
RECARO Aircraft Seating



## SHORTER LEAD TIMES GUARANTEE SPEEDY REACTIONS

In the view of the managers questioned, the number of individual and one-off productions projects is on the increase in the aerospace industry. At the same time, airlines increasingly press for a reduction of the time span between placing an order for a plane and its delivery. Aircraft manufacturers and their suppliers have to reduce their lead times accordingly. 77 percent of those questioned saw this as a central challenge (Rank 3 in the overall ranking, p. 7).

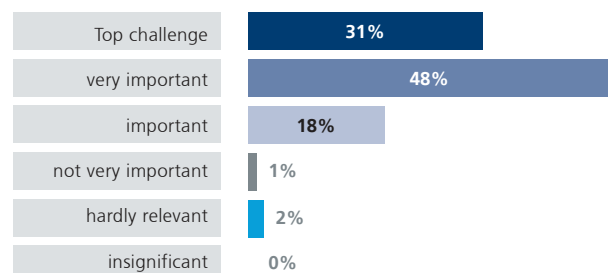
### Customer demands shorter lead times



**CHALLENGE:** “Customers demand ever shorter lead times for the process from receiving a customer order to delivery.”

This is joined by a further challenge: The final assembly at the large aircraft manufacturers takes place on taked lines. This requires a reliable supply of material and components and a consistently high quality standard of all parts. This applies equally to the launch of new aircraft models (e.g. A350) or of variants of already existing models (e.g. A320-NEO range). In order to react speedily to customer requirements, companies have to reduce their material procurement times. Both OEMs and suppliers consider a reduction as crucial for them to react even faster to changes in the future. Four of five questioned (79 percent) see this as a top challenge or as very important (Rank 5 in the overall ranking, p. 7).

### Shorter material procurement times

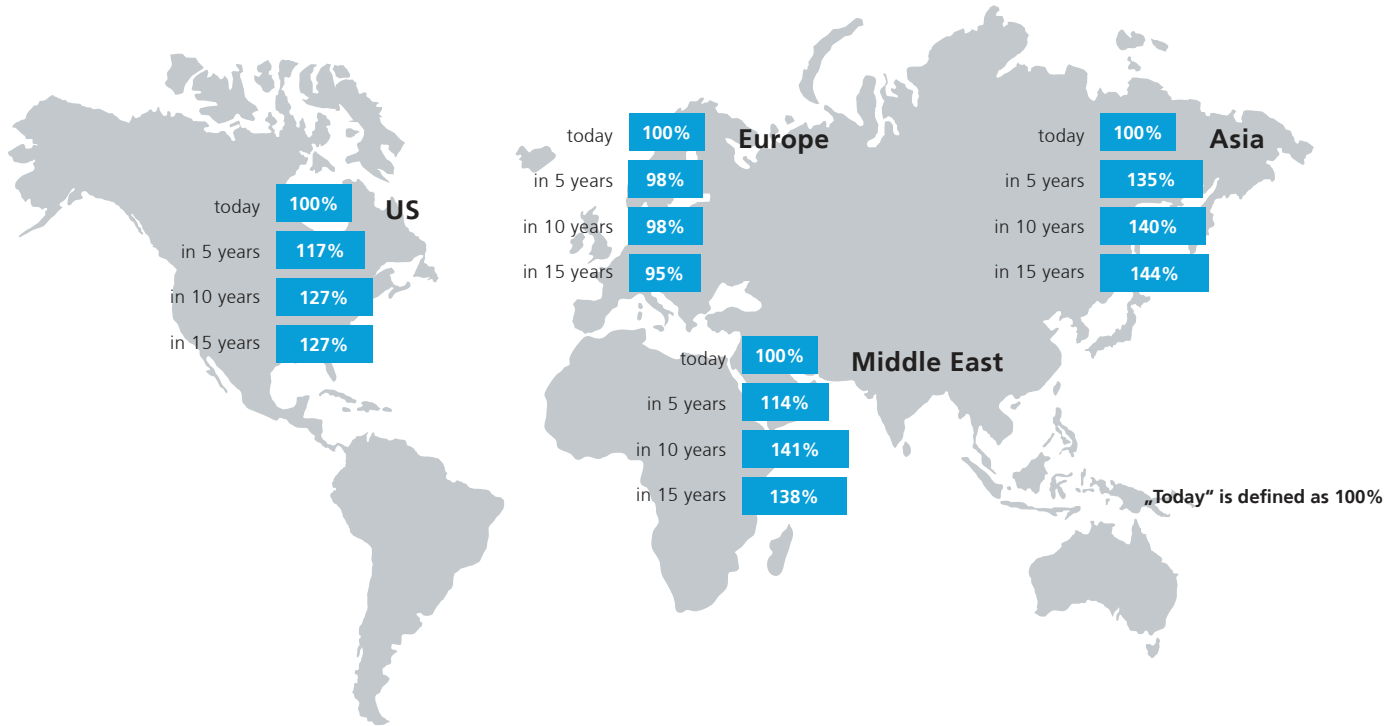


**CHALLENGE:** “Reducing procurement times is becoming ever more important in order to react faster to production requirements.”

# Sphere of activity: Macroeconomics

## THE MARKET OF THE FUTURE IS IN ASIA

“Where are your key markets now and where do you see them in the future?”



Which regions will be the key markets for the German aerospace industry in 5, 10 or 15 years? Those questioned gave a very clear answer. They expect that the European market will remain more or less stable with only slightly lower rates. But for the markets in Asia and the Middle

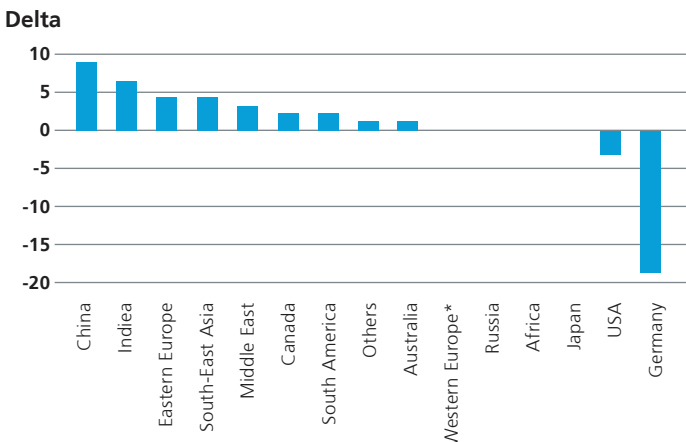
East, they see an enormous growth and correspondingly an increased importance for their company. Only moderate growth is expected for the US market.

## DEVELOPMENT AND PRODUCTION FACILITIES ARE RELOCATED

### Development locations

Relative growth (in % of replies)

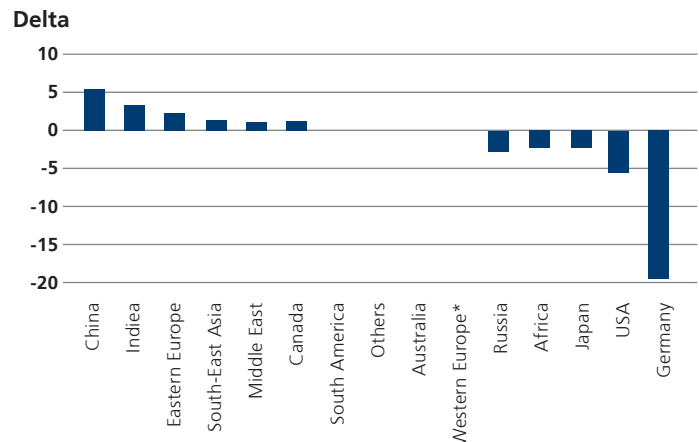
\* without Germany



### Production locations

Relative growth (in % of replies)

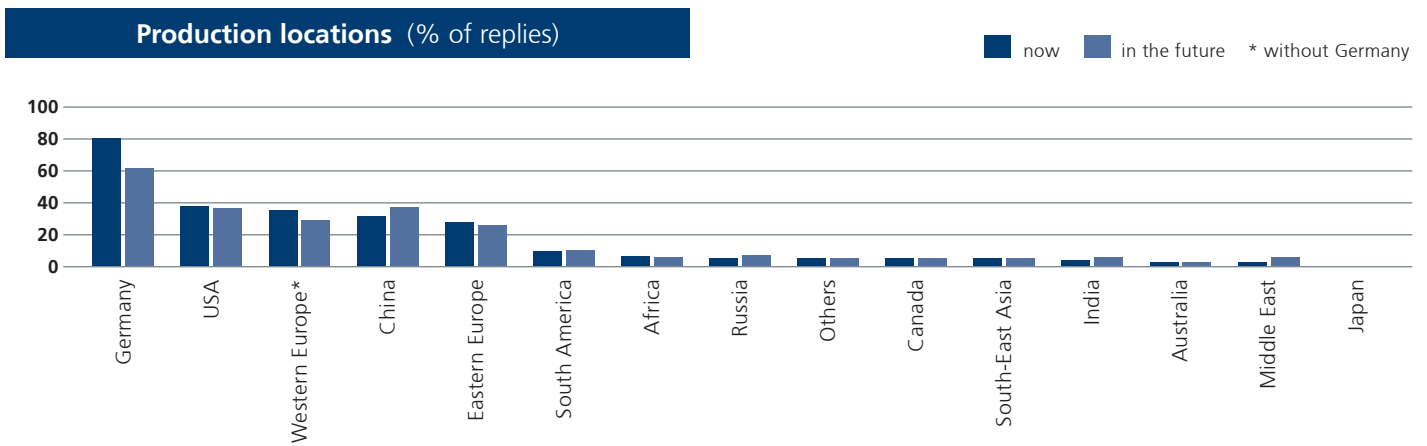
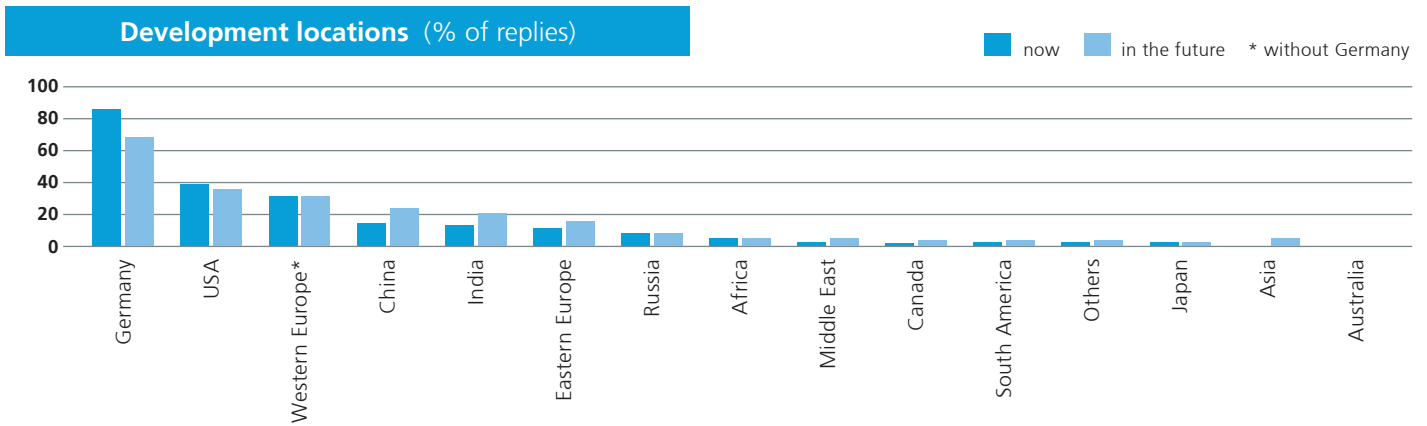
\* without Germany



In parallel with the growing aviation market in Asia, development and production capacities of suppliers will increasingly also migrate East. The survey shows that this trend is almost unstoppable: representation in international target markets is one to the industry’s top challenges (Rank 7 in the overall ranking, p. 7).

Companies still see their main production site in Germany, but almost 20 percent predict a reduction in development and production sites in this country.

## NEW R&D LOCATIONS IN ASIA



Development facilities in Germany and in the US are being reduced, while aviation companies open new R&D sites in Asia. OEMs also consider the future sales market, and suppliers also want to supply new players such as Comac (Commercial Aircraft Corporation of China) and the Japanese Mitsubishi Aircraft Corporation from these locations. India gains in importance, as does Eastern Europe. The role of Western Europe at least as an R&D location remains unchanged.

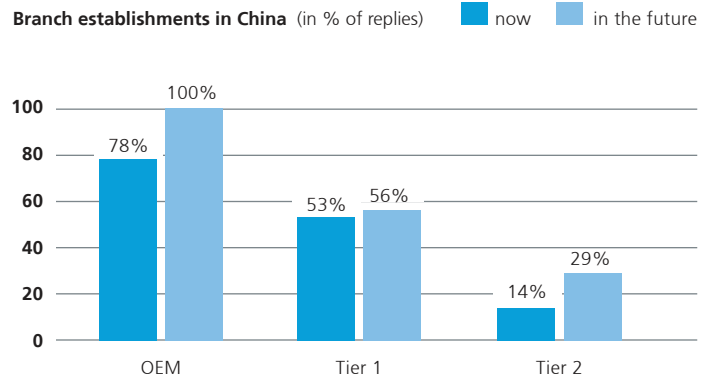
Predictions for productions sites are similar, but with small deviations. In the view of those questioned, Western Europe same as Germany will see a significant reduction in production capacity and thus the closure of production bases. Production will mainly be moved to China and India. In South America, too, the home of Embraer, the companies plan the establishment of production facilities. But the figures show: Germany continues to remain the most important location for the German aerospace industry.

## PROXIMITY TO CUSTOMERS CRUCIAL FOR BUSINESS

Aircraft manufacturers are clear about one thing: they will not be able to do without representation in China in the future and have to expand their capacities in that country immensely. All OEMs plan to set up or expand production facilities in Asia. The situation for suppliers is different. The pressure to establish R&D and production facilities in China depends on their position in the value creation chain. Tier 1 suppliers will only minimally expand their presence in China: even in the future, only about 50 percent plan on having facilities there. For Tier 2 suppliers, there is even less inclination to follow their customers abroad. Only approx. 14% percent of them currently maintain a branch establishment in China, 29% want to do so in the future - after all almost one in three.

Establishing facilities abroad is not primarily a question of costs. Most important is the proximity to customers. It is supposed to ensure good and stable relations, as individual replies in this study show (Rank 20 in the overall ranking, p. 7).

### Site in China now and in the future



„Over the last two decades, the industry has changed from a regional workshop production of one or two aircraft per week to a global small series production of several aircraft per day. Against this backdrop, the German supply industry has to prepare better for the greatly changing market conditions than has been the case before. Only if they succeed will essential parts of the value creation remain in Germany in the future.“

Dr Klaus Richter, Chief Procurement Officer, Airbus Group and Airbus

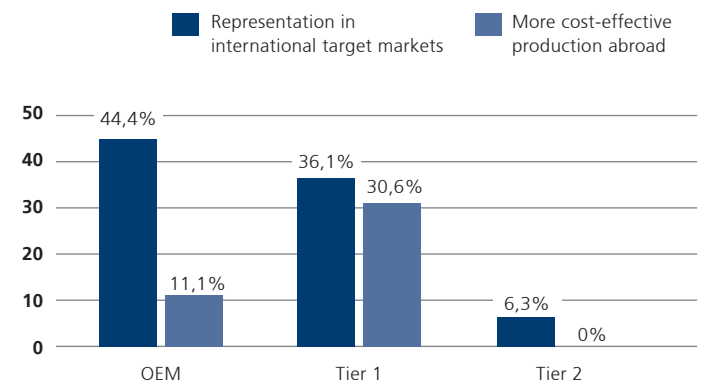


As clearly shown in this study, the reasons for setting up research and development facilities in Asia differ considerably. Depending on their position in the value creation chain, aircraft manufacturers, Tier 1 and Tier 2 suppliers have different views and needs.

For OEM managers, cost savings are less crucial, though not unimportant. Presence in the market and proximity to customers are the crucial factors, though. If you want to do business in China, you have to produce in China.

For Tier 1 suppliers, cost savings and international presence are almost equally important. Approx. 70 percent of those questioned rated both as essential or very important. The picture for Tier 2 suppliers is different. Representational reasons are only of medium importance, cost savings only play a minor role.

### Reasons for activities abroad (Assessed as a top challenge)



# Accepting challenges: Plans by suppliers to the aerospace industry

There was unanimity amongst participants in the survey in one point: The German aerospace industry has to overcome significant challenges in order to maintain its position amongst the big player in manufacturing and supply in the future. The same also applies to OEMs and smaller supplier companies. They all need to scrutinise their production at home and abroad and actively promote change.

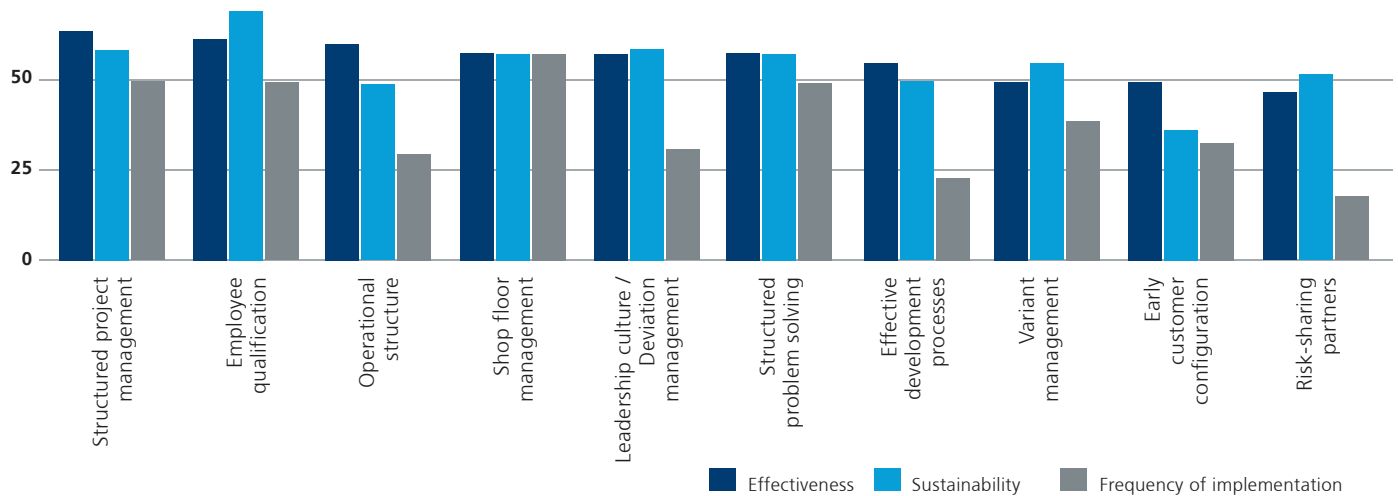
The principles of Lean Management as practised in other industries, particularly the automotive industry, have to be adapted for the aerospace industry. The special features of this industry do not permit a simple transfer. A look at the current situation shows more than clearly that speed in implementation is of the essence, because market pressures have reached all parts of the supply chain.

In the view of those questions, traditional Lean Management methods are very important in this process. Their use can help with the optimisation of processes along the entire value creation chain and with becoming more flexible, cost-effective and faster. However, in many

companies these methods are not yet or not yet consistently enough implemented. Almost every other company has as yet no measures in place for an efficient configuration of their value creation chain. Tier 2 suppliers, in particular, have as yet rarely implemented Lean production methods.

German companies have to be willing to change in order to be prepared for the multiple challenges ahead. The results of this survey point to some optimisation measures of particular effectiveness. Participants in the survey emphasised the following: structured project management, qualification programmes for employees and the implementation of a process-oriented organisation. Measures to improve employee qualification are not only seen as effective, but in the view of more than 70 percent also guarantee the long-term sustainability of the improvement process. Shop floor management is also seen as effective and important for long-term success. Its aim is the consistent assumption of leadership responsibility at the site where value creation takes place, and it is currently the tool with the highest implementation rate.

**Assessment of measures in terms of effectiveness, sustainability and rate of implementation (in % of replies)**



Measures aimed at motivating airlines to an early configuration specification seem to be less successful. Even though companies would welcome this, they do not see a realistic chance for airlines to specify their individual requests at an earlier stage. Customers spending hundreds of millions of dollars on an aircraft can still enforce design changes late in the production process.

A move in this direction means a confrontation with major changes for the traditional organisation. Dealing with all of the tasks ahead will not be possible in only a few months. For that reason, it is even more urgent to set the process in motion now.

Even though the question was an open one, participants in the survey made no further suggestions for tackling their challenges other than traditional Lean Management methods. This can be taken as a clear indication that the next steps are already clearly defined. Their focus is very clearly on project management and process orientation.



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