

PCB shops in Brazil: Are you kidding me?

by Renato Peres
CIRCUIBRAS



Let's face facts: Who would ever think of listening to an opinion about the PCB industry coming from someone in Brazil?

In 2011, when I first came to the U.S. for a training session at an electrical test company, I heard things like: "Brazil is bigger than Texas? WOW!" and "Brazil is almost the same size as the U.S.?" and even this: "Are there cockroaches the size of my hand in Brazil?" People were also very curious about the location of places like Rio de Janeiro and the Amazon rainforest.

It wasn't any better when I went to a PCB show in Suzhou, China, two years ago. The Chinese people I talked with said they had never heard of Brazil.

Brazilian Economy: Briefing

Brazil is the fifth-largest country and the fifth most-populated nation in the world, with approximately 205 million inhabitants. The country ranks among the top 10 richest countries in the world, but its future is not so clear.

Economic Outlook - Brazil					
Subject Descriptor	Units	Scale	2014	2015 ⁽¹⁾	2016 ⁽¹⁾
GDP, current prices	U.S. dollars	Billions	2,346.58	1,799.61	1,672.90
GDP per capita, current prices	U.S. dollars	Units	11,572.70	8,802.17	8,117.65
Total investment	Percent of GDP		20,030	18,032	16,681
Unemployment rate	Percent of total labor force		4,842	6,598	8,570
Population	Persons	Millions	202,769	204,451	206,082

(1) IMF staff estimates

Source: International Monetary Fund, World Economic Outlook Database, October 2015

Table 1: Economic Outlook—Brazil.

Brazil GDP Breakdown by Sector - 2014

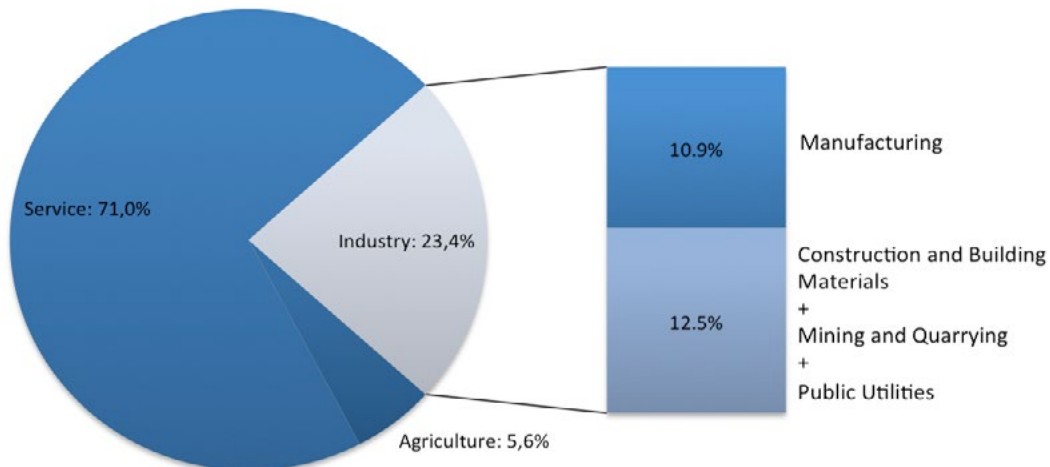


Figure 1: Brazil GDP breakdown by sector, 2014.

ELECTRONIC INDUSTRY REVENUE (US\$ million)	2014	Var % ⁽²⁾	2015 ⁽¹⁾	Var % ⁽²⁾	2016 ⁽¹⁾	Var % ⁽²⁾
Computers	15,993	-26.6%	9,602	-40.0%	7,594	-20.9%
Telecommunications	12,567	1.7%	8,677	-31.0%	7,372	-15.0%
Industrial Equipments	10,922	0.0%	8,121	-25.6%	7,041	-13.3%
Household Appliances	8,715	0.9%	5,522	-36.6%	4,574	-17.2%
Electric Power Generation, Transmission and Distribution	6,685	-11.0%	4,733	-29.2%	3,861	-18.4%
Electric & Electronic Components	4,404	-11.1%	3,084	-30.0%	2,587	-16.1%
Electrical Installation Material	4,115	-6.2%	2,532	-38.5%	2,023	-20.1%
Industrial Automation	1,921	-5.0%	1,355	-29.5%	1,166	-13.9%
Total	65,322	-10.0%	43,628	-33.2%	36,218	-17.0%

(1) Estimates updated on December 2015

(2) Comparison with the previous year

Source: ABINEE (Associação Brasileira da Indústria Elétrica e Eletrônica)

Table 2: Electronic industry revenue, in US\$ million.

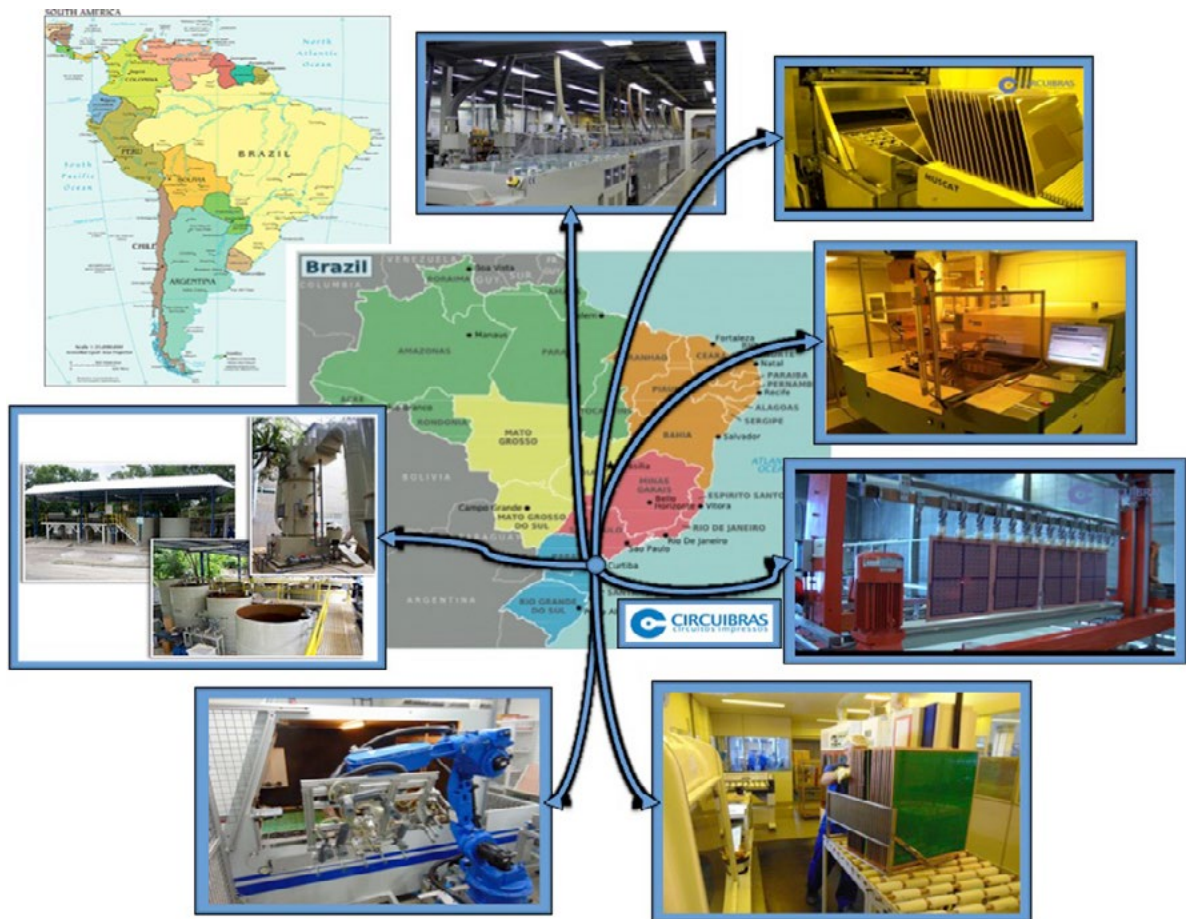


Figure 2: Brazil—The Circuibras facility and location in Brazil.

Brazil is heading toward one of its toughest recessions in the recent history, mainly due to political instability.

Abinee, the Brazilian Electrical and Electronics Industry Association, estimate a drop of 10% in real income (RS) in 2015 compared to 2014,

and 6% in 2016, compared to last year. This industry is responsible for approximately 2.5% of the national GDP and it is divided into eight major segments as shown in Table 2.

The bad news is that there are enormous challenges Brazil must conquer to survive in

this arena. The good news is we are ready for battle.

What's the point of following this column?

Although Brazilian PCB manufacturers' revenue represents a small share of the country's GDP, and consequently has no big influence worldwide, we deal with some of the biggest players in the international electronics industry.

Quick-turn production, small- and medium-size batches, high-tech PCBs, severe environmental laws, lack of a specialized labor force and lots of customer requirements, are just some of the issues we need to deal with in our everyday lives.

My goals for this new column—Made in Brazil—are to present Brazil in a different way from the one I was introduced to when I was abroad, and to share the knowledge I have gained in the PCB industry during the last, almost 10 years I have been part of the Circuibras team, working and leading people in different areas—electrical test, drilling, routing, lamination, process engineering, dry film, AOI and visual inspection.

Going forward in this column, I will write about process and industrial engineering, as well as management and leadership, from a Brazilian worldview.

In my next column, I will bring some news on process engineering: what customer demands we face and why you should care about it, and I will also discuss DMAIC, a powerful tool that may help you improve your processes.

It is going to be a pleasure to offer my insights, and I hope to hear from you, learn your thoughts and talk about the thing that challenges us every day: printed circuit boards.

I hope you enjoy it! **PCB**

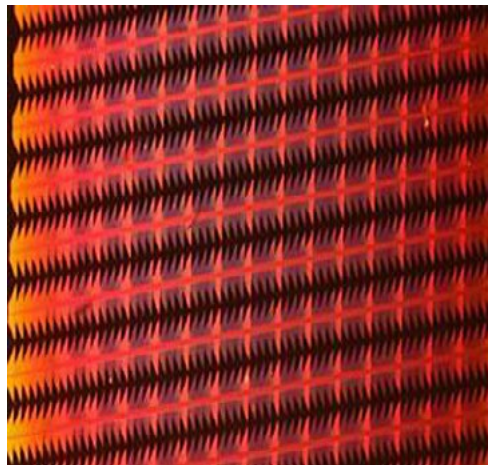


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Physicists Promise a Copper Revolution in Nanophotonics

Researchers from the Moscow Institute of Physics and Technology (MIPT) have for the first time experimentally demonstrated that copper nanophotonic components can operate successfully in photonic devices. Copper components are not only just as good as components based on noble metals, but, unlike them, they can easily be implemented in integrated circuits using industry-standard fabrication processes. "This is a kind of revolution—using copper will solve one of the main problems in nanophotonics," say the authors of the paper. The results have been published in the scientific journal *Nano Letters*.

The discovery, which is revolutionary for photonics and the computers of the future, was made



by researchers from the Laboratory of Nanooptics and Plasmonics at MIPT's Centre of Nanoscale Optoelectronics. They have succeeded, for the first time, in producing copper nanophotonic components, whose characteristics are just as good as that of gold components. The scientists fabricated the copper components using the process compatible with the industry-standard manufacturing technologies

that are used today to produce modern integrated circuits. This means that in the very near future, copper nanophotonic components will form a basis for the development of energy-efficient light sources, ultra-sensitive sensors, as well as high-performance optoelectronic processors with several thousand cores.