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Área de Pesquisa:
(2) CIÊNCIAS EXATAS E DA TERRA, ENGENHARIAS

LEIA ATENTAMENTE AS INSTRUÇÕES

- ☑ Esta prova é constituída de um texto técnico-científico em língua estrangeira, seguido de 5 (cinco) questões abertas relativas ao texto apresentado.
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Ingenious: John Ochsendorf

Meet the architectural rebel who champions ancient engineers.

BY COURTNEY HUMPHRIESPRODUCED BY JOHN STEELEMAY 28, 2015

John Ochsendorf is a professor at the Massachusetts Institute of Technology whose work is devoted to understanding buildings of the past. An expert in masonry vaulting, he's made a career of studying a style of construction that began millennia ago and practically disappeared with the Industrial Revolution.

I met Ochsendorf in a nondescript lab on campus where a model of Rome's Pantheon rested on a table. "I think the Pantheon is probably the greatest building of all time," he says, and he hopes to use the model to demonstrate that the real building is stable enough as it is—even though it's weathered and cracked—without the need for modern-day interventions like steel reinforcing.

Ochsendorf, a MacArthur "Genius" Fellow, isn't entirely comfortable in the spotlight; he says he'd rather ask me questions than talk about himself. His humility stems from his upbringing in a small town in West Virginia, where he was raised in a household with no TV and shelves of books, surrounded by artisans who built their own houses, fiddles, and banjos.

While so many scientists and engineers want to talk about the future, Ochsendorf advocates looking back. It's not that he's nostalgic about ancient builders. Rather, he says, "I'm in awe. I think they accomplished things that we would struggle to accomplish today."

In conversation, Ochsendorf is eloquent and passionate. Our talk ranged from his view that great engineering should be viewed with the same reverence as art, to his conviction that today's engineers are subjecting ancient structures to needless fixes. As we spoke it became clear he is bent on changing the status quo.

Interview Transcript

Explain what this model is behind you.

Yes, this is a 3D-printed model of the Pantheon. I think the Pantheon is probably the greatest building of all time. It was an incredible leap forward at the time in construction, and the clear span on the interior wasn't surpassed for around 19 centuries, so this was an incredible achievement in construction in its day. There's an open question today about how safe the Pantheon is, particularly with earthquakes. So here, we've made the world's first 3D-printed structural model of the Pantheon. This is a 1:100 scale model, which allows us to study the collapse conditions and to really estimate the limits of stability so that we can have greater confidence in the safety of the Pantheon. It's been there for 2,000 years; we don't think it's going anywhere but we want to be able to prove it.

What's the difference between a great ancient building and a modern one?

Well, traditional buildings and stone and brick and masonry, they stand because of their geometry; and the way builders conceived them was really through their geometry. When we design structures today we really rely on the strength of the material to a huge extent. So when we design structures of steel or reinforced concrete, we're working the material much, much harder; so we're stressing it up to much closer to its safety limits.

Old masonry buildings are stressed very low, and so the fundamental issue is that we had knowledge accumulated over centuries, or even millennia, which with the Industrial Revolution was essentially thrown out and we don't really build like that anymore. Engineers are taught today in universities that there are really two dominant materials—steel and concrete—and so when they come to an old structure, too often we're trying to make old structures conform to the theories that we learned for steel and concrete; whereas it's more useful generally to think of them as problems of stability and geometry, because the stresses in these monuments are very, very low. At root, the fundamental issue is that we've lost centuries of knowledge, which has been replaced by other knowledge about how to build in steel and concrete. But today's knowledge doesn't necessarily map easily onto those older structures. And if we try to make them conform to our theories, it's very easy to say that these older structures don't work. It's a curious concept for an engineer to come along to a building that's been standing for 500 years and to say this building is not safe.

What's wrong with strengthening a historical building with steel beams?

We could put a bunch of steel in and make an old structure behave in a new way, and in fact we do it all the time. Engineers do it all the time. But I would argue that that's not our role as engineers working in the context of preservation, and that we diminish the work of engineering if we change its behavior. So as much as possible, we try to remain true to the original constructive intent and that means that an arch made out of bricks should work as an arch made out of bricks—it shouldn't have carbon fiber or epoxy hidden inside of it with bricks glued on to the outside of it, right? And obviously that's a philosophy of preservation and people can have different philosophies, but what I most want is for us to have a debate about what is appropriate for an engineer to do when approaching a structure that's more than a century old and where we have an obligation to think beyond our own lifetimes when we intervene.

Adapted from: http://nautil.us/issue/24/error/ingenious-john-ochsendorf

EM HIPÓTESE ALGUMA, SERÁ CONSIDERADA A RESPOSTA NESTE CADERNO.

Depois de ler o texto, responda as questões a seguir em português.

QUESTÃO 01 – John Ochsendorf é professor no Instituto de Tecnologia de Massachusetts. Diga qual sua especialidade e explique a razão pela qual enquanto muitos cientistas e engenheiros querem falar sobre o futuro, ele prefere olhar para o passado.

QUESTÃO 02 – Por que Ochsendof considera o Panteão o maior edifício de todos os tempos?

QUESTÃO 03 – Qual a finalidade da criação do modelo estrutural do Panteão em 3D?

QUESTÃO 04 – John Ochsendorf faz um comparativo com relação aos materiais e a segurança de edificações antigas e novas. Explique.

QUESTÃO 05 – John Ochsendorf segue uma filosofia preservacionista e faz críticas à forma como os engenheiros intervêm em edifícios históricos. Cite dois de seus argumentos.