Walter Curlook
Materials Characterization & Processing Laboratory

Opening Day Speech – Dr. Walter Curlook

CM, BASc, MASc, PhD, DSc (Hons.), DEng (Hons.), PEng

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Dear associates, friends, and family,

Thank you all, for joining me, here, today, to celebrate the inauguration of two laboratories. The University of Toronto has been an attraction to me since I was sixteen and deciding on a university; which thereafter became an important component of my professional career, and indeed of my life.

Over the years, I have followed the expansions and developments of our university, and more recently the rating of our Alma Mater, and of our Faculty of Applied Science & Engineering. I have noted, with great pride, that our Faculty has maintained the No. 1 ranking in Canada and has generally, held 10th place or better, on the world stage. Our reputation is based, in good measure, on the reputations and strengths of our specific departments and divisions, which in turn and most importantly, are largely based on the competence, knowhow, initiatives and progressiveness in research and teaching of you – our professors – and your assistants and supporters. (Yes, bricks and mortar, equipment, administrators, and financial contributors are, indeed, also very important in maintaining and bolstering our reputation; but, in my opinion, it is academic excellence that reigns supreme).

And, I salute all of you for the important contributions that you have made, and continue to make, in pursuing new knowledge and disseminating it to our own students, and the world.

I would like to focus on our Department of Materials Science & Engineering. Back in 1943, Dr. Pidgeon was enlisted as Chair of our, then, Department of Metallurgical Engineering. Prior to that time, the Department was essentially a wet chemical analytical facility geared to analyzing ores, concentrates and metals for industry; and dedicated to delivery of teaching programs related to existing commercial practices and conventional technology, in preparing engineers for industrial careers. Very little, if any, research was being carried out. But Dr. Pidgeon heralded, and brought about, what I would call, a "World Change!"

As most of you know, Dr. Pidgeon was a chemist, a thermodynamicist, an inventor, a man with a vision and a mission, with energy and drive, and with proven competence having invented and developed a novel process of producing magnesium, which on the first blush seemed to defy the Laws of Thermodynamics. The basis of his process was to employ silicon metal to reduce magnesium oxide to magnesium metal, when the Laws of Thermodynamics suggested the reverse would be true. Well, Dr. Pidgeon pulled off what I would call a "trick" on the Natural Laws, by carrying out the reaction at high temperature and under high vacuum, in gas-tight metal retorts, which were heated externally. Although the magnesium vapour produced was at very low partial pressure, by continually drawing it off with vacuum pumps and condensing the magnesium vapour outside the reaction zone, the reaction could proceed to exhaustion of the reactants. It was a batch process. It was a great example of applied science and engineering. This process was of national and international importance at the time, as magnesium was essential to the Allies' war effort. His process was developed before he came to the University of Toronto. And thereafter, Professor Pidgeon was considered to be the "father of academic metallurgical research in Canada."

Professor Pidgeon quickly attracted enthusiastic and highly-qualified graduates and post-doc candidates to join his research groups. (I happened to be his youngest graduate student). Professor Pidgeon focussed research on other metals besides magnesium, specifically on cobalt, and on titanium (the flavour of the times). At the same time, Professor Pidgeon set about building up the other half of the Department by searching for a top world-renowned physical metallurgist / scientist to head up metals research and teaching. He hit the jackpot by attracting Professor Bruce Chalmers from the United Kingdom, who in turn attracted some of the finest Canadian and foreign candidates, such as post-doc physicist Ursula Franklin, a graduate of the Technical University of Berlin who joined Professor Chalmers' group, while post-doc John Runnals joined Professor Pidgeon's group. The focus of Professor Chalmers' group was single crystals, slip planes, dislocations, grain boundaries and semi-conductors.

At that period of time, it was my feeling, and still is today, that with Professor Pidgeon heading up the chemical-metallurgical sectors and Professor Chalmers heading up the physics / metals sectors that the Department of Metallurgical Engineering at the University of Toronto, was probably the No. 1 metals research and teaching institution, in the world!

But alas! After some five years, Professor Chalmers was spirited away by Harvard University. Professor Pidgeon continued as Chair, and ensured staff replacements and further strengthening of the Department by firstly hiring Professor Flengas who was a metallurgist and thermodynamicist from Greece, and followed with the enlistment of Professor Ben Alcock, a world-renowned thermodynamicist from the UK, and of Professor Alex McLean and subsequently of Professor Iain Sommerville, both from Scotland, both experts in extractive metallurgy and applied thermodynamics. In addition, he developed a Canadian talent Professor James Toguri as a top professor of metallurgy, research and teaching, who specialized in applied thermodynamics; to be followed by Torstein Utigard, also a process engineer and thermodynamicist who obtained his doctorate under the supervision of Professor Toguri. What a long line of process metallurgists and thermodynamicists-that was!

The physics / metals side continued strong over the years with Professors Aust, Winegard, Craig, Franklin, with Perovic arriving some years later, and the introduction of new bloods such as Professors Ruda, Erb, Lu, Nogami, and further additions of Professors Hibbard, Hatton, and Singh. A veritable powerhouse!

I would like to say a word about our third half; but since the Laws of Thermodynamics do not accommodate three halves, I will refer to it as our third sector. It straddles our other two sectors to some degree, as well as straddling the wide temperature range from very high as with molten metals and alloys, to low as with aqueous systems, involving metals extractions and refining, metals applications, and corrosion. Professors Thorpe, Coyle, Wang, and Lian have been occupying this territory most ably.

While we can justifiably conclude that our physics / nano sectors can compete worldwide with the very best top half-dozen universities in the world, there is a major repair job to be done in the metallurgy / applied thermodynamics sectors. With the retirement and passing of Professors Pidgeon, Alcock, Flengas, and Toguri, the retirement of Professors McLean and Sommerville, and with the most recent passing of Professor Torstein Utigard, the study of ores and metals processing, along with application of thermodynamics, have been decimated, leaving only Professor Barati, singularly behind, along with a huge task ahead.

It is imperative that the challenge to correct this situation, this huge gap and imbalance, be addressed and met, to bring the whole Department back, up to par with the best.

Other forward challenges for the Department are to institute modern mineral separation research programs, and also to institute vapometallurgy, as promising laboratory research disciplines, both of which could possibly / eventually foster commercial operations.

I thank you for this opportunity to express my opinions and suggestions, and for your kind attention.