

Announcer: Ladies and gentlemen please welcome Chairman Hochberg and Elon Musk CEO and chief designer SpaceX.

Fred Hochberg: Well we're going to turn up the volume. It's been a quiet conference so far but I think when we brought Elon Musk in here... I had a chance to meet with Elon when actually Scott Schloegel and I were out in San Jose about a month ago and... this is a man who really knows how to push the envelope and change American manufacturing. I kept staring at this car all morning I keep worrying about someone left the lights on because your normal car you'd have to turn the light off pretty fast before you run down the battery but Elon told me that battery could probably last a good month before... so we had a little controversy what to bring into the room. We were thinking about a rocket, we thought about a number of other things that was hard to get in so this was the smallest product we could kind of squeeze into the showroom to get started so... let me ask, when you and I met about a month ago and you just came back from China, you said to me about half your production is going to be exporting so could you talk a little bit about that and how much is going to China and what that looks like?

Elon Musk: Sure... so I actually just came back from China yesterday I was there all week until yesterday evening and... the thing that really surprised me was how positive the reception was for Tesla... going in there I was... I would go in there with some trepidation thinking that there'd be concern about an American car company exporting cars to China and that maybe there would be somewhere between indifferent to slightly hostile but actually I didn't encounter that at all. In fact they were incredibly friendly and supportive including modifying some of their programs which offer electric vehicle incentives to include import electric cars and they actually made that announcement for example Shanghai has this license plate fee that's paid normally for a gasoline car and on the day that I arrived there they changed it to include imported electric vehicles as being... having no license plate fee and so I was just really amazed and... at the positive reception and among the public Tesla is viewed super positively. It was like when I held these customer events to hand over cars it was like... a pop concert I mean it was just crazy. By far the most positive reception of any place I've been. So we handed over the first cars... first Tesla vehicles... production vehicles in China this week to very excited customers and... yeah we expect probably we'll end up exporting half or maybe a little bit more than half of the cars we manufacture in California to... overseas and of that number probably half will go to China alone.

Fred Hochberg: So, so many companies mine included look at exporting after they've saturated the US market you're clearly not doing that so maybe you could talk about back to your early on as you're already going to be exporting close to half your production, could you talk to us about that?

Elon Musk: Yeah I think it makes sense to not to sort of saturate one market before moving to another I mean it's certainly true that we started deliveries in the US well in advance of deliveries to China in fact almost to two years in advance so we started off with deliveries especially in mid 2012 in the US and then a little over a year later started deliveries in Europe and then about eight months after that we started deliveries in China and that was... and later this year we'll be starting right hand drive deliveries for the UK, Japan, Australia and probably South Africa since I'm originally from South Africa I get a lot of complaints about why the hell... the cars are not there but... because like we were getting there.

Fred Hochberg: Some people compare the Tesla to a... somewhat like an iphone on wheels is that the right analogy to make? I have two of them right here but just...

Elon Musk: I mean you just basically get some wheels put that on your iphone and your good to go I mean it's pretty much the same thing... So there are certainly some analogies in that direction that make sense I mean I do sometimes in fact myself refer to it as a computer on wheels... I mean it's more than an electric car it's actually I think a car that's really designed to take advantage of 21st century technology so it's got a 17 inch touch screen display, it's always connected to the internet via cell modem or via Wi-Fi, you can ask for any song anytime just by virtually asking for it so if you hold down the voice button and say "play ring of fire by Johnnie Cash" it'll play it, you could say "play the tea shop sketch by Monty python" anything, like the most obscure thing the car will actually play it on demand. And it just works you don't have to do anything... so... and you can adjust the cars parameters like the ride height of the vehicle, you can... adjust dynamically from the center screen and soon we'll be releasing real time traffic so the cars will collaborate as a networked fleet to optimize the route to your destination. That's going to be pretty exciting and were adding a lot... a whole bunch of functionalities to the car even after you've bought the car it keeps getting better because of added software functionality that we download to it at no charge.

Fred Hochberg: And what makes the US a very good platform to manufacture these and export these from the US? assuming it is a good platform.

Elon Musk: So certainly I've been accused of doing... of that being foolish but I think the... you know I'm someone who believes in manufacturing, I like manufacturing I like making things and I think for some reason that got out of fashion, I'm not sure why but I think if you, if you think of manufacturing not as some boring process of making rogue copies but rather that the manufacturing system that creates the car is itself a very complex machine and just as innovation applies to a bit of the design of ... and engineering of the car, you can apply and should apply innovation to the machine that makes the machine. And you can come up with some really cool new ways to manufacture a vehicle and I also believe in having a tight feedback loop between engineering and production and so if production is far away from engineering you lose that feedback loop and so someone who designed the car in a particular way doesn't realize that it's very difficult to manufacture the particular way that's designed. But if the factory floor is 50 feet away from the desk then they can go out and they can just see it and it's obvious and they can have a dialogue with the people on the floor and likewise a lot of the people in the manufacturing team have great ideas about how to improve the car but if they're far away they can't communicate that to the engineers who designed it. So I think that's it's something that's often neglected but having that strong bi-directional feedback loop between engineering and production is really helpful for making the car better and finding efficiencies and lowering the cost.

Fred Hochberg: Where do you think the strongest market is going to be for your car and also where... its competition might come from?

Elon Musk: Sure so, I think well right now United States is our strongest market and I... you know, long term we might actually sell more cars in China than in the US just because the Chinese market is so huge in fact last year China became the world's largest car market right? And in fact it's disproportionately so for Premium Sedans and they have somewhat of a bimodal distribution with very high demand for premium cars and then a very high demand for economy cars and it was sort of a bit of a dip in the middle. So for example for Mercedes S classes, more than half of all Mercedes S classes last year were sold in China worldwide so it's like two or three times what they sold in the US. So given that that's the basis for things then I would expect just on sheer numbers China is probably larger than the US market over time but that may take a few years to arise.

Fred Hochberg: And what's the... we talked a little bit to people many people in this room may be interested, what would this care sell for here? This one here.

Elon Musk: So the Tesla car starts at about \$70,000 before incentives and with incentives in California it's about \$60,000. And I should say...so one thing that's important to consider though is that the cost of electricity is much less than the cost of gasoline and you also don't have to do smog checks or oil changes or a lot of the things that you would ordinarily have to spend on maintenance for a gasoline car. So the operating costs are much lower and the Tesla Supercharger network is free. So you can go...you have free long distance travel anywhere in the country. So when you net that out it's somewhere in the order of 12, \$15,000 of value. So it's actually like maybe compare apple samples to a gasoline car so maybe like a gasoline car will be mid to high 50's.

Fred Hochberg: And what's the impediment towards...I know you've talked about a car in the 30, \$35,000 range. Is that about cost of batteries, what's the technological breakthrough we've got to get through as a country?

Elon Musk: Absolutely. So the goal of Tesla from the beginning has been to create an affordable and compelling mass market electric vehicle. It...but in order to get there it requires at least three major iterations of technology and it requires very large scale production. So you got to have the economies of scale and you got to have design iteration. This has been true of any new technology of any kind that's really ever been introduced. If you can sort of say cell phones and how they started up you know 'Wall Street One' you had this giant brick...the guys walking down you know the beach are talking to a phone the size of a you know shoe box. And now we've got a phone that's tiny and it's like the power of a super computer and you can buy one for about 100 bucks. So that's gone through many design iterations. With electric cars we are trying to get to mass market in just three major design iterations which is I think about as fast as you could do it. And to get from where we are right now to a \$35,000 price point, there are a couple of things; first of all that car will be like 20% smaller than the Model S. So just a fast

approximation that would drop the cost about 20% for...to achieve the other 30% of cost savings we need to take advantage of the design improvements and their economies of scale. I'm very confident that we can achieve that additional 30% improvement with both of those. In fact I would say I'm 99% sure, yeah. I would be...yeah.

Interviewer: Okay. That's...99 is a good number. Let me ask you, we've done more work with your other company actually, we've mainly been working with our exports but mostly on SpaceX. And we've learnt that about 60% of US commercial satellites are financed actually by the Export-Import Bank and where there has been a great mushrooming of interest. We recently did a transaction with SpaceX for Bulgaria Sat. What's driving this whole...the satellite industry, what's is...I mean obviously it's iPhone's and streaming media but maybe you could give us a little more insight.

Elon Musk: What do you...?

Fred Hochberg: Describing this whole satellite boom that has actually also been a part of SpaceX story and part of what we've been working on. Can you give us some insight on the satellite marketplace?

Elon Musk: Well, I think satellite marketplace isn't quite...I mean the EXIM financing maybe increasing in recent years but the...in terms of the number of satellites it's been relatively steady flow of commercial satellites. There is about roughly 40 large commercial satellites that are launched every year and these are satellites that are used for broadcast communications and in some cases, weather, mapping and we have for Google Maps. But...and this is a whole bunch of satellites of all different types. And yeah so it's been pretty steady you know bad year might be 30, a good year might be 50 something like that. And where it's really important you know...where EXIM is really important is in helping fund the...fund those missions. But actually it's...the money isn't...doesn't go to SpaceX it's really to the satellite operator who wants to upgrade a particular satellite for a particular purpose. And then they will contract with a satellite maker and they will contract with a launch provider and sometimes that's SpaceX. And then they will try to get the lowest cost of funds to fund that and the...EXIM is really important in this equation because...well, the French have this thing they called the Coface which is very aggressive in providing low cost funding. And if we didn't have the American to...EXIM Bank the...it will be very difficult for us to compete on the international market because the French tend to favor their domestic rocket company and they will generally say, "Well, yes we'll provide low cost funding if you use the Ariane Rocket." And so it's really important to have the US in our corner with EXIM Bank to counter the actions of Coface.

Fred Hochberg: And what has changed...I mean I was in preparing for today, in the 1980's there was almost zero commercial satellites launched in the United States. It's now I'm told around 10% and growing. What changed that this has become, is that all SpaceX or..?

Elon Musk: It's mostly SpaceX.

Fred Hochberg: Mostly SpaceX.

Elon Musk: Yeah. So actually before the fall of the Soviet Union, the United States used to launch a very high percentage of commercial satellites. In fact US was the leader in commercial satellite launch but with the fall of the Soviet Union, the Russian rocket industry was able to figure out how to be capitalist really fast. And they...since the USSR invested so much money in rocket technology they actually had really good rockets and arguably the best rocket technology in the world at the time of the fall of Soviet Union. So they were able to completely take the commercial launch market away from the United States. So United States went from...within a course of really just a few years from being the leader in commercial satellite launch to being nonexistent virtually. And then the French with the Ariane with a little bit of help from Germany and Italy, put a ton of money into the Ariane V Rocket. Also a good rocket and then the world commercial launch market then became essentially divided between the Russians and the French. The Russians probably having about three quarters of the business and the French having about a quarter. And that continued on for quite a while until a few years ago when SpaceX started launching their rocket line. And since then we've steadily increased the share of US...US One Missions. And I think we are now about a quarter of all commercial satellite missions are run by a US company...that are run by SpaceX. And I think that's...we've got a decent shot if we you know keep at it of achieving a majority of the commercial launch market...of winning over a majority of commercial launch market. And that's the...you know...yeah. I don't want to count chickens before they've hatched but it's looking increasingly positive that we will probably you know...we'll probably restore the United States to number one on commercial launches in the world.

Fred Hochberg: You also do a lot of work for the US government and the Air Force in the launch area. Could...what...how...what portion of that is your business can you talk to us...it's not really we're on the more commercial side but just to fill it out.

Elon Musk: Well, actually as far as US government launches go, we have a very good relationship with NASA. NASA's been fantastic to work with and really has helped us a lot. And in fact I'm not sure we'd even be where we are today without the help of NASA. So we are very grateful to them. NASA selected us as the primary system for transferring cargo to and from the space station. And so in fact our Dragon spacecraft is the only spacecraft capable of taking any significant cargo down from the space station. So there are a variety of means of getting to the space station but in terms of bringing experiments back which is critical to leverage the value of the space station...our spacecraft is the only one capable of doing that. And I would like to also maybe note that our...we get paid half as much per mission as Orbital Sciences, another provider. And they only take stuff up, they take up less than we do and they take nothing down and they get paid twice as much per mission as we do. But that's okay I mean...

Fred Hochberg: Not for the US tax payers.

Elon Musk: No I think maybe they should get fewer missions in the future but I'm glad that we are able to provide a service that's twice the value for money that our competitor does.

Fred Hochberg: When I was out at SpaceX about a year ago I noticed that you are also developing a recyclable rocket, rocket that actually come back to earth.

Elon Musk: Yeah.

Fred Hochberg: It will be the ultimate recyclable, can you talk to us about that.

Elon Musk: Well this is the fundamental breakthrough that's needed in space transport to fundamentally transform it, because I think what we've done mostly at SpaceX is evolutionary but not revolutionary. We've made a rocket that, in expendable scenario it's better than anything else out there by maybe...like the next best rocket be like 20% to 30% worse in efficiency. So, but that's definitely evolutionary thing, it's not going to revolutionize space flight. To really have a revolutionary impact, we've got to achieve at least an order of magnitude improvement of maybe a two orders of magnitude improvement. And the only way to achieve that is with a full and rapid reusability, but this is a very difficult thing to achieve, in fact a lot of people in the aerospace space industry think it's not possible, and like most have given up on it. But I think it's possible and we recently achieved an important milestone which was to get the boost stage of the rocket to reenter the atmosphere intact, deploy landing legs and achieve a soft landing out in the ocean. So we are first doing this in the ocean to make sure we can land accurately and then hopefully later to see if we will transition to landing it back on land at Cape Canaveral. And then we'll aim to re-fly that, that boost stage probably next year if this year works out and that will really be a massive change in space transport. To give you a sense of the potential there, but the cost of the fuel and oxygen and other sort of expendable liquids in the rockets, you know the cost to effectively fuel it up, is only 0.3 percent of the cost of the mission, so it's...the rocket costs \$60 million, it only costs a couple hundred thousand dollars to fill it up. So the potential is there with the high launch rates if one can achieve full and rapid reusability to improve the cost of the space access by a factor of more than 100.

Fred Hochberg: Any advice, what would you, what could we as citizens do, what could the US government do to make this a better place to support business, to make America even a better place to start a business, you came from South Africa, what else could we be doing to improve that from your point of view?

Elon Musk: And I think the United States is pretty great honestly, definitely the best place in the world to start a business, and particularly if it involves technology. You know I think certainly we need to take a look at our immigration laws if there are really talented people, they are doing graduate courses in engineering at our universities. We really don't want to send them home, we want to try everything we can to keep them here because like for every one person who's like an ace engineer, there are probably like 10 jobs that will be created if that person stays here, it's a huge multiplier effect and conversely if you're missing that special ingredient, you know it's very difficult to create them. I think also we probably need to reform our tax laws because the US corporate tax rate

is really high relative to say the EU. And what, this causes companies to do like you know Apple or Google or SpaceX...SpaceX is a purely domestic company, so....

Fred Hochberg: And we are happy about that.

Elon Musk: Yeah, yeah, so we don't have the ability to play sort of, some tax shell game. But it is tricky like if you had a multinational and you got all these shareholders who are expecting you to maximize profits and you can play the sort of like international tax shell game and you sort of...there is a strong incentive to do so because the US tax rate being, out of whack with almost any other country. What this causes, covers the gap what Google can do is to invest a ton of money in other countries. So this is a big gift that we are giving to other countries, so instead of getting those sort of ace engineers and others to move to the US and create a bunch of jobs here we are actually funding them there to create jobs there. I mean it's quite a nice thing we are doing but it's probably not in the best interest

Fred Hochberg: Overly generous.

Elon Musk: Pretty generous, yeah.

Fred Hochberg: Let me ask the final questions because we've got to wrap up. You have five sons, so it's hard to be a cool dad, what do your kids think is the coolest thing about dad?

Elon Musk: I'm not sure.

Fred Hochberg: The rockets, the cars?

Elon Musk: well, you know they don't seem too excited about these things because they kind of grew up, you know I take them to the factory and it's like is this exciting? They are like, "Oh we've seen it 20 times."

Fred Hochberg: They get more excited

Elon Musk: Really? Yeah, you know maybe they were secretly excited and they just don't want to let on to me but, I do try to get them excited about these things and but, they seem to be like more excited about like if I play a video game with them, that seems to be like their... their favorite thing, but they are only, like the twins are 10 and the triplets are seven, so they are young.

Fred Hochberg: Alright, well thank you, thank you for joining us today, let's give him a round of applause. Super. (Applause)