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**GUEST NAME: PROFESSOR ELIZABETH MAKHATHA – HEAD OF ENGINEERING METALLURGY DEPARTMENT – FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT – UNIVERSITY OF JOHANNESBURG**

<b>SPEAKER</b>	<b>TRANSCRIPTION</b>
DR. MALKA	Hello, I'm Dr. Amaleya Goneos-Malka, welcome to 'Womanity– Women in Unity'. The show that celebrates prominent and ordinary African Women's milestone achievements in their struggles for liberation, self-emancipation, human rights, democracy, racism, socio-economic class division and gender based violence.
DR. MALKA	Joining us on the line today from Johannesburg is Professor Elizabeth Makhatha who is Head of the Engineering Metallurgy Department in the Faculty of Engineering and the Built Environment at the University of Johannesburg. Welcome to the show!
<b>PROFESSOR MAKHATHA</b>	<b>Thank you very much Dr. Malka for having me.</b>
DR. MALKA	Professor to begin with, looking at your resume, it brings to light your long track record of achievements as well as publications in a field which let's say traditionally was categorised as a male dominant sector and has been a barrier for women to enter. Today you hold the position of Professor and in many respects you've become a role model to many young women across the continent to look up to your achievements; firstly, please tell us what made you or motivated you to pursue a career in engineering?
<b>PROFESSOR MAKHATHA</b>	<b>I am a material scientist and this career stems from physical chemistry, I started very young to fall in love in chemistry. I recall when I was ten years going to the hospital with my mother and I was asking a lot of questions at that time and I believe that has been what motivated me to be a material scientist and with my lack of career guidance growing up in the rural Free State, I've always been inquisitive to ask the nurses, are you the ones who are making the medicines and one of the gentlemen they indicated no, we have nurses, we have radiographers, we have doctors and we also have chemists in the pharmacies who are giving the medicine. At that age I wanted to know who is making this, who is coming up with medicine, that's how I fell in love with chemistry, so I went and followed the Bachelor of Science and specialising in physical chemistry. Your question may be then from chemistry how did you become a metallurgist; so I always explain to a lot of people to say physical chemistry, being the study of how matters behave and molecules and atomic levels, how chemical reactions occur; it leads a specialisation in physical chemistry, especially if you have the eager to research and develop potential users for the new materials. That's how I ended up in physical metallurgy.</b>
DR. MALKA	Thank you for walking us through your journey on your progress to enter the space of physical chemistry, material science and eventually to be specialising in metallurgy. Can you tell us about some of the work that you do, specifically in the department, perhaps some of the research projects that you're undertaking?
<b>PROFESSOR MAKHATHA</b>	<b>As a head of department at the University of Johannesburg Metallurgy Department we train metallurgists in two separate streams, I'm coming to answer and give you a perspective of what I do. So when I first joined the university my responsibilities were more in extractive metallurgy, in training students to refine and process minerals, in short I can say it is</b>

	<p>about reclaiming of the metals from the prepared ores. This field of study is more in mining, so whereas then the physical metallurgy is where original metals are being alloyed, they are formed into useful components and they are treated with the heat to get required properties. My research focus is more in polymer fibre composites for automatic parts application and I have also the second project that is still in the conceptualisation stage and this is also still in physical metallurgy whereby we're looking at automotive parts. So this project that I'm working with has a PhD student from CSIR and we are focusing on achieving the skills to have a competitive capacity to cast locally. The nice thing about being a material scientist is the fact that you look at different applications, that is the second project that I talk about, the third that I'm looking into as well working on is the thermo-mechanical processing effect of the micro structural evolution and the mechanical properties of titanium alloys. In that project we're focusing on biomedical applications and we're looking at the demand of the replacement of hard tissues, such as for hip and the knee joints. We all know that if we prepare materials, those materials must be compatible; this is the focal point of our project where we want to have a material which is compatible.</p>
DR. MALKA	The work that you do seems to have such solid practical applications in the real world.
PROFESSOR MAKHATHA	Yes, it does, and this is what we want to have, we want to come up with solutions that suits our Africa, these are the projects which we want the industry to be proud of at the end and South Africa, the country, to be proud of at the end of the day. Even if they take long, even if it involves the students studying, but eventually, if we have plans to reach somewhere, it is going to benefit South Africa. I think it's high time that as Africans, we come up with the solutions that suits Africa more than any other country.
DR. MALKA	You're right, to be able to develop solutions that are appropriate for our continent and besides thinking in the bigger picture of the developments that are happening for the continent, from your perspective, being a woman in a sector which has been traditionally male dominated, are you seeing a stronger intake of young women into the department, whether they're studying material sciences, chemistry, engineering, in comparison to when you first started?
PROFESSOR MAKHATHA	You know in my experience I believe that we are doing well and I think until this far we have taken a lot of students and we have graduated a lot of students, but the challenge I think is the progress; the organisations, I feel that our country and organisations are not necessarily following the progress of those students which we are taking into our systems. Once they graduate they find jobs, after finding the jobs, be it that we funded them, after finding the jobs, we don't follow-up to know where they end; are they staying in the engineering field or are they changing their career paths, it is something that I think that it is not being followed. Not long ago some of our students who I taught years back, they came back, I think two of the female students came back after the experiential learning and one of them was mentioning that no I want to move away from metallurgy and the question that I had was what has happened; the environment was not really conducive for them. So if we can ensure that after graduating them, we're keeping them in the system, especially if the organisations are funding them.
DR. MALKA	Well if you think about the investment that goes into producing a graduate going through their specialisation that one would want to have an economic return on that investment.
PROFESSOR	I believe that it goes to waste if we invest and not follow-up, but like I said,

<b>MAKHATHA</b>	<b>if we don't follow-up with them then we are missing out on the great female engineers that we could have.</b>
DR. MALKA	Yes and when we speak about engineering, when we speak about aspects for the future, we are in the era of the fourth industrial revolution and that will certainly have a monumental impact on the way that we work and the period of discontinuity will require direction setting to shape the near future. We know that technology demands new skills to function and participate in the digital economy, be that 4IR; it has transformed our world and will transform the future working world and thereby create new career possibilities for women. So given what you've just relayed in terms of being able to track or trace women who have concluded their tertiary education and are moving into the business world, how can we ensure that women don't get left behind in this techno-economic revolution?
<b>PROFESSOR MAKHATHA</b>	<b>You know, do you know what Dr. Malka, women have power; we just have to believe it and just have to use the power. I think the tools that women needs to navigate this change are there, generally women have more degrees than men, I think that, together with the so-called soft skills that are naturally in women, if they are recognised and used, we can have women navigating this techno-economic evaluations. We can think about it this way; for women who are in their early years like to have children, I think the fourth industrial revolution could work in their favour in the short-term. They will not have to be faced with kids versus career situation whereby they have to choose, where some companies are losing a talented woman because of that; at some stage women have to choose having kids or staying in the environment and you find that if the environment is not necessarily that much conducive, then as a woman knowing that their biological clock is ticking, you leave the work or choose a different career. I think that the confidence in the industry, I think it's an integral part of the success, so all of the stakeholders must consider the inclusive approach, so for women to be able to work in those environments and again I think it will also help in the situations whereby we feel that gender is overtaking our abilities, so the fourth industrial revolution is going to help a lot of us, only if we are very confident about what we do.</b>
DR. MALKA	And you're right, from an organisation point of view, that if organisations pay attention and I like to think about things from an outputs perspective as opposed to thinking how long someone is on campus for and the number of hours that they're spending within a department, outputs is what matters and if women are able to manage their time effectively and perhaps working remotely, provides part of that solution. The next question that I wanted to ask you and this relates back to the introduction, for instance, when you were talking you said that from a career point of view and I think this would be fair to say for many young people going through the schooling system, we have no idea what types of career opportunities are available and the more we look, the more careers are evolving, so what types of outreach programmes has the department got in place to encourage young people, particularly young women, to pursue careers within the engineering space?
<b>PROFESSOR MAKHATHA</b>	<b>So with this one Dr. Malka, unfortunately at the departmental level we only have a metallurgical students organisation, this is at the departmental level and we have women in engineering for our female staff members at the faculty level. I think it is high time for us to refocus and see how we work with the universities, it is not something that we have done much lately, especially after I took over the position of leadership, not that it was there, but it is something that I think will help us to motivate the young girls and get them to know about the stem fields. I think having the new</b>

	<b>programmes has shifted that direction, that from the direction of the young girls rather to the females who are growing in their career at the faculty at the department.</b>
DR. MALKA	You know from a studying point of view that education is a long-term investment, so the choices you make earlier on in the subjects that you elect at school do have an impact on your future. I'd like to ask you now, what would be your advice to high school girls who perhaps want to follow in your footsteps and enter the field of either chemistry or engineering; what subjects should they be concentrating on?
<b>PROFESSOR MAKHATHA</b>	<b>So I believe that they must first believe in themselves, that whatever they want to be, they can be, if they put their minds to anything that they want to do and build the confidence, it is doable. Mathematics is not a subject for boys, as it is perceived, girls need to or rather let me say it is a must to choose pure mathematics rather maths literacy, without pure maths and physics it would be very difficult for them to...for the girls to, not only the girls, but to enrol in any engineering field and I think the best way to encourage them to pursue opportunities in engineering should start from home. If the society or if the parents can stop asking what kind of a girl are you, fixing cars, playing with computers or fixing phones and so on, I think we will really have the best engineers out of females. I also take...I also believe that taking boys with or taking them along, it will help us to change the environment, the environment in future because in engineering field, as it is male dominated, the treatment is not so good, this is why at the end of the day or we find the female engineers leaving the environments that they studied for, because the males, they have been groomed in a way that they believe girls belongs to the kitchen and as a result the treatment is not good, so if we tag along the boys, we are changing their mind and then we will have a better future, I think, going forward. For me, Dr. Malka, I grew up doing almost everything, me and my brothers we would play outside, we will work with my father, we will work with my mother; being the first daughter but the third born as a family of seven children, I looked up at my brothers and my elder brother had to cook and as I grew up my mother made sure that I worked, even in the garden. So even for girls, maths is not difficult, physics is not difficult, it is a perception.</b>
DR. MALKA	One of the things which really stood out for me in what you've just said is this key aspect of socialisation, of making sure that gender roles are not stereotyped from the onset, that children grow up knowing that there are no differences between whether I'm doing my chores in the garden, whether I'm doing my chores of housework, that these are universal lessons that irrespective of gender, children should know how to appreciate them and that those ideas that they take with them continue to cement in adulthood.
DR. MALKA	Today we're talking to Professor Elizabeth Makhatha who is Head of the Engineering Metallurgy Department in the Faculty of Engineering at the University of Johannesburg.
<b>PROFESSOR MAKHATHA</b>	Prof Makhatha the next question that I wanted to ask you really concerns our issue of women leaders and role models; we know that female role models in society are important sources of influence in the way that women see themselves by being able to identify with these individuals and to emulate them and also in turn how men perceive women. If we think in the discipline of science, some of the great female scientists include the likes of Marie Curie, Katherine Johnson and if we look at aspects of female leadership on the continent we've had Ellen Johnson Sirleaf, former president of Liberia; Joyce Banda, former president of Malawi and Ameenah Gurib-Fakim, former president of Mauritius and from a more current perspective Phumzile Mlambo-

	Ngcuka, leading UN Women, recently sworn in president of Tanzania, Samia Suluhu Hassan and the president of Ethiopia, Sahle-Work Zewde; how do you see the role of female leadership, whether it is in the business world, academic world or government and secondly, how can women strengthen their leadership qualities?
<b>PROFESSOR MAKHATHA</b>	<b>I feel very much motivated by increasing the number of women occupying leadership positions in many fields, however, the challenge is still there, to lead in a context which is male dominated. However, I also believe that the role of female leaders is increasingly influencing and motivating and encouraging young and junior females to rise to the occasion and I can proudly say that I'm one of those who got motivated by other female leaders in the leadership positions, the likes of Professor Phakeng and the previous vice dean in teaching and learning, Professor Esther Akinlabi who used to serve our faculty. I won't lie, working in that space it is not as glamorous at all, I think one needs to be resilient and very determined and by sharing of our experiences and sharing our challenges, our different approaches to different situations or problems that we have encountered, I think that will continuously strengthen other women's leadership qualities, not only that, but to support each other. We may have been classified as not controlling our emotions, but if we look at the women that you have just mentioned, they are very strong, they have visions, they have empathy, perseverance, they have passion, they have also the skills to take the decisions, but one thing that I think we need to build on the most to benefit women in the future is to have the same female leaders in the position to truly truly be in the forefront of creating women empowered workplace, to be part of the decision taking while they are grooming the juniors, however, those junior colleagues they must also be showing the eagerness to grow.</b>
DR. MALKA	So you see this in part of succession planning and development of being able to nurture upcoming female talent and help guide them through mentorship, perhaps, and then onto leadership roles within those respective organisations?
<b>PROFESSOR MAKHATHA</b>	<b>Definitely, growing is a crucial part that we have to look into to make sure that the juniors are not scared by the challenges.</b>
DR. MALKA	Utilising your experience and given what you know today, if you could project in the future, say ten, twenty years down the line, what do you think gender equality will look like for women in South Africa?
<b>PROFESSOR MAKHATHA</b>	<b>Shew, you know, it is very difficult to answer this question and a prediction is not even easy. If I recall well, in 2014, the gender gap report issued by the World Economic Forum predicted that the world will reach gender parity by 2095...</b>
DR. MALKA	...and that's a crazy number.
<b>PROFESSOR MAKHATHA</b>	<b>It is a very crazy number, but you know what, it went further to say, I think in 2018 that focus appeared to have worsened, now we think that the 2095 was a crazy number, but later on the gap was anticipated to close as late as 2135, but then looking at South Africa, there's legislations in place and I think that motivates us to look at the number differently. However, I think the South African legislations in place are, they are well articulated in papers. Women's rights and gender equality will not change any time soon as long as we have this legislation not being implemented and I think, I should say that in my view that is where the challenge is.</b>
DR. MALKA	And perhaps a weakness lies in respect of monitoring and evaluation; we know that companies should be submitting workplace or skills reports that indicate the composition of their workforce, be it gender, be it race and I know that within those documents you also have to indicate a person's level within the organisation, be it junior, be it senior; if we can utilise those monitoring aspects

	to more effect, because those measures exist and then we can hold organisations more accountable for gender representation.
<b>PROFESSOR MAKHATHA</b>	<b>Definitely, I believe so as well, however, you know, with all different layers, women are continuously harassed at work, they are being bullied, be it the lower level or at the leadership positions and that if the organisations are not really taking care of or they are not applying what they are putting on their papers.</b>
DR. MALKA	Like you said earlier, implementation is the key and adhering to it so that all these systems are transparent and we are all judged by the same criteria.
<b>PROFESSOR MAKHATHA</b>	<b>Exactly, so we really have to work hard to ensure that implementation takes place, then we will see a change, we will see a different increase in women in the field...in the stem fields or even in engineering or the leadership positions.</b>
DR. MALKA	Prof Makhatha we are coming towards the end of the show and in this segment I'd like to turn towards some more personal questions and ask you about some of the factors that have contributed towards your success. For instance, some of our of our guests who have reached tremendous achievements in their respective fields talk about hard work, their upbringing or perseverance; in your opinion what are some of the key drivers to your success?
<b>PROFESSOR MAKHATHA</b>	<b>Okay thank you very much Dr. Malka, you know, I believe that hard work, perseverance and upbringing influences a lot of us on a lot of factors that contributes to our success and I'm not a different one, what stands out on my side is the upbringing. My parents really worked hard, as I said that I grew up in a very poor background, but their teaching and strong belief in God helped me to work hard and also persevere to see through and ensure that tomorrow I'm going to be something. My father was working alone and my mother was not working, but both of them, they were not seasoned to tell us how education is the key to success. My mother would even go to the extent of saying that no husband will take care of you than education; that is to us as her daughters. So I really worked hard and I believe that working hard and the upbringing and the fear of God is what brought me to this level. I sold peanuts at school and saved money to buy...to help and take some of the responsibilities to buy some shoes because I grew up having only a pair of shoes to go to school, so hard work was really paying off for me. One of the key drivers to my success was that to hold very dear to my heart is believing in God in every situation that I have been in.</b>
DR. MALKA	You grew up in a family of seven siblings in a rural environment; when you look at the type of environment that you come from one could say it's almost impossible for someone to succeed in your position and here you are today, heading up a significant department at one of the country's leading universities; how did you do it?
<b>PROFESSOR MAKHATHA</b>	<b>You know it was not easy at all, there is this defining moment where my mother passed on when I was in matric; it is a dark moment where a lot has changed. Yes, I have been a dreamer and I wanted to go on and study and I recall saying to my friend at that time that one day I'm going to put my foot at university, I don't know how, but I'm very sure, I'm very determined, I will fly overseas and I'm going to take my siblings out of this poverty and I had hope, but I only...I could only hold fast on the promises that my mother taught us from the Bible. She used to quote the scripture Ephesians Chapter four, verse six to seven, you know in that I remember very well in her absence I would go back to that scripture and read again and again and remember that my mother used to say that you must not be anxious about anything, but in everything by prayer and petition, with thanksgiving, present your requests to God. It was very difficult, but</b>

	<p>having my father and my younger sister who comes after me, I held fast to my dream that one day I'm going to be someone, one day I'm going to register at university, I may not have the funding, I may not have the promises, but something will come up and eventually I finished matric with an exemption, it was not as good as I would have loved it to be, but I passed under all the circumstances, but being from a poor background, I didn't even have clothes, so 1998 I worked as a street vendor in QwaQwa and I was selling the apples, the fruit and vegetables and at the same time I also took a job of selling someone's shoes and the clothes outside, the ones that you hang outside, just next to my fruits and vegies and with the money I would save to buy one pair of shoes, my plan at that time was to buy at least one shoe and the sneakers, a pair of jeans and a T-shirt. So, 1999 eventually I managed to register at university, so all this happened because of that defining moment where my mother passed and left my four year brother, I realised that I have to work hard, my father is struggling with all of us and I was the first to go to the university where I had to excel to get the bursary and I excelled to get the bursary and on top of that I also got a job on the second year, when the first year finished I was offered a research assistant position by my PhD promoter, then I did not even think that I will study to that level and unfortunately in that second year my father's health deteriorated and he was admitted to hospital and he passed on on the second year. It was very difficult, I find it very difficult to hold myself when I share the finer details of how I walked kilometres and kilometres and after eating only one egg, but eventually God made it for me, helped me to finish all my degrees in record time.</p>
DR. MALKA	<p>Thank you for walking us through your journey, there was certainly a lot of pain and tragedy that you experienced, but you truly demonstrated the fruits of hard labour and having a vision to succeed no matter what. If you hold your faith and follow your dreams, it is possible to make them come true.</p>
<b>PROFESSOR MAKHATHA</b>	<p><b>Yes it is.</b></p>
DR. MALKA	<p>Lastly, as we close out the conversation today, please can you share a few words of wisdom or inspiration that you'd like to pass onto young girls and women listening to the show?</p>
<b>PROFESSOR MAKHATHA</b>	<p><b>I'd like to say that there is a saying by Alfred Adler "Follow your heart, but take your brain with you". Women must hold fast in their belief and not let anything to sway them, they must get up, no matter how they feel, they must dress up, show up and never give up. In addition to that I think they must also never tolerate people who are treating them poorly, be it a friend or family member, a partner as well, even a colleague, I think we all are allowed to set boundaries. We also belong where we want to be, not in the kitchen, the future female...the female leaders, there's no time for being apologetic for our femaleness and femininity, we have to continue to work hard.</b></p>
DR. MALKA	<p>Thank you for that great message, it's been a pleasure having you on the show today and hearing your views. Thanks for coming on.</p>
<b>PROFESSOR MAKHATHA</b>	<p>Thank you very much for having me Dr. Malka.</p>
<b>PROGRAMME END</b>	