Horizon shift:

Accelerated disruption in aerospace

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Acknowledgements

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Massimo Bandecchi
Special Advisor – Space Systems Engineering, European Space Agency

Eduardo Bellido
CEO, Thales Alenia Space

Robert Dingemanse
CEO, PAL-V International BV

Hannes Hecher
CEO, Schiebel Group

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Introduction

The aerospace industry, with its long tradition of innovation fuelled by the very particular demands of flight, is no stranger to unexpected challenges and rapid shifts in demand. But the coronavirus pandemic is its toughest test yet – a test that demands new ways of thinking and unprecedented flexibility.

While air passenger numbers have flatlined, demand for global air cargo has outstripped freighter capacity. So passenger airliners are being returned to service loaded with medical supplies in their holds and even on passenger decks.[1]

And as people adapt their family and working lives to lockdown and long-term social distancing, unmanned aerial vehicles (UAVs) – drones – are becoming more and more attractive. Consider, for instance, the value of delivering medical supplies remotely, and being able to disinfect public areas without human contact.

Tech appeal
To survive the crisis, Europe's aerospace industry must try to ensure its short-term resilience while anticipating a resurgence of competitive activity in the longer term. Protolabs' new research suggests that innovation and emerging technology will be essential to those efforts.

More than six in 10 respondents (62%) say that disruptive technologies are making their companies more competitive (see figure 1). They say they are focusing on electrification, autonomous systems, satellites and lightweight materials to drive cost-efficiencies and enable new services. And the majority (58%) expect to see autonomous and electric aircraft in our skies in just a few years' time (see figure 2).

Six in 10 European respondents believe disruptive technology has made their company more competitive

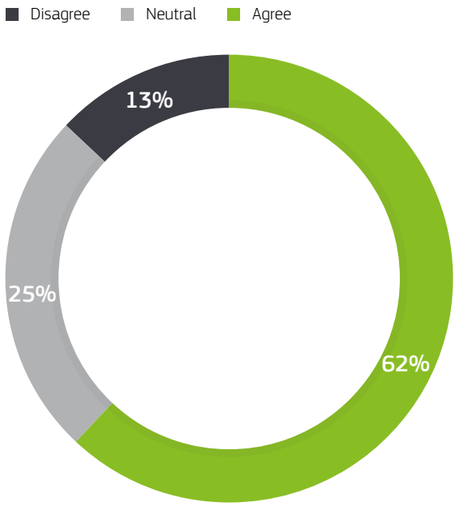


Figure 1. Q: To what extent do you agree or disagree with the following statements? Disruptive technology has made my company more competitive.

Opportunity knocks
The findings indicate that, despite the uncertainty and inevitable concern engendered by the pandemic, aerospace has a bright future. They show persistently high levels of confidence in industry growth before and during the initial phases of the outbreak, in February and March 2020 when the survey was conducted.

That confidence may now be affected by economic uncertainty, but there is still opportunity for new growth. In this study, we look at some of the ways in which the industry can bounce back.

In this first instalment, we look at disruptive technology and its implications for the industry, and ask four important questions:

- **Will disruptive technology give companies an edge?**
- **Which technologies and business models will thrive?**
- **Will this be the era of the drone?**
- **Is Covid-19 a catalyst for disruption?**

1 Inside the massive effort by US airlines to transport medical supplies and mail on cargo-only flights using passenger jets, Business Insider

Will disruptive technology give companies an edge?

The aerospace industry is, of course, closely regulated and tightly controlled, which is one of the reasons consumer electronics evolve more quickly than aviation electronics (avionics).

There is, however, a strong belief in aerospace that disruptive technology gives companies a competitive advantage: the research findings reveal a clear expectation that technology will drive competitiveness. More than six in 10 respondents (62%) say that disruptive technologies are making their companies more competitive (see figure 1).

"We are at the edge of a transition for the European aerospace industry, and disruptive technology is having an impact," says Massimo Bandecchi, Special Advisor – Space Systems Engineering, European Space Agency. "Transitioning from one big costly system to many smaller systems can give us more performance for a lower price. So the range of cost, risk and the overall approach to engineering is changing in favour of smaller companies that can jump into the field."

Compete by diversifying

The proliferation of new market entrants to the satellite business in recent years demonstrates the potential for technology to transform the industry. It has created a competitive environment in which small, cost-efficient satellites are sent into orbit to provide on-demand services to customers.

Covid-19 has of course slowed fundraising in this market, and consolidation is expected in the wake of satellite manufacturer and communication company OneWeb's exit in March 2020.[2] The ability to innovate and implement cost-efficiencies through new technology and lighter materials is becoming increasingly critical.

Aerospace manufacturer Thales Alenia Space is one example of a company that has moved up in the satellite value chain. A prime contractor for satellite payloads in telecommunication and Earth observation, the company has diversified into new areas and customers, such as the launchers domain, the launchers ground segment and stratospheric platforms.

CEO Eduardo Bellido says the company took an innovative and disruptive approach to an unfamiliar market. "Two years ago, a new client asked us to manufacture equipment for transmitting telemetry from satellite launches at a very challenging price," he says. "We had to invent and innovate from zero, looking at the cost of every component, planning for every stage, and considering automation with a completely new mentality. Since then, we have been using what we learned developing that programme, to satisfy clients asking for new ways of thinking, innovation, a disrupting approach, and disrupting technologies."

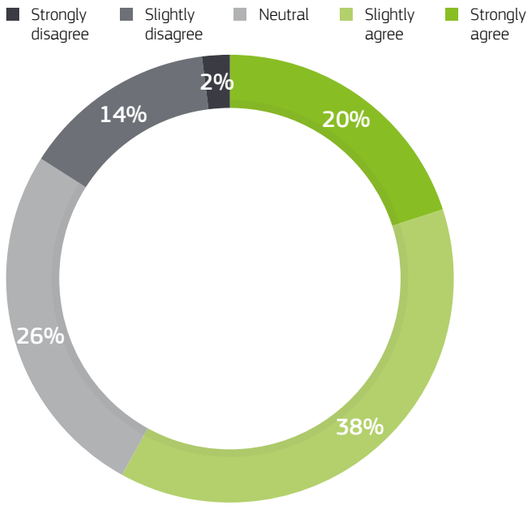
2 OneWeb's bankruptcy may be a sign of things to come for satellite internet, Axios

Which technologies and business models will thrive?

Will autonomous aircraft and on-demand flying eventually be part of commercial aerospace operations? Our survey respondents think so.

About six in 10 (58%) say that autonomous aircraft and on-demand flights are the future of commercial aerospace, while another 58% believe that commercial electric short-haul flights will become available in a few years' time.

Autonomous aircraft and on-demand flights are the future of commercial aerospace



In a few years' time commercial electric short-haul flights will be available

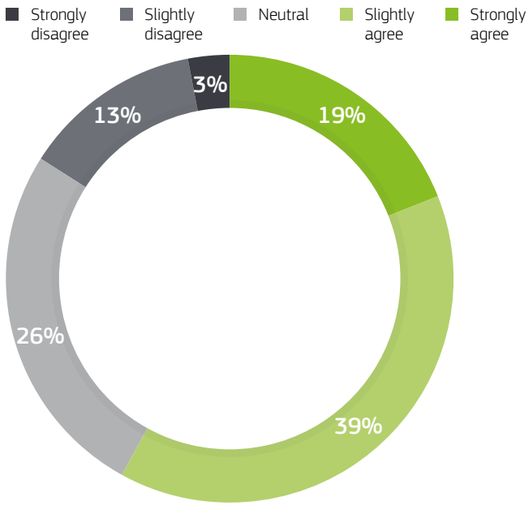


Figure 2. Q: To what extent do you agree or disagree with the following statements?

A new vision of travel

That means we can expect to see major changes to urban mobility. The sci-fi vision of self-guiding aerial 'taxis' depends on careful planning and investment in disruptive technologies, and is probably a way off. But some on-demand services are already within reach.

Today's fixed-wing aircraft and helicopters are fast and efficient, but are expensive to operate. The future of such connections is with lightweight, electric aircraft that are capable of carrying small payloads safely and efficiently.

Dutch firm PAL-V International BV is developing an entirely new category of personal mobility: the flying car, which flies and drives – unlike an electric vertical take-off and landing (VTOL), which competes with helicopters.

"The first market in air mobility will be fly-driving between cities, towns and rural environments," says PAL-V CEO Robert Dingemanse. Operators will be flying between cities using Europe's abundant smaller airfields and airstrips, and then using the same vehicles to drive through urban road traffic. "That's a very new form of mobility," he says, "Which gives people the opportunity to move faster, live somewhere else, or go to their summer home for a weekend instead of for a week."

"There's no doubt that moving goods and providing personal mobility in the air will drive major trends in autonomous operations, distributed propulsion and new ways of flying in the next decades."

Dingemanse notes that when it comes to developing new forms of electric propulsion, there remains a big question: where will the electric energy come from? Existing batteries are still too heavy.

Survey respondents recognise the importance of this question: faster battery charging and battery storage are in the top three technologies they expect to affect the industry in the next three to five years (see figure 3).

European aerospace companies have high hopes for advances in battery technology

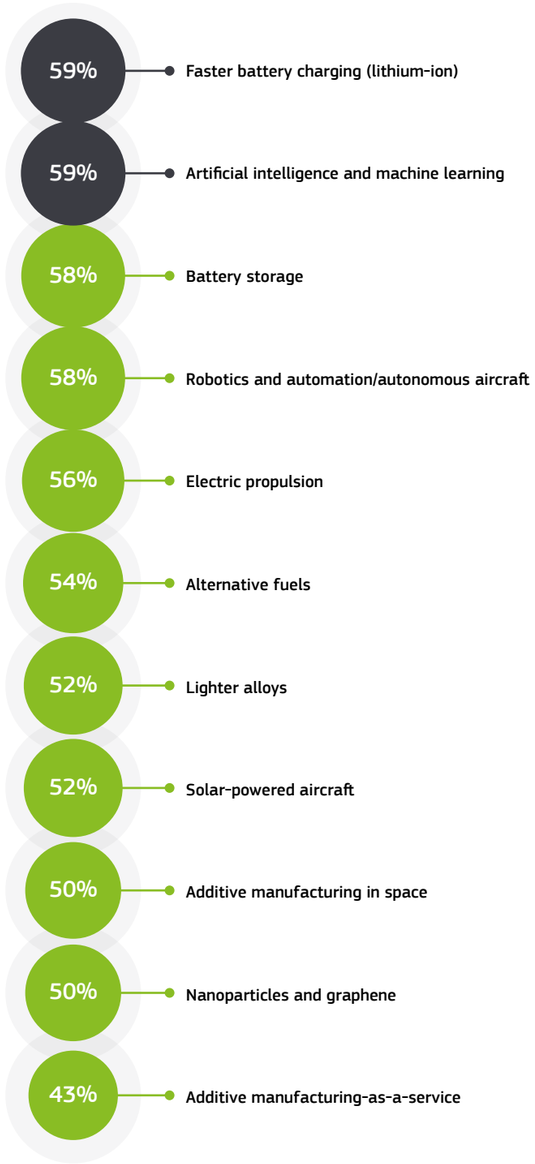


Figure 3. Q: Which materials and technologies do you expect to have the most pronounced impact on the aerospace industry over the next three to five years?

Will this be the era of the drone?

Seven in 10 respondents expect to see a rise in the market for consumer drones over the next two to three years, 67% are confident about the outlook for battery-electric propulsion, and 62% expect to see growth in the satellite market.

These are linked. Expansion of the satellite market and advances in electric propulsion will underpin the growth in alternative aircraft,[3] and enable growth in the drones market in particular.

Today's drones are usually flown with an operator in the loop, a connection to the human controller; the link might be through radio control, wi-fi app or even gesture control, but as soon as operator and drone lose line-of-sight, GPS and data links are mandatory. Think ahead to multiple UAVs operating in the same airspace, and the importance of advanced control and surveillance, and a single, underpinning technology emerges: satellites. No surprise, then, that respondents also expect to see continued growth in the satellite market.

The European drone market was predicted in 2019 to grow from $4.0bn in 2018 to $9.7bn in 2024.[4] And depending on EU legislation and advances in technology, last-mile delivery of products through drones could eventually reach between 7% and 30% of EU citizens.[5]

The survey results support those predictions, with half of respondents expecting commercial drone delivery to become commonplace in Europe in the next three years (see figure 5).

To get there, we need further disruptive development in lightweight materials. Developers are turning for this to additive manufacturing, which enables more flexibility than traditional casting methods.

Hannes Hecher, CEO of Austrian drone manufacturer Schiebel Group, says his company has invested in 3D printing. "We believe that additive manufacturing is hugely important to stay ahead of the curve," he says. "The advantages are increased design freedom as well as valuable weight savings. Every future gram we save on the aircraft allows us to further increase endurance or payload capacity."

3 Electric flight just over the horizon, Roland Berger
4 What is the value of the European drone market?, Commercial UAV News
5 Last mile delivery by drones: an estimation of viable market potential and access to citizens across European cities, European Commission Science Hub

Seven in 10 respondents expect growth in the consumer drone market

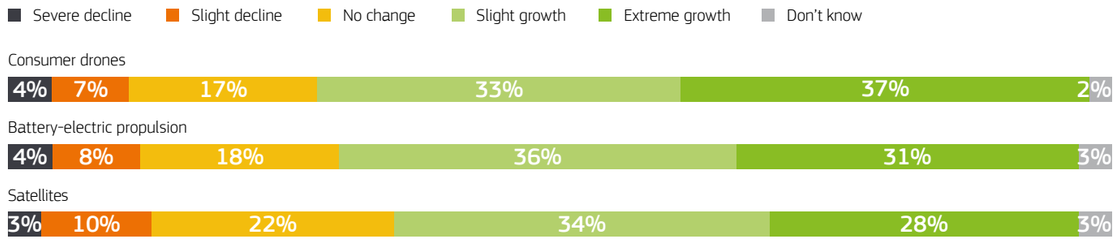


Figure 4. Q: How do you think the market for the following types of aircraft will develop over the next two to three years?

Proportion of businesses that expect the following services to become commonplace over the next five years

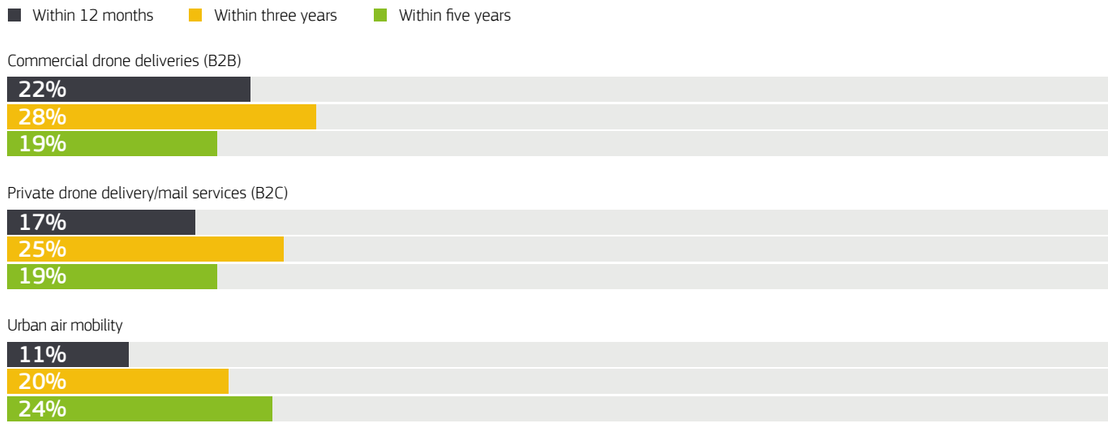


Figure 5. Q: In your view, how long will it take – if ever – for the following services to become commonplace?

Is Covid-19 a catalyst for disruption?

For remote delivery to become commonplace, its usefulness will have to be weighed against the concerns of regulators. That means putting safety first.

PAL-V's Robert Dingemanse is cautious. "We need to ensure that drone operations are restricted and regulated to maintain safety," he says. "The busier the air gets, the more we need to create technology to regulate all operations, but that's being worked on and will follow. I don't see it as the biggest challenge in the future."

The challenges posed by Covid-19 could speed up that process. Our survey findings show that respondents surveyed between March 5 and March 20 were more optimistic about the commercial drone delivery market than those surveyed in the earlier stages of the crisis in February (see figure 6).

Hannes Hecher of Schiebel Group says that the UAV market is on the rise and will continue to increase in importance.

"New applications are constantly being developed," he says. "The current global situation and the need for limiting human contact will push the unmanned market even further."

The crisis has expedited the testing of drones as the public and private sectors look for ways to deliver services safely and contain the spread of the virus.[6] And services such as food delivery by drone are now being tested with renewed vigour.[7]

In the US, applications for drones in response to the pandemic have been granted regulatory waivers by the US Federal Aviation Administration (FAA), which drone companies hope will pave the way for future use.[8] So Covid-19 is providing the stimulus and demand for operators and regulators to explore drone applications further.

Proportion of businesses that expect drone deliveries to become commonplace over the next three years

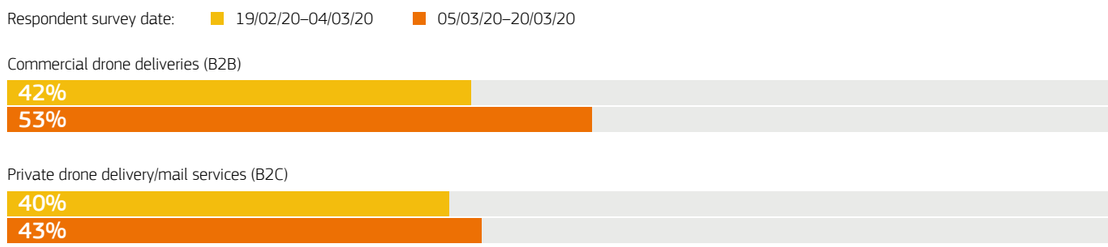


Figure 6. Q: In your view, how long will it take – if ever – for the following services to become commonplace?

6 Robots and Drones Are Now Used to Fight COVID-19, Forbes
7 JustEat is launching Europe's first food delivery service via drone in Dublin, The Sun
8 US regulator grants exemption for drone flight during lockdown, Financial Times

Conclusion: Deal with today, prepare for tomorrow

Drones and innovative modes of air mobility look set to transform our skies and give a boost to Europe's aerospace industry, and their usefulness is only emphasised by the challenges of the Covid-19 crisis.

First, however, the industry and regulators need to consult at greater length on tackling safety challenges and dividing up the airspace. In the aftermath of the crisis, regulatory support will be critical in kickstarting and supporting new business, reviving beleaguered incumbents, and helping the aerospace industry stay afloat.

And it is up to the industry itself to find new use cases and continue to explore the next frontier in technology, where breakthroughs could revolutionise aerospace. Thales Alenia Space, for example, is continuing to invest in technologies such as AI for their potential in several areas linked to the satellite business.

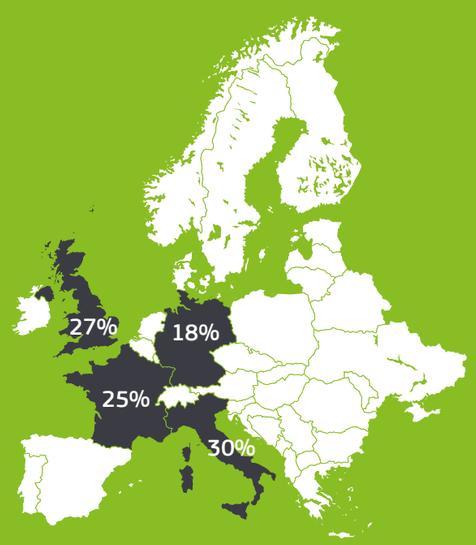
Investment in AI, batteries and electric propulsion will help companies to migrate into the new business models – satellites, urban air mobility, commercial drones – that will gain them an edge in future markets, even in times of crisis.

And it will throw a lifeline to the aerospace industry's vast shared supply chain and increase market confidence at a time when companies are slowing or pausing production, furloughing staff, and striving to keep going in an environment of unprecedented uncertainty.

About the research

The data in this report is based on an online survey of 325 senior executives in the European aerospace industry, which was carried out with Longitude in February and March 2020. We also conducted in-depth interviews with thought leaders and senior executives.

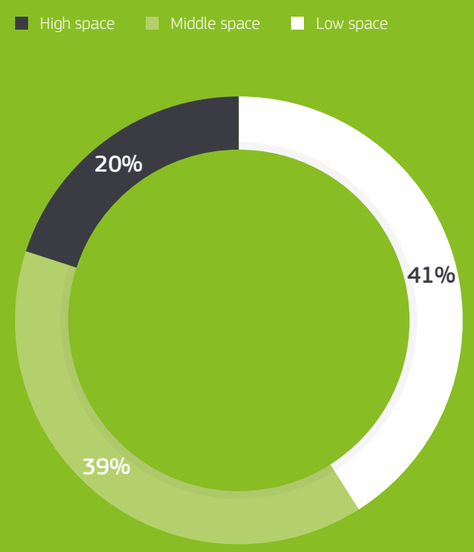
Respondents' countries



Job titles

- Chief Executive Officer
- Chief Operating Officer
- Head of Operations
- Director/VP of Operations
- Senior Operations Manager
- Chief Information Officer
- Chief Technology Officer
- Chief Digital Officer
- Chief Innovation Officer
- Chief Strategy Officer
- Senior Strategy Manager
- Head of Design
- Senior Designer
- Head of Innovation
- Head of IT/Technology
- Director/VP of IT/ Technology
- Technical Director
- Senior Technology Manager
- Chief Engineer
- Head of Supply Chain
- Senior Supply Chain Manager
- Head of Project Management
- Senior Project Manager
- Head of Research
- Senior Research Engineer
- Head of Manufacturing
- Senior Manufacturing Manager

Organisation types

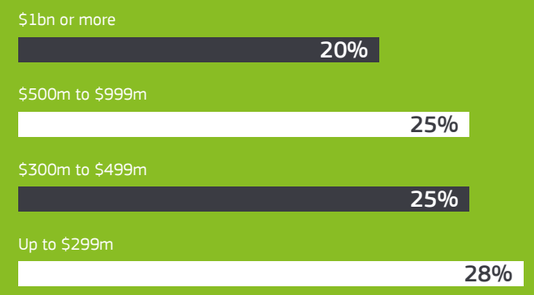


High space = government organisations and not-for-profit organisations involved in aerospace; satellite manufacturers

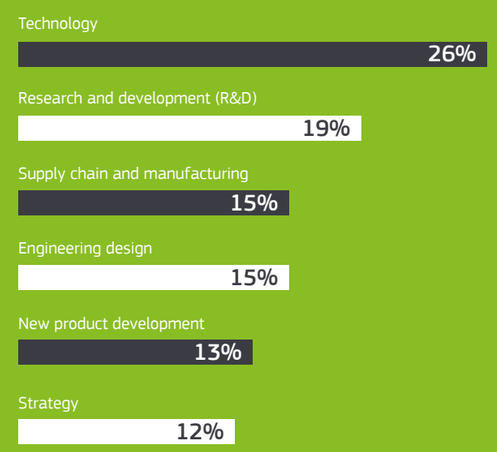
Middle space = aerospace manufacturers; components manufacturers; helicopter manufacturers; defence contractors

Low space = drone manufacturers; automotive with a focus on urban air mobility

Total annual revenue



Job functions



PROTOLABS
Manufacturing. Accelerated.

Northern Europe

Halesfield 8, Telford
Shropshire
TF7 4QN
United Kingdom
P: +44 (0) 1952 683047
E: customerservice@protolabs.co.uk
Protolabs.co.uk

Sickla industrivag 3,
131 54 Nacka
Sweden
P: +46 (0) 8408 391 86
E: customerservice@protolabs.se
Protolabs.se

Central Europe

Kapellenstraße 10
85622 Feldkirchen
Germany
T: +49 (0) 89 90 5002 22
F: +49 (0) 89 90 5002 90
E: customerservice@protolabs.de

Alte-Neckarelzer-Straße 24
74821 Mosbach
Germany
P: +49 (0) 6261 6436 947
F: +49 (0) 6261 6436 948
E: customerservice@protolabs.de

Blauänger 6
82438 Eschenlohe
Germany
T: +49 (0) 8824 91033 0
F: +49 (0) 8824 91033 95
E: customerservice@protolabs.de
Protolabs.de

Southern Europe

Savoie-Technolac
Parc Ouragan Bâtiment C
Rue du Lac Majeur – BP 331
73377 Le Bourget du Lac Cedex
France
P: +33 (0)4 56 64 80 50
E: customerservice@protolabs.fr
Protolabs.fr

Spain
P: +34 (0) 932 711 332
Protolabs.es

Via Biandrate, 24
28100 Novara
Italy
P: +39 0321 381211
E: customerservice@protolabs.it
Protolabs.it